# Nudging towards Sustainability

A study of the drivers of pro-environmental behaviour and the effect of nudges to overcome barriers for sustainable consumption

# MASTER THESIS

Authors: Laura Plank - 106287 Laura Ekholm Axters - 106621

Institution: Copenhagen Business School MSc in EBA – Brand and Communications Management Supervisor: Jesper Clement

Date: 17th September 2018

> Pages: 105 STU:213.078

# ABSTRACT

The environment is facing considerable challenges. Due to the ever-growing population on the planet - soon to reach 9.6 billion people - food production must keep up to satisfy the increasing demand. Combined with the growing affluence of major parts of the population, a significant rise in demand for meat has been noticed. However, meat production has a devastating effect on the environment, predominately through the resource-intensive breeding and high methane emission of cattle.

Meat consumption is deeply ingrained in cultural and habitual consumer behaviour, making it very difficult to change. Thus, to ensure the planet's well-being and limiting the environmental impact of consumer diets, researchers seek to understand the underlying drivers of pro-environmental behaviour and how to overcome barriers to behave sustainably. Unfortunately, the efforts to change unsustainable behaviour have shown limited success thus far.

This research investigates the underlying factors for engaging in pro-environmental behaviour - specifically that of buying less meat - by making use of the Motivation-Ability- Opportunity-Framework by Ölander and Thøgersen. At the same time, the effect of nudging as intervention strategy is explored.

The research setup was twofold. Through an online experiment simulating a supermarket setting, we asked participants to shop groceries for dinner. Following this, measurements of prevalent motivation and ability to shop meat-free were carried out through an enclosed questionnaire. Additionally, the experiment included four different conditions to test the effect of an ease and convenience nudge, accounting for an increased opportunity, and disclosure nudge on meat choice.

Our research found that the underlying barriers to decreasing meat purchase are habits and positive meat attitudes. Further, we found that through simple nudges, meat purchase can be decreased substantially at the point of sale. The implications of this research are considerable: by employing nudges at the point of sale, sustainable behaviour can be enhanced, and environmentally harming attitudes and habits potentially overcome.

# Acknowledgements

We would like to thank our families and friends for supporting us through this journey and always providing us with support and inspiration.

Further, we thank our supervisor Jesper Clement for his continuous support, advice and space for our own ideas.

To the reader: We hope to shed a light on pressing challenges of today and make you aware of the impact of your single and everyday actions. We have personally gained much awareness through our work and hope that our research will help in moving forward a shift towards sustainable lifestyles.

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# LIST OF ACRONYMS

MAO- Motivation-Ability-Opportunity Framework
TRA- Theory of Reasoned Action
TPB- Theory of Planned Behaviour
FAO- Food and Agriculture Organization (UN)
UN- United Nations
Defra- Department for Environment, Food & Rural Affairs (UK)
VBN- Value-Belief-Norm Model
VIF- Variance Inflation Factor
SDG - Sustainable Development Goals
CAGR- Compounded Annual Growth Rate
AIC- Akaike Information Criterion
NEP- New Environmental Paradigm
DSP- Dominant Social Paradigm
PEB- Pro-environmental Behaviour
SCP- Sustainable Consumption and Production

### **1. INTRODUCTION**

#### 1.1 - Sustainable consumption and the role of meat

Our environment is facing considerable challenges. While the world's population is growing at an alarming rate, with an expected population of 9.6 billion people by 2050 compared to 7 billion in 2012 (Ranganathan, 2013), the question of how to guarantee food security is becoming prevalent. To match the growing demand, food production has seen a worldwide growth of approx. 50% since 2013 (FAO, 2017).

The impact of a growing population on the environment is summarized in the IPAT formula (I=P x A x T) by Holdren and Ehrlich (1974, found in Thøgersen, 2014), where the environmental impact (I) increases as the population (P) and affluence per capita (A) grows.<sup>1</sup>

As predicted by the formula, in addition to the growing population, diets have seen a dramatic change due to increasing life standards and affluence in developing countries (York & Gossard, 2004), leading to a rising intake of dairy and meat products. According to the Food and Agriculture Organization of the UN (FAO), a continuation of current rates would lead to an 85% increase in global meat consumption by 2050 compared to 2005-2007 (Bruinsma, 2009, found in Spiller & Nitzko, 2014). This poses another challenge, as meat and milk products have a higher impact on the environment than plant-based diets (Ranganathan, 2013). In fact, according to Scarborough et al. (2014), meat-eaters in the UK contribute around 48 % more to GHG emissions than fish-eaters, approximately 52 % more than vegetarians and 100 % more than vegans, proving that diets based on animal products have a considerably higher environmental impact than plant-based diets. This is due to the fact that the conversion of plant protein into animal protein is highly energy inefficient (Graham & Abrahamse, 2017). According to Peters et al. (2007, found in Spiller & Nitzko, 2014), 31m<sup>2</sup> of land are needed for 1000 kcal of beef, while 1000 kcal of cereals only need 1.1m<sup>2</sup>. Thus, an ever-growing area of agricultural space is being used for animal feed, where excessive fertilization, overgrazing and land degradation are only some of the consequences (Sutton & Dibb, 2013). The total agricultural environmental impact accounts for nearly one-quarter of

<sup>&</sup>lt;sup>1</sup> The variable T refers to the technology, which is needed to convert resources into goods

global greenhouse gas (GHG) emissions, uses 70% of freshwater and 37% of the world's landmass (Ranganathan, 2013). Of all agricultural land, the production of animal-based food uses 70 % (WWF, 2013) and is responsible for 80% of all emissions associated with the creation of food products (McMichael et al., 2007). Thus, livestock contributes 15 % in direct global GHG emissions (Macdiarmind, Douglas, & Campbell, 2016). The main reason behind this is generation of methane and nitrous oxide by livestock (Graham & Abrahamse, 2017), which are both harmful greenhouse gases.

At current and future production rates, the environmental impact of meat production is enormous and eventually must shrink to minimize the effect on climate change.

Consequently, demand for meat products has to decrease, and sustainable consumption needs to be promoted. While vegetarianism and veganism are on the rise as countertrends, flexitarianism has become a popular alternative to strict meat-free diets (Kenward, 2017):

"Flexitarianism or casual vegetarianism is an increasingly popular, plant-based diet that claims to reduce your carbon footprint and improve your health with an eating regime that is mostly vegetarian yet still allows for the occasional meat dish. Following a flexitarian diet highlights an increased intake of plant-based meals without completely eliminating meat." (Delaney, n.d.).

According to this definition, flexitarian diets can be considered sustainable diets. As Milfont and Markowitz (2016) depict, sustainable consumption can be analysed on several levels, such as the individual, household or contextual level.

On a household level, availability plays an important role. In this case, this might refer to the availability of meat alternative products. Accordingly, so called meat alternatives, or plant-based meat substitutes, which have a similar look, feel and taste to meat (Apostolidis & McLeay, 2016), have started to enjoy popularity. Meat alternatives have an expected strong growth of 7.6 % CAGR in the vegan meat market between 2018-2015 (Smith, 2018). While meat alternatives have seen a considerable growth over the last years and might be the solution to change carnivore dietary patterns, it is yet to be determined whether they will prove to be a suitable alternative for meat in the future.

The private sector is taking its share in the discussion to shape a meat-reduced future by offering new products. However, on an institutional and contextual level, the picture is still different, where specific policies and regulations are yet to be determined.

Led by the United Nations, international institutions have joined the race against climate change. In 2015, the United Nations created the 2030 Sustainable Agenda and 17 Sustainable Development Goals (SDGs) (UN, n.d.). The SDGs aim specifically at eradicating poverty, fighting inequality and tackling climate change. At the same time, the SDGs do not only target developing countries, but also put responsibility on developed countries (UN, n.d.,a).

Especially Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), Goal 12 (Ensure sustainable consumption and production patterns), Goal 13 (Take urgent action to combat climate change and its impacts) and lastly Goal 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss) relate directly to the issues of balancing food security and environmental impact. The inherent emphasis of the SDGs on both climate change and sustainability shows the importance of this issue. Along with the SDG's, 195 countries adopted a legally binding global climate deal during the Paris climate conference (COP21) in 2015 with the ultimate goal to limit global warming to below 2°C (EC, n.d.). Consequently, ambitious and necessary targets towards sustainability have been set by nations worldwide.

On a national level however, specific and encompassing policies regarding the necessary decrease of meat production and consumption, e.g. meat taxes, are not yet in place (Ölander & Thøgersen, 1995). This might be due to the significant influence of the meat lobby, or simply the existing behavioural patterns of the majority of the world's population. This leads to the last point of analysing sustainable consumption, the individual or consumer level.

As Thøgersen (2014) states, most environmental pressure comes from the production of products. Simultaneously, consumption is the driver of production. Considering this, a change in consumption patterns is required to adjust production accordingly. Through a switch to more sustainable consumption, production would follow, and environmental pressures might decrease. However, even though many consumers report pro-environmental attitudes, a large gap between attitudes and actual behaviour (attitude-behaviour gap) can be observed (Prothero et al., 2011). Unfortunately, although 40 % of consumers say that they want to buy sustainable products, only 4 % actually do so (UNEP, 2005, found in Prothero et al., 2011).

Through insights into consumer behaviour, researchers see the potential to address and hopefully revert the destructive power of human consumption. Within the field of consumer research, many studies have been concerned with the attitude-behaviour gap, pro-environmental behaviour and barriers to sustainable consumption. However, the reasons for the attitude-behaviour gap have not been sufficiently established (Kollmuss & Agyeman, 2002; Terlau & Hirsch, 2015).

To start with, the topic of sustainability and sustainable consumption, specifically relating to food consumption, is inherently an interdisciplinary field, with insights from psychology, sociology, marketing and behavioural economics (Lehner, Mont, & Heiskanen, 2016), but also neurology and anthropology (Terlau & Hirsch, 2015).

Research has shown that the drivers to pro-environmental behaviour can be broadly divided into internal and external factors (Kollmuss & Agyeman, 2002). Internal drivers for pro-environmental behaviour include for instance motivation, attitudes, emotion, awareness, pro-environmental knowledge, while external drivers are economic, institutional or infrastructural factors (Kollmuss & Agyeman, 2002).

While these drivers can act as enablers for pro-environmental behaviour, they can also act as barriers to it. A telling example to illustrate this case are habits: Especially during low-involvement decisions such as food purchasing, decisions are executed fast and automatically through old and established patterns of behaviour (Wilson, Buckley, Buckley & Bogomolova, 2016). Thus, habits need to be considered when looking at consumer behaviour in sustainable consumption.

Thøgersen and Ölander (1995) combined most of the aforementioned variables in the Motivation-Ability-Opportunity (MAO) Model of pro-environmental consumption in an effort to put these in relation to another. As the name indicates, this model consists of three variables, motivation, ability and opportunity, to explain pro-environmental behaviour. While motivation refers to the goaldirected arousal, ability is defined as skills and proficiencies to perform a certain behaviour (MacInnis, Moorman, & Jaworski, 1991). Lastly, opportunity describes the infrastructural or institutional pre-conditions to perform that behaviour (Rothschild, 1999). INTRODUCTION

While the aforementioned variables certainly explain some behavioural variance among individuals, they still do not explain how to overcome barriers to act pre-environmentally, such as old behavioural patterns.

Most recently, a new concept building on that notion has been introduced into the behavioural science world: nudging. This concept has gained popularity through the work by Thaler, Sunstein and Pratt (2008, p.6), who define a nudge as an element of *"choice architecture that alters people's behaviour in a predictable way without forbidding any option"*. The relevance of this concept in the area of sustainable consumption is increasing with the exploration of using "green nudges" to influence individuals to choose a sustainable option and is the main focus of this work. In particular, this research investigates whether nudging can be the solution to "push" consumers towards more sustainable consumption patterns, such as purchasing less meat.

This introduction briefly highlights the three levels of sustainable consumption. If the role of meat substitutes in the private sector could be enhanced, the lack of international and national policies in the public sector targeted, and the barriers of consumer decision-making regarding pro-environmental behaviour overcome, sustainable consumption patterns could be achieved. Even though our planet needs a change in current behaviour towards a more sustainable alternative, neither the individual consumer decision-making nor the international policies account for that needed change yet. This research aims at tackling the barriers towards pro-environmental consumer behaviour by providing a holistic solution to ultimately decrease the vast amount of meat consumption.

# 1.2 - Purpose of the present study

As the previous sections show, we are at a crucial point where current ways of living are no longer viable. Hence, a shift in consumer behaviour towards more sustainable lifestyles is required.

By combining insights from sustainability, consumer behaviour, decision-making, behavioural economics and nudging, we aim at effectively overcoming barriers to pro-environmental behaviour and contribute to forming more sustainable consumption patterns.

By focusing on the impact of our food system, especially that of meat consumption, on the environment, we want to investigate what influences our current (un)sustainable choices and how we

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can effectively influence them through nudging. Based on the Motivation-Ability-Opportunity Framework for pro-environmental behaviour by Ölander and Thøgersen (1995), our research investigates:

"How do motivation, ability and opportunity influence consumer behaviour regarding meat purchase and can nudges alter this behaviour?"

Firstly, this paper sets off with providing an overview of the current literature. Here the definition of the term sustainability is provided and consumer decision-making models for pro-environmental behaviour are introduced, while explaining our applied model, the MAO model by Ölander and Thøgersen (1995). Furthermore, the terminology of habits and System 1 and System 2 by Kahneman (2011) are clarified, as well as an extensive introduction of choice architecture, nudging and the ethicality of these practices.

Secondly, this literature review will subsequently be used to introduce the theoretical framework for this work, which is mainly the application of the MAO framework and the effect of nudges.

Thereafter our methodology and research design are presented and executed, where we explain our online experiment and questionnaire set-up.

Thirdly, this paper offers the analysis, interpretation and discussion of the insights gained through the research and closes with the implications and the contribution our findings offer for further research and the public and private sector.

#### **2. LITERATURE REVIEW**

As the first part of our research, we offer a comprehensive literature review to introduce the topic of promoting sustainable consumption and, more specifically, the decrease of meat purchase. Within, we will explain the concepts of sustainability, decision-making models of pro-environmental behaviour, System 1 and 2, habits, choice architecture, nudging and libertarian paternalism. Following this, we present the current gap in the research, which we aim to close.

#### 2.1 - Introduction to Sustainability

As this research aims at nudging consumers towards sustainability, it is important to firstly define sustainability. The founding definition of sustainable development was established in the Brundtland report (1987, found in Robinson, 2004), which states that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, n.d.).

During the World Summit on Social Development in 2005, it was agreed that sustainable development needs to reconcile three imperatives: ecological, which is defined as "to stay within the biophysical carrying capacity of the planet"; economic, which strives at providing "an adequate material standard of living for all"; and social, which aims at establishing "systems of governance that propagate the values that people want to live by" (Robinson & Tinker, 1997, found in Robinson, 2004, p.381; UN, 2005).

Other definitions of sustainable development include the definition of the Forum for the Future<sup>2</sup>, which defines sustainable development as "*a dynamic process which enables all people to realise their potential and improve their quality of life in ways which simultaneously protect and enhance the Earth's life support systems*" (Chambers, Porritt, & Price-Thomas, 2008, p. 3). Thus, all definitions agree that sustainable development is defined as staying within the planet's limits while satisfying human needs.

<sup>&</sup>lt;sup>2</sup> (independent non-profit organisation working amongst others with businesses)

Since this work is centred around meat consumption, the concept of sustainable consumption needs to be defined. As specified during the Oslo Symposium in 1994, sustainable consumption and production (SCP) is about *"the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations"* (UN, n.d., b).

Areas of consumption that are responsible for the highest environmental pressures are consumption of food and drink (especially meat and dairy), housing (e.g. heating systems) and mobility (car use and airplane travel) (Thøgersen, 2014; Lehner et al., 2016).

The British Department for Environment, Food, and Rural Affairs (Defra) defines sustainable behaviour, also commonly referred to as pro-environmental behaviour, as behaviour that *"consciously seeks to minimize the negative impact of one's actions on the natural and built world"* (Kollmuss & Agyeman, 2002, p.240). These include recycling waste, decreasing food waste, using a bicycle, installing insulation at home, re-using and repairing items, eat local and seasonal food and adopting a lower impact diet (Defra, 2008). Relating to the suggestion to adopt a lower impact diet, the FAO has developed a definition of sustainable diets to guide humans in their dietary choices and thus reduce the impact of food production and consumption.

According to Burlingame and Dernini (2010, p.7), "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources."

Clearly, excessive meat consumption violates the notion of sustainability as it harms planetary boundaries and uses vast amounts of natural resources. Thus, diets containing meat are not respecting the ecological aspect of sustainability, as defined on the World Summit on Social Development (2005). Consequently, adopting a low-meat, or flexitarian diet, can be regarded as pro-environmental behaviour.

However, adopting a flexitarian diet and consistently decreasing meat is a challenge for many consumers. Even though many intend to cut meat from their diet, they do not stick do this intention.

Over the past decades, researchers have tried to understand and explain the main drivers for proenvironmental consumer behaviour and the barriers to it, but so far have not come to a conclusion. The next chapter aims at providing an overview of the current status of research on that matter.

### 2.2 - Consumer Decision-Making Models for Pro-Environmental behaviour

Even though many consumers report pro-environmental attitudes, only a small percentage behave accordingly. So far, no consensus on how to explain and close the attitude-behaviour gap in pro-environmental behaviour exists. Kollmuss and Agyeman (2002) outline that many barriers to act pro-environmentally hinder consumers to act pro-environmentally. Nevertheless, over the years research has developed several models to present the relationships among main drivers of pro-environmental behaviour.

While many models and theories try to explain these relationships, this paper provides a short introduction into key models that have had a considerable impact on the research in proenvironmental consumer behaviour. As Jackson (2005) states, a basic understanding of the models and their evolution is crucial to understand consumer behaviour and explore possibilities to change it.

However, one criticism has to be stressed in regard to the validity of the displayed models. Many of these have not and cannot be empirically tested and include blurry variables, which have not been defined sufficiently (Jackson, 2005). Allen (2016) mentions that most research investigating proenvironmental behaviour has focussed on self-reported behaviours, behavioural intentions or attitudinal measures, instead of the actual behaviour, as *"it can be extremely difficult to gather actual behaviour data"* (Allen, 2016, p. 4)

Furthermore, a considerable number of different variables seem to be crucial to explain proenvironmental behaviour, making the models complex and difficult. Kollmuss and Agyeman (2002) state that even though the incorporation of all relevant variables might not be feasible, it could help to shed light on this challenging topic. In consumer behaviour decision modelling, two approaches can generally be differentiated: the internal and external approach. The internal approach only looks at individuals, e.g. beliefs, attitudes, values, habits, while the external view takes policies and social norms into account (Jackson, 2005). To avoid any confusion regarding terms when talking about the internal perspective, Allen (2016) proposes a definition of values, attitudes and beliefs.

Dietz, Fitzgerald, and Shwom (2005, p.339) explain that values are a "sense of what something is worth, our opinions about that worth, and the moral principles and standards relevant to our social group", beliefs "are our understandings about the state of the world" (Allen, 2016, p.107). Lastly, attitudes are the evaluations, either positive or negative, about certain situations. To highlight the distinction, Allen (2016, p.107) proposes the following example: "I may think that it is very important to protect forests (value), but strongly oppose purchasing forest credits as a way to offset my own organization's CO2 emissions (attitude), due to my scepticism regarding whether or not climate change is really occurring (belief)".

Approaching the development of behavioural models, several researchers have sought to provide an exhaustive overview of models and variables of PEB (e.g. Hines, Hungerford, and Tomera (1987), Stern (2000), Bamberg and Möser (2007), Allen (2016)), Kollmuss and Agyeman (2002) provide the most complete overview by far.

# 2.2.1 - Rational models of consumer behavior

While trying to explain pro-environmental behaviour, research firstly focused on a common decisionmaking model of consumer behaviour, parting from economic theory. Rational models of consumer behaviour assume that consumers are inherently rational in their choices and that they choose the best economic outcome - meaning maximizing profits and minimizing costs, thus maximizing their utility (Jackson, 2005).

One example of rational models are linear progression models, based on the linear relationship between knowledge, attitude and the consequent behaviour (Kollmuss & Agyeman, 2002).

**Linear progression models,** as explained by Allen (2016), assumed that by providing individuals with new information and awareness about environmental issues, their attitudes and respective behaviour would change (see Figure 1). Consequently, by informing the public of the tremendous impact of meat consumption on the environment, humans form a negative attitude about consuming

meat and thus decrease their meat consumption. However, as Allen (2016) and Kollmuss and Agyeman (2002) state, research has shown that knowledge does not have a considerable impact on behavioural change.



Figure 1: Linear Progression Model (Kollmuss & Agyeman, 2002, p. 241)

As a response to the inherent criticism, the well-known **Theory of Reasoned Action (TRA)**, was developed by Fishbein and Ajzen in the 1970s (Jackson, 2005), which can be seen in Figure 2. In their general model about social behaviour, they state that beliefs about outcomes and the evaluation thereof form an attitude, which will lead to a behavioural intention, ultimately resulting in the intended behaviour. Additionally, Fishbein and Ajzen added the variable subjective norm, which adds the component of sociality in the model, describing the influence of others' opinion on one's behaviour (Jackson, 2005).



Figure 2: Theory of Reasoned Action (Jackson, 2005, p.46)

Relating this to the case of meat consumption, the models predicts if negative attitudes regarding meat consumption are prevalent, together with a social environment supporting this notion, meat consumption will likely decrease.

According to Kollmuss and Agyeman (2002), the TRA is one of the most influential attitudebehaviour models in social psychology. However, while the TRA certainly was a ground-breaking model, it assumed volitional control over one's actions.

Ajzen and Madden (1986) recognized the need to incorporate a variable of volitional control. Thus, they developed the TRA further and introduced the **Theory of Planned behaviour (TPB)** in the 1980s, which includes a component to account for actions under limited or no volitional control, called perceived behavioural control. The perceived behavioural control (PBC) variable explains the perception of how easy or difficult a task will be and thus accounts for the perceived ability to carry out a task (Ajzen & Madden, 1986). Consequently, if one feels able to have a non-meat diet or cook vegetarian dishes, this could explain decreased meat consumption.

While the TPB has been used for research in a variety of contexts, this model is also often used to explain pro-environmental behaviours, such as understanding recycling behaviour, travel mode choice, ethical investing etc. (Staats, 2003).

Even though the TRA and TPB are still widely applied in research, they both face issues. Studies using these models mostly measure behavioural intentions and equalize intention with actual behaviour. However, as has been established, intention and behaviour are often not aligned, making the assumption critical. Furthermore, the conceptualization of the variables and measurement discrepancies have an important impact on the correlation of behavioural intentions and attitude (Kollmuss & Agyeman, 2002). These fallacies lead to the questionability of the models and measured results (Jackson, 2005).

#### Criticism of rational models

The TRA and TPB, as well as the linear progression models, can be classified as rational models, since they assume rational choices of the customer by maximizing benefits and minimizing costs. Fishbein and Ajzen assume that people are rational, since they make "*systematic use of information*" and are not influenced by desires or motives (Kollmus & Agyeman, 2002, p.9).

However, rational choice models are built on assumptions that are criticized by research and do not hold nowadays. Firstly, they assume that humans are able to see all available options, form objective attitudes, and choose the best option in the end. However, research has proven that consumers act under bounded rationality. This term describes that customers are not able to evaluate all possible outcome options, as they face uncertainties about the future and costs to acquire all information in the present (Jackson, 2005). According to Simon (1957, found in Jackson, 2005), an objective calculation of net costs and benefits is not possible, as information is either not available or simply not possible to objectively process.

Secondly, old behaviour patterns such as habits and emotions limit decision-making abilities. These factors influence the apparent "irrationality" of human behaviour (Jackson, 2005).

Additionally, rational models only look at individual decision-making, but ignore the influence of society and human interaction. Linear Progression Models clearly take an internal approach, instead of including external factors. The TRA and TPB incorporate an external stance but do not account for old behavioural patterns or heuristics and biases when making decisions. Conclusively, rational models fail to fully explain pro-environmental behaviour.

# 2.2.2 - Moral models

Another stream of research focused on normative or moral dimensions to explain why humans behave pro-environmentally. Here, altruism and morality are mostly investigated.

Schwartz (1973/1974, found in Jackson, 2005) defines two dimensions of human values, which are self-enhancement (self-regarding) and self-transcendence (other-regarding). Here he finds that self-regarding people will not engage in pro-environmental behaviour to the same degree as other-regarding people. Relating to that, Borden and Francis (1978) find that people with strong selfish and competitive mindsets are less likely to act ecologically.

Put differently, humans can adhere on the one hand to a value set of strong Dominant Social Paradigm (DSP), who assumes that there are unlimited resources on earth and humanity is superior to all other

species (Oxford Reference, n.d.) On the other hand, humans can show values sets referring to the New Environmental Paradigm (NEP), which is characterized by strong values towards the protection of natural limits and preserving the nature (Dunlap & van Lieren, 1978). Humans with a strong NEP value set are more likely to engage in pro-environmental behaviour than humans with DSP values. The **Norm-Activation Theory** by Schwartz (1977) is an important moral model and looks at the influence of personal norms on pro-social behaviour, where personal norms are feelings of strong moral obligation and directly relate to altruism. As shown in Figure 3, to have a strong personal norm the individual must be aware of the consequences of his or her behaviour and feel responsible for it. For instance, if an individual knows that meat consumption is a threat to the environment and feels responsible for the damage by eating meat, the decrease of meat consumption is likely.



Figure 3: Norm-Activation Theory (Jackson, 2005, p.55)

This model has been widely used to explain recycling behaviour, energy use, transportation means and environmental protection (Jackson, 2005).

However, one common fallacy also prevails in this model: most experiments only test the relationship between the antecedents of personal norm and personal norm, leaving the relationship between personal norm and behaviour out. Nevertheless, this model seems to be able to explain some variance of behaviour, but external situational factors are still not accounted for.

The most well-known moral model is Stern et al. (1999) **Value-Belief-Norm Model**, which adapted Schwartz's work. Here, personal norms and pro-social attitudes act as predictors for proenvironmental behaviour, as can be seen in Figure 4. Firstly, the model hypothesizes that the acceptance of the new environmental paradigm (NEP), which is relevant to being aware of the environmental impact, is positively correlated to biospheric (related to the environment) and altruistic (social) values and negatively correlated to egoistic values. The model further predicts that being aware of the consequences leads to personal responsibility, thus developing a personal norm, which ultimately results in pro-environmental behaviour.

Thus, an individual with a strong biospheric and altruistic value set would recognize the negative consequences of meat consumption, feel responsible for it and due to the sense of urgency engage in one of the outlined behaviours, such as decreasing meat consumption (private sphere behaviour).



Figure 4: Value-Belief-Norm Model (Jackson, 2005, p. 57)

Stern's model is widely used in research, but still has low explanatory power of the variance in behaviour and is not explaining pro-environmental behaviour fully (Jackson, 2005). Furthermore, the model is sensitive to the exact measurement of variables, especially when drawing the line between biospheric, altruistic, and egoistic values (Jackson, 2005).

In general, moral models only account for internal factors of individuals and do not look at external influences. Several models try to incorporate both factors and are presented next.

### 2.2.3 - Integrated models

As the importance of both internal and external factors in influencing consumer decision-making was recognized, researchers started to develop models that account for both perspectives. Here, Stern (2000) stood out by defining the **attitude-behaviour-context (ABC)** model of pro-environmental behaviour (Figure 5).



Figure 5: Attitude-behaviour-Context Model (Jackson, 2005, p. 92)

In this model, Stern defines behaviour as the product of the organism and the environment, alias of personal attitudes, such as beliefs, norms, values etc., and context (financial incentives, costs, physical capability, policies etc.). Furthermore, Stern assumes that the attitude-behaviour link is strongest when contextual barriers are weak or non-existent.

In the case of meat consumption, or recycling as in this model, more people will decrease meat consumption if there is a suitable alternative, just as more people will recycle if there are facilities in place.

Even though this model explains both internal and external factors, it still fails to integrate the effect of old and trained behaviour, such as habitual behaviour (Jackson, 2005).

Lastly, we want to point out another important model, which will serve as the basis for the research at hand. The **Motivation-Ability-Opportunity Model** by Ölander and Thøgersen (1995) incorporates many of the aforementioned variables and manages to integrate both internal and external factors, as well as the importance of old behavioural traits, while still keeping its simplicity in comparison to more complex models.

# 2.2.4 - Motivation-Ability-Opportunity Model

# Development of the MAO model

While this paper focuses on the application of the MAO model in pro-environmental behaviour, the model has been used in a wide range of topics (Hung & Petrick, 2016).

The MAO model was first developed by MacInnis et al. (1991) regarding information processing of advertisements. By enhancing consumers' motivation, ability and opportunity to process an advert, the effectiveness of the advert should be improved (MacInnis et al., 1991).

The MAO framework was also used for public healthcare issues and conceptualized by Rothschild (1999) in relation to whether to educate, legislate or employ marketing to change consumer behaviour. By presenting the specific combination of when to use education, law or marketing depending on the prevailing ability, motivation and opportunity, Rothschild (1999) offers a comprehensive framework for health managers.

Ölander and Thøgersen adapted the MAO model in 1995 to explain pro-environmental behaviour such as waste handling, recycling or energy reduction (Ölander & Thøgersen, 1995; Jackson, 2005). Building upon the work of previously elaborated models of pro-environmental behaviour such as the TRA, Ölander and Thøgersen suggest at least three variables to explain this behaviour (1995): motivation, ability and opportunity, which can be seen in Figure 6.



Figure 6: Motivation-Ability-Opportunity Model (Jackson, 2005, p.96)

# The components

Broadly defined, **motivation** is seen as goal-directed arousal (MacInnis et al., 1991). According to Rothschild (1999), motivation is aroused when the self-interest of the individual is served. The

motivation component, as described by Ölander and Thøgersen (1995), consists of the social norm and attitudes forming an intention, while attitudes are influenced by respective beliefs.

Regarding **ability**, MacInnis et al. (1991) define it as skills or proficiencies, and Rothschild (1999) adds, that it "*may include breaking a well-formed or addictive habit or countering the arguments of peers*" (p.32). Also, Rothschild (1999) mentions Bandura's self-efficacy theory, which is similar to the PBC (perceived behavioural control) as explained in the TPB before. Rothschild (1999) states, that "*those with high expectancies of personal achievement show greater abilities on a variety of tasks*" (p.32).

The ability variable in Ölander and Thøgersen's model incorporates both habit and task knowledge. Here, the task knowledge refers to ability to be able to perform a task correctly, such as recycling, while habits are automatic behaviours, which are defined later.

Lastly, **opportunity** or the lack thereof "*includes situations in which the individual wants to act but is unable to do so because there is no environmental mechanism at hand*" (Rothschild, 1999, p. 31). In the case of meat reduction, this could include the lack of alternative products in the supermarket. In Ölander and Thøgersen's definition, opportunity describes the influence of objective preconditions for behaviour and relates to Stern's external conditions and Triandis' facilitating conditions. This variable explains the effect of the actual opportunity, e.g. having recycling garbage containers nearby to recycle.

Due to the integration of the internal and external perspective and accounting for habitual behaviour, this model is an important contribution to this research field but has not enjoyed the same popularity as other models. We want to test the validity of the MAO model in pro-environmental behaviour by incorporating it in our research.

# 2.2.5 - Variables driving Pro-Environmental Behaviour

In summary, we can observe a clear evolution of consumer decision-making models of proenvironmental behaviour. Beginning with rational models, research started incorporating internal factors, then accounting for external factors and finally incorporating past behaviour patterns/habits in the models. The previous section is not aiming at providing a comprehensive list of all decision-making models that exist, but rather to give an overview of the development.

While there is still no consensus on a final model, research has found a more or less stable consensus of the variables that seem to have an influence on pro-environmental behaviour.

Kollmuss and Agyeman (2002) provide a good final overview over the variables that seem to carry general importance: demographic factors, external factors and internal factors.

With regard to demographic factors, gender and years of education seem to influence proenvironmental attitude. According to Fliegenschnee and Schelakovsky (1998, found in Kollmuss & Agyeman, 2002), women are more concerned with environmental destruction and more emotionally engaged than men. Furthermore, the more years of education, the more extensive is the knowledge about environmental issues. However, this should not be equalized with increased pro-environmental behaviour (Kollmuss & Agyeman, 2002).

External factors include institutional factors, which are the necessary infrastructure to behave proenvironmentally. For instance, people will not buy organic food if there is no suitable supermarket close by.

Also, economic factors (e.g. prices, taxes) influence pro-environmental behaviour, which are, however, not clearly understood by researchers (Kollmuss & Agyeman, 2002).

Social and cultural factors play a very important role to shape consumer behaviour, as each culture's norms vary significantly.

Internal factors on the other hand include motivation, which "*is the reason for a behaviour or a strong internal stimulus around which behaviour is organized*" (Wilkie, 1990, found in Kollmuss & Agyeman, 2002). While motivation can push one to behave pro-environmentally, it can certainly present a barrier, too, where primary motives (environmental values) are overridden by selective motives (e.g. personal comfort).

Another factor is environmental knowledge, e.g. the knowledge that meat has a negative effect on the environment. However, only a very small percentage of pro-environmental behaviour can be attributed to the knowledge of environmental issues, and at least 80 % of the motives for pro-environmental behaviour are other factors (Fliegenschnee & Schelakovsky, 1998, found in Kollmuss & Agyeman, 2002).

Values also play an important role in shaping behaviour, which are seen as predecessors of motivation and mostly shaped by the environment surrounding a person. According to Graham and Abrahamse (2017), values are more important for food choices than any other factor.

Additionally, attitudes seem to have a limited influence (Newhouse, 1991, found in Kollmuss & Agyeman, 2002). Other internal variables include environmental awareness, which is knowing about the impact of our behaviour on the environment; emotional involvement, which is having an affective relationship to the natural world; locus of control, representing "*an individual's perception of whether he or she has the ability to bring about change through his or her own behaviour*" (Hines et al., 1987, p.4); and finally, responsibility for our actions.

Again, this overview provided by Kollmuss and Agyeman (2002) is not exhaustive and we are missing the reference to habitual behaviour. However, it provides a good finishing overview of this topic. Based on this information, Kollmuss and Agyeman define one exhaustive model, covering all the variables explained before. As can be seen in Figure 7, many of the drivers of pro-environmental behaviour can also act as barriers, e.g. existing values or old behavioural patterns. Furthermore, it becomes clear that this model is too complex to be tested in research. In appendix 1, this model applied to meat consumption can be found.



Figure 7: Model of pro-environmental Behaviour (Kollmuss & Agyeman, 2002, p.257)

In the next section, we introduce possible reasons for these barriers by explaining the Dual Process Theory of Nobel Prize winner Daniel Kahneman and the important role of habits.

# 2.2.6 - Dual Process Theory

In trying to explain the gap between pro-environmental attitude and behaviour, researchers have sought to establish decision-making models to account for this gap - with limited success as the previous section shows. The Dual Process Theory developed by Daniel Kahneman helps to explain why consumers do not behave consistently and seem to be irrational at times.

First of all, the underlying assumption behind this theory is the bounded rationality of humans, meaning that decision-making is influenced by biases, heuristics and shortcuts, which limit the rational thinking of people (Kahneman, 2003). In that regard, Kahneman introduces two modes of thinking, referred to as System 1 (Intuition) and System 2 (Reasoning) (Kahneman, 2003).

System 1 is "*fast, automatic, effortless, associative and often emotionally charged*" (Kahneman, 2003, p.1451), while System 2 is "*slow, serial, effortful, and deliberately controlled*" (Kahneman, 2003, p.1451). In that regard, System 2 needs more attention and energy when in use, while System 1 relies on heuristics and shortcuts which will briefly be explained below.

Kahneman (2011) mentions several biases and heuristics, one of them being *Anchoring*. Anchoring happens when people refer to something they know for a fact and adjust this known information to other situations. For instance, when estimating the population of a city, one might use a known population of another city as an anchor and adjust accordingly to make a somewhat informed estimate. The issue with anchoring lies in the fact that it is often insufficient, and bias does occur. In fact, it has been proven that the higher the anchor, the higher the estimate and vice versa.

Another heuristic is that of *availability* (Sunstein & Thaler, 2008). Here, people assess the likelihood of risks by considering how easily relevant examples come to mind. For instance, after major terror attacks (e.g. 9/11), people are more likely to be concerned with terror than they were before. Similarly, if people have had previous personal experience with certain situations, they are more likely to feel a higher risk of the same thing happening again. Hence, availability is also responsible for bias.

The bias known as *loss aversion* is also considered a barrier to rational decision-making. Thaler, Sunstein and Pratt (2008) claim that people are loss averse and consider losing something twice as painful as the happiness experienced from gaining the same thing. As a result, inertia occurs, which causes people to have strong desires to stick with their possessions and holdings, even though there might be more beneficial alternatives.

Further, *status quo bias* is considered. Here, it is assumed that people have strong tendencies to stick with current situations. This is for instance prevalent in the choice of pension plans, where it is found

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that people rarely make changes to existing ones. Similarly, when applying this bias to magazine subscriptions or memberships, it is observed that people tend to keep them running rather than making changes even if they are not in use, simply due to the status quo bias making people stick to their current situations.

Lastly, the concept of *framing* is considered the root of another bias. Here, choices depend on the ways in which situations are stated. For instance, Thaler, Sunstein and Pratt (2008) give the example of a doctor telling patients that a certain surgery results in "90 out of 100 patients being alive one year after surgery" versus "10 out of 100 patients are dead one year after surgery". The framing of these statements will have an effect on whether or not patients will choose to go through with the surgery, with the latter being framed much more negatively than the former. Since people tend to make passive and mindless decisions, they are not likely to consider the fact that the two statements have the same message. Hence, the framing of questions, statements, campaigns and much more must be closely considered in order to account for the framing bias.

While this list of consumer biases is far from exhaustive, it clarifies that consumer decisions are heavily influenced by various biases.

As System 2 requires more time and effort, System 1 will most likely override System 2 and solve situations instinctively. In a shopping context, this means that System 1 will push consumers to buy the same products when confronted with the task of grocery shopping, while it might require System 2 to actually change automatic choices.

As Terlau and Hirsch (2015) describe, especially the purchase of food products is a low-involvement process due to established routines and generally low prices, where the decisions are subject to System 1 processing. However, cognitive efforts and conscious decision-making are required to buy sustainable products (at least in the beginning), thus activating System 2 (Young et al., 2010). Relating to the previous sections about drivers of PEB, System 2 refers more to attitudes and values that are inherent to the consumer, while System 1 is influenced by old behaviour patterns or habits.

### 2.2.7 - The importance of habits

Research shows that food purchases and meat consumption are ingrained in habitual behaviour and daily routines (Terlau & Hirsch, 2015; Spiller & Nitzko, 2014). According to Verplanken and Roy (2015, p.247), habits are "*a form of automaticity in responding, which develops as people repeat* 

# actions in stable circumstances". Wood and Neal (2009, p.580) add that habits are "characterized by a rigid contextual cuing of behaviour that does not depend on people's goals and intentions."

Habits have three features that are important to note: firstly, the behaviour needs to be repeated often to actually become a habit. Secondly, as a direct consequence of that, the behaviour needs to be performed automatically, meaning no conscious effort is required when performing the task and a lack of awareness prevails. In a shopping context, a consumer automatically chooses the same products again and again due to his/her consumption habits.

Mostly, new information is not processed due to a "tunnel vision", where customers tend to stick to their prevalent behaviour even though it might not be optimal (Verplanken & Roy, 2015). Lastly, habits are triggered by environmental cues, which are associations between the behaviour and context of a performance. These situational cues are key when habits are formed. When a certain behaviour is performed in the same stable context repeatedly, the context alone can end up cuing consumers to respond by behaving the same way as they usually do in that given context (Wood & Neal, 2009).

As an example, Wood and Neal (2009) explain that people's habitual response to bars and drinking alcohol is smoking a cigarette, as they did so repeatedly in that context. Verplanken and Wood (2006) add that habits can also be triggered by internal states (e.g. moods) or interaction partners. In the case of meat purchase, the environment of the usual supermarket can trigger the habitual purchase.

Further, consumers prefer habitual behaviour over new behaviour. Performance of known behaviour is easier, as opposed to new behaviour which is perceived to be more difficult given the unfamiliarity (Wood & Neal, 2009). In general, habits are very hard to break, and especially under time constraints, limited cognitive ability and low self-control, consumers tend to act habitually (Wood & Neal, 2009).

The role of habits has been increasingly recognized in the development of consumer behaviour models for pro-environmental behaviour and has been incorporated in Thøgersen and Ölander's (1995) and Kollmuss & Agyeman's models. Verplanken and Roy (2015) describe how habits and behavioural intentions are often in conflict. When habits are strong, intentions are not a significant force to influence behaviour, and vice versa (Reisch & Thøgersen, 2015). Translating this into sustainable consumption patterns, even though consumers might want to buy sustainable products, their purchase habits will most likely override intentions.

How can habits be overcome to promote more sustainable consumption behaviour? Research has explored several options in the pursuit of changing habitual behaviour: As Verplanken and Roy (2015) state, most policy interventions focus on delivering informational campaigns, which are often not fruitful.

However, when these interventions are delivered during time periods where habits are broken or suspended, they might actually create change (Verplanken & Roy, 2015). For instance, changes in performance environments or habit cues might lead to habit disruption, such as changes in the physical environment (e.g. new house, new menu options in a restaurant) or social environment (e.g. new friends) (Verplanken & Wood 2006). During these habit discontinuities, policy interventions might be successful as people are re-orienting their behaviour (Verplanken & Roy, 2015). Other options to change behaviour include vigilant monitoring, where consumers exert self-control to not perform a certain habit, or implementation intentions, which are if-then plans to override an existing habitual behaviour (Wood & Neal, 2009).

While these interventions might show temporary success, the question remains how sustainable these effects are and whether the time effect will reverse the behaviour change (Wood & Neal, 2009). However, while "traditional" habit change methods show limited success, a new method has been identified recently.

A novel concept in behavioural science is nudging, which accounts for the biases and errors in human decision-making. The theory behind this concept is introduced next.

# 2.3 – The Theory of Nudging

# 2.3.1 - Introduction

As previously established, consumers have proven to, at times, pursue flawed decision-making based on cognitive shortcuts and social processes (Kahneman, 2011; Sunstein & Thaler, 2008). Common consumer biases and heuristics steering consumers into more flawed decision-making have been identified. This is where the theories of choice architecture and nudging enter and gain relevance. In fact, Hausman and Welch (2010) claim that it is precisely because of these natural flaws in human decision-making that nudges work.

This section will focus on the theory of nudging. In an effort to fully understand the topic, it is vital to explain related topics of choice architecture and Libertarian Paternalism. Hence, an introduction to the above concepts are given, followed by brief examples of methods of such. Lastly, the theory is related to the purpose of promoting sustainability by exploring previous findings, as well as ways of nudging individuals towards more sustainable consumption patterns.

# 2.3.2 - Defining the terminology

## Libertarian Paternalism

Libertarian Paternalism is a philosophy established by Sunstein and Thaler (2013), which guides the concepts of nudging and choice architecture. Essentially, Libertarian Paternalism combines two otherwise contradicting ideas, namely Paternalism and Libertarianism.

While Paternalism usually describes individuals facing a restricted sense of freedom, choice and responsibility, Libertarianism assumes minimal intervention and respects the freedom, choice and responsibilities of individuals. By combining the two, Sunstein and Thaler (2013, p.2) define Libertarian Paternalism as "*a policy that is selected with the goal of influencing the choices of affected parties in a way that will make those parties better off.* "*Better off*" is to be measured as objectively as possible".

In other words, when choice architects nudge individuals, the philosophy of Libertarian Paternalism is followed as long as the nudge is intended to go towards welfare-promoting activities. Conclusively, while choice architecture and nudging might have paternalistic tendencies, which some argue goes against the idea of a free society and freedom of choice, Sunstein and Thaler (2013) counter this notion with the term Libertarian Paternalism (Hausman & Welch, 2010).

Since choice architects merely suggest an option rather than force a decision upon individuals, the Libertarian aspect is clearly evident as well. With regards to this, Sunstein and Thaler (2013) further note Libertarian Paternalism as being "*a promising foundation for bipartisanship - a way of maintaining our firm commitment to freedom of choice while also helping people make better decisions for themselves*." (found in Hausman & Welch, 2010, p.1). They further claim that nudges and choice architecture do not, in fact, threaten liberty or limit choices, as all options are still available to individuals, they are merely given a gentle push in a welfare-promoting direction.

## Choice Architecture

When individuals are faced with a decision, choices are never made in a vacuum. The environment surrounding individuals is what shapes decision-making, consciously or unconsciously. According to Thaler, Sunstein and Balz (2010), people who create said environment are "Choice Architects". Choice architects have "*the responsibility for organising the context in which people make decisions*." (Thaler et al., 2010, found in Hausman & Welch, 2010, p.2).

In other terms, choice architecture is responsible for shaping the context of any decision made by individuals, though it often goes unnoticed. Sunstein (2015) even claims that choice architecture is an inevitable part of life. No matter where one goes, someone had to make a decision about how objects are presented to individuals. Whether that be at a supermarket where certain products are placed in certain places, or restaurant menus where dishes are presented in a particular order. Position and design influence decision-making, and position and design are an inevitable part of life (Hausman & Welch, 2010).

It is however crucial that choice architects remember to respect basic human psychology principles when creating environments. Failing to do so might cause lower performance abilities for individuals. The principle of this is termed "*Stimulus Response Compatibility*" (Thaler et al., 2010). Key outtakes from this term are that the signals received from an object or environment by individuals must be consistent with the desired action. For instance, Thaler et al. (2010) share an example of a door in a lecture hall at university. Here, the door was opened by a handle rather than a flat plate. More specifically, the door was opened by pushing the handle. However, basic human psychology relates handles to pulling and flat plates to pushing. Hence, students always pulled the handle first, before realising they were meant to push. The *Stimulus Response Compatibility* was not accommodated by the choice architects in this instance.

Given the many choices and decisions individuals are faced with on a daily basis, shortcuts are used in situations like these. Since handles usually mean pull and flat plates usually mean push, individuals jumped to conclusions that the door with a handle should open by pulling. Conclusively, if choice architects fail to respect human psychology principles and align signals and desire, confusions and misunderstandings arise.

Thus, "choice architecture can be used to nudge people to make better choices (as judged by themselves), without forcing certain outcomes upon anyone" (Thaler et al., 2010, p.1). In other words, choice architecture has the power to influence choice, and nudge individuals.

Interestingly, Reisch et al. (2017) even claim that choice architecture is a key contributor to changing nutritional and activity patterns, making the concept highly relevant to the present study.

Now that the concept of choice architecture has been explained, a quick overview of the main methods of such is given in order to gain understanding of how the theory works in action. The examples given are based on findings by Thaler et al. (2010).

Firstly, *Defaults* are considered one of the most efficient and commonly used methods of employing choice architecture. Individuals like to make decisions that require as little effort as possible, a tendency that can be explained by reasons such as laziness, fear and distraction. Essentially, default options mean that a choice has already been made for individuals. Nonetheless, there is an option to opt-out of that choice and change it according to personal preferences. When employing this method, it has been proven that the majority of people do not change the default and end up with the existing option, regardless of its outcomes.

Further, by implying (explicitly or implicitly) that the default option represents the "social norm", the tendency to stick with the default is reinforced even further.

Another method is that of *Expected Error*. The method of Expected Error simply assumes that humans make mistakes and accommodates its design to the fact. In other words, this method develops systems that expect, and forgive, individuals when making errors. An example of this method includes warning signs in cars when, for instance, seat belts are not buckled, or gas is running low. Another case where expected error is accommodated is when writing emails. On the Google server, whenever a sender writes the word "attachment" in an email and forgets to attach a file accordingly, Google asks "Did you forget to your attachment?" (Thaler, et al., 2010). Again, human mistakes are anticipated and accommodated by simple choice architecture.

Additionally, *Giving Feedback*, has proven to improve performance of humans. Simply providing feedback and engaging actively with individuals will spur them to improve performances.

choice architecture can also be enacted in terms of *Structuring Complex Choices*. It has previously been established that individuals act and decide differently depending on the complexity and availability of options given. For instance, if only a few options are available, individuals generally tend to fully analyse all attributes of all alternatives and make decisions based on such. On the contrary, when there are many alternatives, this strategy is no longer viable, possibly causing more irrational and less-informed decision-making. This is due to the fact that consumers tend to engage

less with each option when there are many to choose from, therefore relying more on the context given by choice architecture. In situations like these, the role of choice architects becomes more prevalent, and the impact of their influence steadily increases (Thaler et al., 2010).

Lastly, *Incentives* serve as an effective tool of choice architecture. These include economic forces such as prices and other incentives.

# Nudging

As previously established, behavioural sciences generally identify two different systems of decisionmaking, System 1 and System 2 (Kahneman, 2011). While intuitions (System 1) work well in many instances, there are situations in which they might misguide individuals. It is precisely in these situations that nudges pose as a great potential help of guidance for decision-making (Sunstein, 2015). While nudging theory does not claim that people act irrationally, it is based on the fact that cognitive shortcuts, social pressures and motivations are used as base for decision-making, which as a result might be flawed (Moseley & Stoker, 2013).

Nudges are defined by Sunstein (2014, p.2) as "Liberty preserving approaches that steer people in particular directions, but that also allow them to go their own way". The goal of nudges is to simplify life, while making it safer and easier for people to make decisions on a daily basis (Sunstein, 2014). Hence, nudges aim at influencing individuals to perform certain actions or make certain decisions, however without limiting their freedom of choice and without making alternatives costlier in terms of time, trouble and money (Reisch, Sunstein & Gwozdz, 2017; Hausman & Welch, 2010). For instance, as Sunstein (2015, p.8) explains, "A reminder is a nudge, so is a warning. A GPS

nudges, a default rule nudges. To qualify as a nudge, an intervention must not impose significant material incentives. A subsidy is not a nudge, a tax is not a nudge, a fine or a jail sentence is not a nudge. To count as such, a nudge must fully preserve freedom of choice. If an intervention imposes significant material costs on choosers, it might of course be justified, but it is not a nudge".

The theory of nudging has gained a substantial following over the past years, with nations such as the UK or USA even employing "Behavioural Insights Teams", also known as "Nudge Units". One of the reasons for the rise in popularity, according to Sunstein (2014), is the fact that nudges cost little and have great potential to achieve economic, social and other goals in a quick manner, while maintaining freedom of choice for individuals.

Interestingly, Reisch et al. (2017) found that the majority of people even support nudging, as long as they are intended to promote health and welfare. In these cases, nudges were generally perceived as posing as helpful guidance rather than "*malicious tricks*" (p.8).

Nudging has received some critique for interfering with individual choice. However, the notion of free choice assumes that people are capable of, and tend to, make decisions that provide maximum benefit and are best for them. Research does not fully support this claim. More specifically, it is known that people use shortcuts such as heuristics to make decisions, hereby not always ending up choosing the best possible option. It can therefore be argued that a need for guiding individuals through nudging might arise (Sunstein & Thaler, 2013).

#### Bringing it all together

Sunstein and Thaler are the founders of the terms "Libertarian Paternalism", "choice architecture", and "nudging". As discussed, all of the concepts are related in that they collectively guide individuals towards certain behaviour (Hausman & Welch, 2010; Sunstein & Thaler, 2013; Sunstein, 2015).

The philosophy of Libertarian Paternalism is one that guides the concepts of choice architecture and nudging. More specifically, Sunstein and Thaler (2013) coined the somewhat contradicting term based on the fact that nudges are influencing behaviour and aiming to dominate choice, making up the paternalistic view. Simultaneously, individuals are left with a free choice and are not forced to act in any certain manner, they are merely given a gentle push in the direction of *welfare*. A key word in this philosophy is welfare, since Sunstein and Thaler (2013) claim that as long as welfare is the ultimate goal, Libertarian Paternalism is achieved.

Choice architecture is built on the notion that it is the environment of individuals that shapes decisionmaking. This environment is created by someone or something, namely choice architects. choice architecture describes the context of decision-making and how the creation, design and execution of context can influence decision-making. In fact, choice architecture and nudging are strongly linked concepts, as nudges are built on notions of choice architecture. Nudges are essentially small pushes that steer individuals in desired directions, however without limiting choice. As opposed to choice architecture, nudges do not change the attractiveness of other alternatives through monetary or other
incentives (Reisch et al., 2017; Sunstein, 2014). Essentially, choice architecture influences decisions, in other words, nudges individuals (Thaler et al., 2010; Hausman & Welch, 2010).

## 2.4 - Nudging Methods

After having provided specific definitions of the crucial terms, this part provides examples of nudging methods. As previously noted, Kahneman has proposed the so-called *dual process theory*, explaining two distinct systems of human processing.

The concept and theory of System 1 and System 2 by Kahneman can also be applied to the theory of nudging, where Hansen and Jespersen (2013) suggest a distinction of nudges between type 1 and type 2, directly based on the dual process theory.

This distinction is an important one to make, since there is a substantial difference between communicating and aiming to change behaviour via automatic or reflective processing and thought.

Essentially, *type 1 nudges* aim at influencing behaviour resulting from automatic and intuitive thinking, which does not involve rational thought and deliberation. A popular example of a type 1 nudge is to, for instance, decrease plate sizes in canteens, hereby nudging consumers to put less food on their plate and, as a result, eat less. This is a nudge that requires no reflection or deliberation, in fact it goes straight to an automatic reaction by changing the default option. *Type 2 nudges* on the other hand, refer to instances where nudges are used to influence the environment, context and attention of individuals, hereby promoting reflective thinking and deliberation (Hansen & Jespersen, 2013). To give an example, the classic depiction of a fly in a urinal is a type 2 nudge. Here, a visual of a fly is placed in the urinal in order for individuals to aim better. The visual presented in the urinal (the fly) attracts visual attention via automatic thinking, which in turn results in reflective attention. In other words, when an individual sees a fly in the urinal (automatic process), the reflective attention kicks in, resulting in a decision either to aim for the fly or not.

Another important aspect of consideration when discussing the theory and methods of nudging, is that of transparency. In fact, Hansen and Jespersen (2013) suggest that the transparency of the intentions and means of any given nudge could serve as a guideline to assess the ethicality of said nudge. For example, transparent nudges include foot-paint prints on streets leading to garbage bins

or large letters writing "look right" on the streets of London. Here, individuals are highly aware of the purpose and way they are being influenced, and by whom.

Non-transparent nudges however are not as clear. More specifically, the intentions, means and ends of nudges are not obvious and visible. Examples include decreasing plate sizes in canteens or changing defaults from opt-in to opt-out with regards to organ donation or pension plans.

Making use of non-transparent nudges could arguably be considered as using deceptive and abusive tactics to manipulate individuals, without their consent and knowledge thereof. However, as Bovens (2013, found in Hansen & Jespersen, 2013, p.15) claims, nudges "*do work best in the dark*". Therefore, demanding complete transparency could have a negative impact on the effectiveness of nudging techniques.

Entirely eliminating and forbidding nudges that are non-transparent could therefore also have negative consequences and possibly stand as a barrier to use many successful nudges. This might not be in the interest of the general public, as nudges are generally aimed at improving public welfare, a means and ends that is widely accepted and appreciated by citizens (Reisch, Sunstein, Gwozdz, 2017). A more in-detail discussion of the ethics of nudges can be found in section 2.6 - Ethical Considerations.

Based on the findings and knowledge of the distinction of nudges in type 1 and type 2, as well as the importance of transparency of nudging, Hansen and Jespersen (2013) have created a matrix of four main categories of nudging techniques (see Table 1). Here, they have identified the categories: transparent type 2 nudges, non-transparent type 2 nudges, transparent type 1 nudges and non-transparent type 1 nudges. These are briefly explained below.

	Transparent	Non-transparent
System 2 thinking	Transparent facilitation of consistent choice	Manipulation of choice
System 1 thinking	Transparent influence (technical manipulation) of behavior	Non-transparent manipulation of behavior

Table 1: The Nudge Matrix (Hansen & Jespersen, 2013)

*Transparent Type 2 Nudges* typically aim at influencing the reflective system of individuals, while clearly representing the intentions, means and goals of behavioural change. Hence, the nudge is obvious and the behavioural goal clearly visible.

*Transparent Type 1 Nudges* includes nudges which speak to the automatic processing of the brain, while clearly depicting and reflecting the intentions, means and goals of any given nudge. While reflective thinking might be a by-product of behaviour, it cannot be used to change behaviour when making use of these nudging techniques.

When employing *non-transparent type 2 nudges*, the reflective and rational system of individuals needs to be catered to. Here, goals and intentions are not obvious and clear. In fact, only very few suspicious and cautious people even realise the fact that a nudge is taking place. Lastly, *non-transparent type 1* nudges refer to nudging techniques which aim to accommodate automatic processing. Again, due to the non-transparency, these nudging techniques do not have obvious means, ends and intentions for individuals.

Now that the four key dimensions of nudging have been established, specific techniques and examples used in previous studies are discussed. Although not exhaustive, Sunstein (2014) has proposed a list of the most effective and relevant nudging techniques.

These include default rules, simplification, social Norms, ease and convenience, disclosure, Warnings and information. These methods are placed within the nudging Matrix (see Figure 8), after which they are described in more detail, both theoretically and practically. As Hansen and Jespersen (2013) mention, some techniques are difficult to place solely in one dimension, as they might be working in a grey-zone of the matrix, or even have aspects of more than one dimension at once, as can be seen in the figure. Therefore, some techniques are mentioned in two categories of the matrix and examples are given for both cases.



*Figure 8*: Nudging Methods on the Nudging Matrix (own illustration based on Hansen & Jespersen, 2013)

# 2.4.1 - Type 1 Nudges

*Default rules*. D*efault rules* are one of the most used and popular nudges. Essentially, default nudges work by changing defaults towards certain behaviour. For instance, by changing the default option for opt-in rather than opt-out of organ donation, retirement plans or even small changes such as printer settings, numbers of participation and levels of success strongly increase. Sunstein (2014) argues that defaults might even constitute as the most effective nudge, as people tend to stay with default options in order to avoid having to spend time and energy on changing any given option. These could be used in instances of education, health savings or enrolment in programs.

Default rules are placed as being Type 1 nudges, speaking to the automatic processing of the mind, since there is no conscious deliberation of behaviour caused by the default. Simultaneously, default rules can be either transparent or non-transparent, as mentioned by Hansen and Jespersen (2013).

*Ease and convenience*. Matters of *ease and convenience* have also shown to greatly influence behaviour. People generally tend to take the path of least resistance and as a conclusion make the easiest possible choice. It is therefore vital to take down barriers that might stand in the way of desired actions. As Sunstein (2014) suggests, resistance is often not a result of disagreement, rather that of perceived difficulty.

Hanks et al. (2012) conducted a study in which students were nudged towards healthier eating at school. This was done by placing the food to be promoted (healthy option) in a more obvious and visible manner than the unhealthy option, making it easier to recognize. The results were substantial, showing an increase in healthy eating by 18%. Further, Rozin et al. (2011) held a study with the goal of decreasing unhealthy eating by making it more difficult to obtain. As Sunstein (2014) suggests, perceived difficulty is the main barrier to behavioural change. Therefore, as a result of this change in display and accessibility, unhealthy eating decreased.

Additionally, in an effort to understand how positioning and accessibility work on decisions and behaviour, Dayan and Hillel (2011) investigated how positions of certain dishes on restaurant menus influence choice. Indeed, items on the top and bottom of the menu proved to be substantially more popular than ones in the middle. Since items on the top and bottom are more eye-catching than those in the middle, this study further confirms the fact that consumer choice is often based on ease and convenience, choosing the option that is most easily accessible and visible.

Lastly, Kleef, Otten and Trijp (2012) conducted a study aimed at promoting healthy snack consumption. Two interventions were made: placement of the product as well as availability of healthy snacks. They found an insignificant difference regarding shelf arrangements. Contrary to this, Gestel, Kroese & Ridder (2017) conducted a similar study, rearranging snacks at a train kiosk to make healthy snacks more easily accessible. Here, an increase in sales of healthy snacks could be observed. In other words, the placement rearrangement saw success in this study. The difference could be explained by the fact that this study was a longitudinal one as opposed to that of Kleef et al. (2012). However, with regards to the availability of healthy snacks, an interesting finding was that sales for healthy snacks increased significantly when the assortment consisted of 75% healthy snacks rather than 25% healthy snacks, once again proving that consumers prefer to take the path of least resistance and choosing the easiest way possible (Kleef et al., 2012).

Nudges making use of ease and convenience are considered type 1 nudges, since going for the easiest option is an automatic response to choice, not one that is necessarily reflective or deliberate. As with default options, ease and convenience falls in a spectrum between transparent and non-transparent. While placing certain dishes on specific places on a menu is not a clear and obvious nudge to understand, emphatically promoting certain foods can be considered quite transparent.

# 2.4.2 - Type 2 Nudges

*Disclosure. Disclosure* is also an important method to consider. Here, one should aim at conveying, in a simple form, all information and consequences of certain actions to individuals. Simplicity, clarity and openness are key aspects of disclosure. In other words, when nudging while using the method of disclosure, economic, environmental and other consequences of one's actions should be communicated in an easy-to-understand and clear manner.

Swartz et al. (2011) serve as an example with their study of downsizing fast-food intake. In their study, consumers at a Chinese restaurant were asked if they were interested in downsizing their portion. They found that many consumers were willing to downsize and, as a result, ate less on average. Conclusively, by telling consumers about their options and possible outcomes of that option as well as alternative ones (i.e. over-eating), adjustments can be made.

Another method of nudging while using disclosure is that of Thorndike, Riis, Sonnenberg and Levy (2014). The study they conducted was concerned with the food environment and interventions within. More specifically, traffic light labelling was used to simplify information and consequences regarding the healthiness of certain products. Essentially, traffic light labelling uses three colours to mark products: red, yellow and green, where green represents healthy products, yellow represents less healthy products and red stands for unhealthy products. The study was a longitudinal one, lasting 24 months. At the end of the experiment, sales for red label products were found to be reduced significantly.

The method of disclosure is a type 2 nudge, since it requires deliberate thought and action, something that automatic processing alone cannot comprehend. The nudge itself is of a transparent nature, given that consumers are clearly being told about consequences of their actions, the means, ends and intentions of any given nudge.

*Information*. Simply *informing people about their own behaviour* might increase the likelihood of shifting behaviour. Often, people do not realise how they actually behave and what consequences occur from this behaviour. By making this information available and visible, individuals are more likely to change.

In the context of food products, Mathios (2000) gives the example of nutrition labels on food products. More specifically, the issue of nutritional labels on salad dressings were investigated. While displaying labels on products has not always been mandatory, dressings with high-fat levels simply

did not enclose any such information. With the change of labels becoming mandatory, this information was now forced to be presented, resulting in consumers shifting from products with highlevel fat to low-fat products. In other words, by making consumers aware of the content and consequences of using certain products, behavioural change can be elicited. Further, Lehner, Mont and Heiskanen (2015) conducted a study with a burger restaurant in which burgers were marked with labels signifying their carbon footprint. Over time, an increase in sales of burgers with low carbon footprints was seen, suggesting that the employed nudge of "Information" was successful.

These nudging mechanisms are type 2 nudges of a transparent nature. Deliberate thought and rational thinking are a key prerequisite to making them work. Transparency is clear and well displayed by providing the information visibly and obviously. However, as noted, consumers tend to use heuristic processing if there is an overload of information. In these instances, the nudge in question would be considered a type 1 nudge.

*Warnings. Warnings*, privately or publicly, have power over decisions. These are at their most powerful when using large fonts, colours and bold letters. Warnings are mostly used when situations are asserted with risk, here it is vital to inform individuals of how to reduce harmful or risky behaviour. Cigarettes are an example where this technique is often employed, by vivid and explicit pictures and statements being shown on packages (Sunstein, 2014). The nudging technique of warnings is used mostly to decrease harmful or negative behaviour. Therefore, in the case of sustainability, warnings are more likely to warn against unsustainable behaviour rather than promoting sustainability directly.

Making use of warnings is considered a type 2 nudge, since deliberate and rational thought are required to make sense of the received warnings. Transparency is also available, since the means, ends and intentions of using such warnings are obvious and clear to most.

*Simplification*. *Simplification* of programs or information is key in the success thereof. Making things too complicated, complex and difficult to understand might result in people avoiding it because it takes too much energy and time to make sense of it. As a general rule of thumb, one should therefore always aim at making information regarding programs, education, health and employment easy to understand and relate to. Failing to do so might cause programs or movements to be less successful than their full potential would allow them to (Sunstein, 2014).

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An example of a simplification nudge can be found in the UN Sustainable Development Goals. While the development towards a more sustainable world is a severely complex matter, the UN has created 17 easy-to-understand and well-presented goals that would help getting there, one of the goals being movements towards more sustainable consumption and production. Making this information easily understandable and accessible increases the likelihood of individuals taking on the desired behaviour (UN, 2018). Simplification methods are placed within the dimension of type 2, non-transparent nudges, catering to the reflective processing of the brain. While the specific nudge might not have obvious means, goals and intentions, these nudges place subtle cues regarding specific choices, social norms or even framing issues in a certain manner in order to make individuals understand and reflect about issues at hand.

*Social Norms*. Lastly, *social norms* have shown to have great influence on behaviour. Especially when information is given on local and specific options, people tend to follow and engage with the social norms, in other words following behaviour of other people. When nudging, one should therefore aim at using these norms to guide behaviour.

Nielsen et al. (2016) provide an example of how the power of social norms influence behaviour. More specifically, Nielsen et al. (2016) set up an in-store experiment in a supermarket. They aimed at increasing customer engagement with regards to donating beverage container deposits at reverse-vending machines. One of the nudges employed was that of social norm, by indicating the amount of people who have donated their deposits in the past. With this reference came a sense of responsibility and power of social norm, nudging participants to donate their own deposits as well. Social norm nudges are type 2 nudges since deliberate thought and effort is required. However, the means, ends and intentions of the nudges may not be fully transparent, as suggested by Hansen and Jespersen (2013).

While nudging has been used in a wide array of settings, especially to encourage healthy eating, this research is predominantly focused on so called "Green Nudges", which are explained next.

### 2.4.3 - Green nudges

This section will briefly introduce the concept of "Green Nudges". "Green nudges aim at encouraging pro-environmental behaviour. In other words, they aim at encouraging people to voluntarily contribute to a public good, namely, environmental protection." Schubert (2016, p. 331).

Considering the original goal of nudges being an increase in welfare for all, green nudges naturally fit within the agenda and serve as a focus point for this study, which aims at understanding drivers behind meat consumption and decreasing said consumption through nudges. For the present study at hand, two nudges are employed to test their effectiveness in overcoming barriers to PEB. The ease and convenience nudge is used to research whether convenient and easily accessible meat alternative products impacts meat purchase. The disclosure nudge will then be applied to measure whether disclosing information about the impact of meat on the environment leads to more PEB. Given that the overall goal is the decrease in meat consumption, these nudges qualify as green nudges.

## 2.5 - Governmental Policies and the future role of nudges

This section will briefly introduce nudges in the context of governmental policies. Governments can take actions against undesirable consumer behaviour in many ways, i.e. criminal law, threats, promises, taxes or subsidies. Governments can also coerce, although that is considered ineffective and unethical, and is a technique that is not used much nowadays.

However, even though governments have committed to combating climate change by signing the Paris Agreement, national policies, taxes or subsidies to decrease meat consumption are not in place. In an effort to find effective tools to influence consumer behaviour, recent years have seen a tremendous rise in popularity of behavioural insights (BIs), more specifically in the concept of nudging. Besides the use of behavioural insights in academia and the private sector, nudging has gained much attraction with governments around the world.

Here, it is important to make a distinction between behavioural insights and nudging. As Lourcenco, Ciriolo, Almeida and Troussard (2016) state, BIs investigate how to incorporate nudging into national policy-making, alongside more traditional forms of intervention such as regulations or incentives.

Further, BIs are a product of inputs from various academic fields, including economics, psychology and neuroscience, coming together in an effort to understand and explain everyday human decision-making (Lourcenco et al., 2016). Nudging refers to one of many behavioural techniques that can be used within the field.

With the rise in popularity of BIs, and more specifically of nudges, came an increasing interest in using these insights for government policies. In 2010, the United Kingdom employed a so-called "behavioural insights team (BIT)", asking to incorporate insights of behavioural research and

psychology into policy making. Similarly, in 2015, United States President Barack Obama sent out an executive order stating that behavioural sciences must now be part of governmental processes and policy-making. These initiatives were grounded on the notion that a large body of academic research has proven that small changes and cues within the decision-making context can have large impact on behaviour (Sunstein, 2016).

Halpern (2015) further states that another argument for the increasing engagement with behavioural insights is that advice needs to be based not only on economic perspectives but also on that of social sciences. Following these developments, nudge units gained worldwide attention, with countries such as Germany, Australia, Denmark, Sweden, Canada, Singapore, Israel, the Netherlands, South Korea and Mexico having made use of behavioural insights since, especially with issues regarding environmental protection, financial reform, energy policy and consumer protection (Sunstein, 2016). With regards to the specific tasks of said "nudge units", issues such as smoking cessation, energy efficiency, organ donation, consumer protection and tax compliance are all areas of interest. Particularly, the UK "nudge unit" has seen great successes in the past. After efforts to increase participation in organ donor registries, 100.000 individuals signed up within a year. Further, by creating opt-in defaults for enrolment in pension schemes, saving rates for employees at large firms increased by 22%. Similarly, the Netherlands is set to implement a new law making all citizens organ donors by default, unless they actively opt-out. This is expected to help decrease the major shortage on organ donors (Lieber, 2018). It is precisely with such small differences and interferences that nudges are able to create change with impact. Even though it seems that nudging towards decreased meat consumption has not been on the political agenda yet, there is certainly potential for governments to do so. By decreasing meat consumption and consequently production, GHG emission targets as specified in the Paris Agreement might be more attainable.

Even though nudges aim at improving welfare, the concept is of a sensitive nature due to the links to manipulation. Thus, ethical considerations are addressed next.

## 2.6 - Ethical Considerations

This section explores ethical considerations relevant to the topic of nudging. Given the nature and goals of nudges, namely that of behaviour change, the topic is one of many controversies. As Schubert (2016) mentions, it is vital to understand and know all risks relating to any intervention method in order to properly implement and make use of it.

One of the central critiques of nudging is the claim that nudges work by manipulating the minds of individuals towards certain choices and that the mechanisms behind nudging are an exploitation of consumers without their consent and knowledge thereof (Hansen & Jespersen, 2013). While Sunstein and Thaler (2008) admit that nudging does require a manipulation of the mind of some sort, they note that any choice made by an individual is influenced by something, since no choice is made without choice architecture guiding the way. Further, while nudges do give individuals a gentle push towards certain choices, individuals are still free to make their final decision and, if desired, choose to behave against the nudge presented to them (Hansen & Jespersen, 2013).

As mentioned, the goal of nudging is to *"influence choices in a way that will make choosers better off, as judged by themselves."* (Sunstein, 2014, p.429). With that in mind, it could be argued that the ethicality of nudges depends on the specific nudge and its specific means and ends.

As Sunstein (2014, p.413) states, "Much of the answer depends on whether nudges promote or undermine welfare, autonomy, and dignity. Many nudges, and those that deserve support, promote some or all of those ideals, and undermine none of them."

Further, he claims that the perception of nudges depends on the efforts and steps taken to challenge behaviour. If behavioural biases are exploited (e.g. type 1 nudges), nudges tend to be considered more unethical and manipulative than nudges which require individuals to act on their deliberative abilities (e.g. type 2 nudges).

The next section will briefly introduce the concept of manipulation, followed by a summary of prominent critiques of nudging and the defences thereof by the founders of the concept, Sunstein and Thaler. Lastly, the topic is referred back to the present study, where green nudges are considered in this regard.

# 2.6.1 - Manipulation

Sunstein (2016, p.443) defines manipulation as an "*effort to influence people's choice (...) to the extent that it does not sufficiently engage or appeal to their capacity for reflection and deliberation.*". Based on this statement, non-transparent type 1 nudges could arguably be categorised as manipulating, yet the majority of nudges should not be considered a manipulating force (Sunstein, 2014).

However, all decisions and choices are made as a result of variables and influences experienced throughout the day, week, month or year. Of course, some nudges might deliberately manipulate individuals by, for instance, engaging in information overload, framing problems in certain ways, providing deceiving information or generally bypassing system 2 processing.

Generally speaking, this is not in the interest of nudging, and manipulation should be criticised as it undermines autonomy and dignity of individuals. However, some situations or individuals can benefit from being manipulated through nudging, for instance smokers or alcoholics. Hence, there is no simple, black and white conclusion on the boundaries and lines between nudging and manipulation. Friedrich Hayek (1943) claims that choosers should be able (and allowed) to make any decision by themselves, only allowing others to inform and attempt to persuade without manipulation. However, even though manipulation can be pervasive, Sunstein (2016) simultaneously claims that it is impossible to avoid in our modern day. Manipulation can be found anywhere, from the TV to the internet, markets, or political campaigns. He further concludes that ethical objections are reasonable and fruitful when two contextual factors are met. Firstly, when the goal of manipulators is selfinterested, and secondly, when the manipulated act bypasses any deliberative capabilities of individuals.

#### 2.6.2 - Critiques and Defences

Sunstein (2014) claims that there are three main objections to nudging, those of welfare, autonomy and dignity. He also claims however, that these objections are often not fruitful and legitimate. This section will attempt to explain and elaborate on critiques of nudges from an ethical standpoint. Firstly, choice architecture is often scrutinised for being paternalistic in nature. Sunstein and Thaler (2003) acknowledge the fact that nudges follow "libertarian paternalism", steering individuals towards choices which promote welfare, as judged by themselves. Hence, there is grounds for calling out nudges for being paternalistic. However, Sunstein (2014) notes that it is a soft and means-oriented paternalism, avoiding any form of coercion and financial incentives and fully maintaining freedom of choice. He further states that serious concerns should arise if freedom is blocked and choice architects do not respect individuals, none of which nudges do if used appropriately. On the contrary, nudges are designed to help people and achieve higher levels of overall welfare. The thought of nudges being critiqued on the notion of welfare can therefore be dismissed.

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Secondly, the matter of autonomy is questioned. The main issue in this regard is that of respecting any individual's authority to make their own, informed decisions. As Whyte and Selinger (2011) depict, the idea of nudging individuals *"rests on the assumption that the masses are too stupid to make good decisions for themselves.*" (p.928). Sunstein (2014) acknowledges this claim and states that, while some nudges do intrude on autonomy, many actually promote it. In order for individuals to make informed choices, certain knowledge and information is required. Nudges aim to do just that. Of course, some nudges (i.e. default rules) could be argued to override autonomy. However, default rules do not eliminate any possibility of making a choice, they merely serve as a starting point to which some agree, and others do not. Further, given the fact that choice architecture is an unavoidable part of life, the very concept of this cannot be critiqued for overstepping ethical boundaries (Hausman & Welch, 2010).

Lastly, it has been argued that nudges do not respect individuals and undermine their dignity, treating them as if they were children who need an authoritative figure to guide the way. However, in a sense, feeling humiliated and disrespected could have a direct effect on the feeling of welfare. Failing to account for dignity could therefore result in a loss in welfare. With the goal of nudges being to increase welfare, failing to account for, or offending, dignity should be avoided, unless *"it has an overwhelmingly strong justification"* (Sunstein, 2014, p.441). However, reminders, warnings, uses of social norms or spreading information should not, in principle, offend anyone (Sunstein, 2014). Additionally, some claim that nudges can result in individuals being left with fragmented selves, since nudges make individuals behave in certain ways when being nudged, and an entirely different way when they are not being nudged (Whyte & Selinger, 2011).

Conclusively, it can be argued that most objections to nudging on ethical grounds lack force. While manipulation is a topic that should be closely monitored, choice architecture is inevitable: nature nudges, stores have a design, menus place products in a certain manner, TV stations are numbered, websites have designs.

Lastly, it is noted that nudges can be objectionable if the goals are illicit or are driven by religious or political favouritism. However, if nudges aim at being transparent, public and have legitimate ends, finding them unethical is much rarer (Sunstein, 2014). Surely, nudges can be misused if intended to, however the concept was built on the idea of welfare. Not following this ideal would be a misuse and misrepresentation of the concept.

# 2.6.3 - Variations

As previously discussed, Hansen and Jespersen (2013) created a nudging matrix identifying four different types of nudges. Based on this matrix, they also found that the principles and levels of acceptability based on ethicality depends on the different type of nudge. In principle, they argue that nudges are a more acceptable approach to behaviour change compared to techniques such as manipulation and coercion. This statement however is more or less true depending on the specific type of nudge performed. The four nudges presented are considered along the lines of "libertarian paternalism", placed on a spectrum between the two extremes (libertarian and paternalism).

Firstly, transparent Type 2 Nudges. These nudges aim at speaking to the reflective thinking and do not work by manipulation. Consideration and active thinking are encouraged and promoted. This is a truly Libertarian nudge, empowering individuals, leaving freedom of choice and not being invasive. Secondly, transparent type 1 nudges. Here, nudges aim at influencing, in a transparent manner, automatic behaviour rather than choices, speaking to the automatic processing of the mind. This nudge is not considered truly libertarian, as it does work by manipulating behaviour and activating behavioural biases. While individuals are left with a freedom to choose otherwise, this is more so in theory than in action due to the trigger of automatic behaviour.

Thirdly, non-transparent type 1 nudges. These describe a technical and psychological manipulation of the mind. These nudges are considered to be on the paternalistic side, working in the background of consumer minds. However, non-transparent type 1 nudges do not intervene with reflective and conscious thinking, making them less invasive than non-transparent type 2 nudges.

Lastly, non-transparent type 2 nudges are considered a straight manipulation of choice working by manipulating individuals. Here, consumers are being manipulated through underhanded and deceptive tactics, without intention or means being visible. Since non-transparent type 2 nudges target deliberate and conscious thinking of consumers, this nudge is considered the most invasive. Again, in principle, individuals are free to choose what they like, however due to the lack of transparency this is unrealistic. This nudge is considered the most invasive and fully paternalistic. This is due to the fact that responsibility of actions is given to consumers, even though these are results of manipulation (Hansen & Jespersen, 2013).

We now revert back to the topic of green nudges. Schubert (2016) claims that green nudges are nonpaternalistic in nature. In fact, support by individuals for nudges has proven to be higher when the goal of the nudge is considered important and meaningful. Given the seriousness and urgency of environmental problems, Schubert (2016) even considers ineffective nudges to be unethical. It can therefore be argued that green nudges are necessary and welcomed by society, as they are intended to increase social welfare.

## 2.7 - Summing up the Literature and defining the Research Question

As we have established, there are currently many obstacles the world is facing with regards to sustainability and preserving the environment. Especially the current level of meat consumption is a threat to our planet's well-being. While this issue is one that requires change from many industries and the public sector, the role of consumer behaviour is undeniable. However, even though individuals might report positive attitudes towards the environment and intend to behave proenvironmentally, a significant gap between attitude or intention and actual behaviour is still observed. Much research has been dedicated towards understanding the drivers of consumer behaviour and gaining an understanding of how this attitude - behaviour gap might be closed, or at least minimised. It is precisely this gap that the present study aims at tackling, based on an integrative framework and using the concept of nudging. In order to better understand the present research, the literature review offered an overview of the most dominant literature within the field.

For the purpose of this study, the MAO framework was chosen for serving as a baseline for further research as it provides a complete and holistic view of consumer behaviour, including factors such as attitudes, habits, beliefs and situational context, as well as a cost-effective, long-term solution to problems with consumer behaviour. With the MAO model, we hope to identify the drivers of pro-environmental behaviour. As Steg and Vlek (2009) state, when the causal factors of pro-environmental behaviour have been identified, intervention strategies can be directly placed on that variable.

The question remains: how can one change behaviour? Especially when dealing with obstacles such as system 1 processing and habits, behaviour change is not easily achievable. Recently, the concept of nudging has therefore become increasingly popular and is employed in this research as the main intervention strategy, specifically to decrease meat purchase in a shopping context.

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The literature review has reflected several gaps that this research aims to close. Firstly, no study using a theoretical framework of pro-environmental behaviour has achieved to explain clearly and effectively how to close the attitude-behaviour gap. Through our study, we aim at contributing to this stream of research and provide more insights on how nudges might help to close that gap. By linking the nudge specifically to the MAO model, we are, to our knowledge, the first research investigating this relationship. Through connecting both theories, we hope to find out how nudges affect drivers and barriers to PEB.

Also, the MAO model and nudges have both been used extensively in health research, but research incorporating the MAO model, nudges and pro-environmental behaviour is still lacking. The topic of meat consumption has received large attention by researchers, who aim to isolate the drivers of consuming meat. However, to our knowledge, no research has combined the issue of meat purchase as pro-environmental behaviour with neither the MAO model nor nudging. Furthermore, most researchers focus on the choice of the product itself as dependent variable (e.g. choice of healthy product -yes or no), while our research specifically aims at decreasing the quantity of meat products, hence allowing for a more nuanced approach and investigating the feasibility of promoting flexitarian diets.

Finally, the last research gap is more of a technical matter. Many researchers test the theoretical models by applying questionnaires only or equalizing behavioural intentions with intention. The actual observation of behaviour is not given through this approach. However, our research aims at measuring actual behaviour through an experiment. As Bamberg and Möser (2007, p.23) demand, *"the next decade of research on pro-environmental behaviour should concentrate more on the direct experimental test of the causal processes postulated by the theoretical frameworks. For this purpose, more laboratory as well as field experiments are needed that systematically manipulate the variables viewed as causally determining the motivation as well as actual performance of pro-environmental behaviours" We follow that call through the research at hand, by conducting an experimental study in a virtual supermarket.* 

Following this, we intend to assess whether barriers to PEB can be changed by employing nudges and measure their effect on behaviour. Based on the above, this research aims at studying the following question:

How do motivation, ability and opportunity influence consumer behaviour regarding meat purchase and can nudges alter this behaviour?

## **3. THEORETICAL FRAMEWORK**

### 3.1 - The MAO Framework

This section will focus more in-depth on the framework serving as the main point of departure for the present study. The framework in question, developed by Ölander and Thøgersen (1995), is known as the "Motivation- Ability - Opportunity Framework" (MAO). Originally, Ölander and Thøgersen (1995) developed the framework using the case of environmental problems and consumer lifestyles as a serving ground and purpose. The authors identified a need to understand individual consumption patterns from a holistic and integrative point of view in order to understand consumer processes more accurately. In doing so, they created a framework including consumer motivation, ability and opportunity as determinants of behaviour. Overall, the goal of the MAO framework was to serve as "a frame of reference for the study of consumer behaviour with an environmental impact" (Ölander & Thøgersen, 1995, p.347).

The MAO Framework differentiates itself from previous research, beliefs and models within the field of applied behavioural research. As previously established, other popular models such as the TRA concentrate mainly on internal factors, such as attitudes or beliefs. However, research demonstrated that external factors, e.g. the availability of trash cans, were indispensable to explain proenvironmental behaviour such as recycling. Additionally, many models, e.g. the well-known VBN Theory, do not acknowledge the importance of past behaviour or habits, which has proven to be an important predictor of pro-environmental behaviour. While research has now recognized the importance of both external factors and past behaviour, new models try to incorporate all variables that seem to have an influence, making research not feasible due to the plethora of variables (see Kollmuss & Agyeman's model of pro-environmental behaviour).

Contrary to that, Ölander and Thøgersen (1995) aim at providing a cost-effective framework and solution, an issue that is widely ignored by other applied behavioural analyses, while at the same time incorporating the main variables of habit (in form of the ability variable), external factors (reflected in the opportunity variable) and internal factors (found in the motivation variable).

Even though the MAO model provides a simple, but still exhaustive overview of the main variables to explain pro-environmental behaviour, it has not been used extensively in pro-environmental behaviour research. We thus aim at highlighting the importance and the validity of the MAO model in explaining pro-environmental behaviour.

To illustrate our research further, the various variables of the model and its relationships are explained next.



Figure 9: The Motivation-Ability-Opportunity Framework (Ölander & Thøgersen, 1995, p. 361)

# Motivation

The motivation component of the MAO is essentially a simplification of Fishbein and Ajzen's Theory of Reasoned Action and includes four elements: Beliefs, Attitudes, Social Norms and Intentions. As Ölander and Thøgersen explain (1995, p. 361), "...*the person's intention to engage in the behaviour captures the motivational factors and transforms them into a behavioural disposition*". In other words, intention serves as a determinant of behaviour.

Our research investigates the potential decrease of meat purchase as pro-environmental behaviour. Thus, intention is defined as the intention to decrease meat purchase. As Figure 9 shows, intention is in turn influenced by other motivational factors, namely the attitudes towards behaviour and the social norm regarding behaviour (Ölander & Thøgersen, 1995). Although attitudes are a somewhat controversial topic within the field of consumer research due to the attitude-behaviour gap, this framework allows for the integration thereof.

In fact, Ölander and Thøgersen (1995) claim that understanding attitudes and their relations with behaviour allow for a better understanding of interacting, moderating and co-determining the variables shaping consumption.

As Thøgersen (2010a) explains, it is important to measure the attitude towards performing a specific type of pro-environmental behaviour, instead of measuring general environmental concern. Thus, the attitude towards climate change and meat purchase behaviour will likely not correlate (Kollmuss & Agyeman, 2002). As a consequence of that, attitude in our research refers to the attitude towards meat consumption, while beliefs reflect the perceptions towards a carnivore diet. Social norm then refers to the expectations of others to behave in a certain way, in our case to reduce meat consumption. Overall, the motivational component of the MAO framework aims at investigating the drivers behind

the behaviour of individuals.

#### Ability

The ability component of the MAO framework includes notions of habits and task knowledge. In other words, it describes an individual's actual capability to carry out certain tasks. As Figure 9 shows, the relationship between motivation and behaviour is moderated by the individual's ability. More specifically, as Ölander and Thøgersen (1995) suggest, learned habits and routines make individuals capable of performing certain tasks and performances in a routinely and automatic manner. Habits have further proven to play a big role as a determinant of behaviour, especially in regard to the attitude-behaviour gap. As Ölander and Thøgersen (1995) state: *"When habit was strong, the attitude-behaviour link was weak, whereas when habit was weak, the attitude-behaviour link was strong"* (p.365). It could therefore be argued that habits serve as a barrier towards eliminating the attitude-behaviour gap (Reisch & Thøgersen, 2010).

In our research, habits describe old behaviour patterns to purchase meat frequently in shopping situations.

Besides habits, task knowledge plays an important role in determining an individual's ability to perform behaviour. Knowledge comes in many forms and could refer to lack of information, incorrect information, forgetting information or simply not being able to understand information. If people do

not have sufficient knowledge to perform a given task, they are simply not able to do so (Ölander & Thøgersen, 1995). Aside from the knowledge to perform a task, the skills to perform the task are also crucial. Referring these aspects to our research, task knowledge describes whether an individual is actually able to decrease his or her meat consumption, either through knowledge or the skills to do so (e.g. skills to cook meat-free).

Thus, the relationship between the intention to decrease meat purchase and the actual behaviour is stronger if individuals possess the task knowledge to do so.

## **Opportunity**

The final component of the MAO framework is that of opportunity and refers to the situational context of decisions. Opportunity, just like ability, is understood as a moderator to behaviour, meaning behaviour is more likely to occur if individuals have the opportunity to do so. While opportunity can generally be measured subjectively and objectively, Ölander and Thøgersen (1995) suggest viewing opportunity as an objective component.

Although individuals might perceive the same opportunity differently (subjectively), they ultimately still have the same opportunity at hand (objectively). An example of the effect of opportunity on environmental behaviour is given with the case of recycling. More specifically, research showed that households living closer to recycling stations also tend to recycle better and more than households living further away from recycling stations. In other words, when the opportunity to recycle is closer and more convenient, behaviour adjusts accordingly (Ölander & Thøgersen, 1995).

In the case of meat purchase, the availability of meat alternatives in the supermarket might be crucial, as *"environmentally friendly everyday products are usually not as widely distributed as their conventional and more environmentally harmful counterparts"* (Thøgersen, 2010a, p.108). Thøgersen (2010a) further describes that consumers have thus limited opportunities to shop environmentally friendly in everyday shopping situations. When the opportunity to shop meat alternative products is available, the link between the motivation to decrease meat purchase and the actual behaviour is stronger.

As we have established, motivation, ability and opportunity all play an influential role on behaviour. More specifically, consumers, even though they have the motivation to behave environmentallyfriendly, do oftentimes not do so, unless this relationship is facilitated through the opportunity and ability. Especially within the field of sustainable consumption, it is vital to take action and aim at adjusting consumer behaviour to more sustainable consumption patterns. While many strategies to promote pro-environmental behaviour still focus on educating and providing information to ultimately change beliefs and attitudes (Kollmuss & Agyeman, 2002), facilitating conditions for ability and opportunity might be necessary.

One identified method of doing so is that of nudging. More specifically, this study aims at investigating the influence of motivation on consumption and assess whether nudges enhancing the ability and opportunity of consumers can alter the behaviour.

More specifically, this study uses a non-transparent type 1 nudge (*ease and convenience*) to influence consumer opportunity. Through positioning of meat products next to meat alternative products, a more accessible choice alternative is given. Thus, by providing an easier access to meat alternatives in the supermarket, the opportunity to shop sustainably is enhanced.

The second nudge used, transparent type 2, is that of *disclosure*. By disclosing the environmental impact through traffic light labels, this is used to target the ability of consumers to choose less meat products. Specifically, traffic light labels will enhance the knowledge about the impact of meat. The exact operationalization of these nudges is explained in the methodology.

### 3.2 - Relating theory to the present study/Developing Hypotheses

To outline our theoretical framework further, we identified the dependent and independent variables of this study. Essentially, we have three different parts to test:

Firstly, as attitude is predicted by beliefs, we need to verify this relationship, namely with attitude as dependent, and beliefs as independent variable.

Secondly, we aim at understanding the underlying drivers of intention, which are, according to the MAO framework, social norm and attitude towards the behaviour. Thus, intention acts as dependent variable, while social norm and attitude are independent variables.

Thirdly, with the ultimate goal of the study being the decrease in meat consumption, **meat purchase** is considered the **dependent variable**, more specifically the quantity of meat products chosen. Further, since we are measuring the effect of **ability**, **motivation** and **opportunity** on meat purchase, these are identified as being the **independent variables**. To clarify, motivation includes beliefs, attitudes, social norm and intentions, while ability includes habits and task knowledge.

	Dependent Variable	Independent Variable
Part 1	Attitude towards meat consumption	Beliefs
Part 2	Intention to decrease meat purchase	Social Norm, Attitude
Part 3	Behavior (Meat purchase)	Intention, Social Norm, Attitude
		Task Knowledge, Habit (Moderator)
		Opportunity (Moderator)

Table 2: Definition of variables (own illustration)

# Part 1:

According to the framework of Ölander and Thøgersen (1995), beliefs about meat consumption will have an influence on attitudes towards meat consumption. To specify the belief variable further, we included beliefs regarding carnivore and flexitarian diets, where the latter refers to meat-reduced diets, as we hypothesize that positive beliefs about flexitarian diets and negative beliefs about carnivore diets influence the attitude regarding that topic.

H1a: People reporting favourable beliefs towards a flexitarian diet will report stronger negative attitudes towards meat consumption than people with unfavourable beliefs.
H1b: People reporting unfavourable beliefs towards a carnivore diet will report stronger negative attitudes towards meat consumption than people with favourable beliefs.

# Part 2:

In this part, we focus on the predictors of behavioural intention. As the MAO framework establishes, intention is influenced by social norm and attitudes. While Ölander and Thøgersen (1995) refer specifically to the attitude towards the behaviour, we also include environmental concern/ environmental attitude as predictor.

H2a: People with negative attitudes towards meat consumption will report a higher intention to decrease their meat purchase than people with positive attitudes.

H2b: People reporting high environmental concern will report a higher intention to decrease their meat purchase than people with low environmental concern.

H3: People being subject to strong perceived social norms regarding the decrease of meat consumption will report a higher intention to decrease meat purchase compared to people under weak social norms.

### Part 3:

While the first hypotheses are concerned with the predictive power of several variables to explain behavioural intention, our main research is concerned with the actual measured behaviour. Contrary to other researchers using this or similar frameworks, we do not equalize behavioural intention with actual behaviour.

We hypothesise the following for the relationship between intention and actual behaviour:

*H4: People reporting a high intention to decrease meat purchase will choose less meat products than people reporting low intentions to decrease meat purchase.* 

Additionally, we go one step further in analysing the predictors of behaviour, and look at social norm, attitude towards meat purchase and environmental concern as independent variables to account for any possible direct relationship.

H5: People being subject to strong perceived social norms regarding the decrease of meat consumption will choose less meat products than people under weak social norms.
H6a: People with negative attitudes regarding meat consumption will choose less meat products than people with positive attitudes.

*H6b: People reporting high environmental concern will choose less meat products than people with low environmental concern.* 

Another important predictor of behaviour is ability, which can be divided in task knowledge and habit. While the MAO model establishes ability as a moderator, we are also interested in the direct effect of ability on behaviour.

To operationalize the variable task knowledge further, we use perceived knowledge, perceived skills and objective knowledge as variables. These is explained further in the methodology.

H7: People reporting strong habits regarding meat purchase will choose more meat products than people with weak meat purchase habits.
H8: The link between intention and behaviour will be stronger if meat purchase habits are weak.

H9a: People reporting high perceived knowledge on how to decrease meat consumption will choose less meat products than people reporting low perceived knowledge.
H9b: People reporting high perceived skills on how to decrease meat consumption will choose less meat products than people reporting low perceived skills.
H9c: People reporting high objective knowledge on the environmental impact of meat consumption will choose less meat products than people reporting low objective knowledge H10: The link between intention and behaviour will be stronger if the participant reports high task knowledge.

As a next step, the effect of the employed nudges needs to be considered. Firstly, we have a control condition, where no nudge is employed. Secondly, in condition 1, the ease and convenience Nudge is used, while condition 2 employs the disclosure nudge. Lastly, condition 3 combines both nudges. In the first condition, we apply an ease and convenience nudge, which simply places meat alternatives next to normal meat products. Through the direct placement of a meat alternative next to meat, we assume that a higher degree of objective opportunity is given. Thus, we hypothesize that, as in the example of recycling bins, an immediately available alternative increases the opportunity to decrease meat purchase, and thus leads to choosing less meat products.

Furthermore, the link between intention and behaviour will be stronger in Condition 1 as the opportunity to choose an alternative is enhanced.

H11a: Compared to the control condition, meat purchase in condition 1 will be significantly lower due to the increased opportunity.

H11b: The link between intention and behaviour will be stronger if the opportunity to choose alternatives is given.

While seeing the nudge as an increase in opportunity, there are certainly other ways to hypothesize the effect of the nudge. As ease and convenience is a type 1 nudge, and hence caters to the automaticity of the brain or System 1, one could also argue that the nudge directly influences habits. Through the change in environment, habits could be disrupted, and new habits evolve. While this is certainly a plausible hypothesis, one has to keep in mind that habits take a long time to change, and that an increased opportunity to behave in a certain way also might change habits. Thus, we leave this short excursion as a line of thought.

Condition 2 includes the disclosure nudge, where traffic light labels are placed on meat products and meat alternatives. The purpose of the disclosure nudge is to convey the negative impact of meat consumption due to high GHG emissions in a simplified way. Thus, we hypothesize that through using this nudge, meat purchase will decrease. While the available literature only investigates the effect of the nudge in terms of outcome, we also investigate how it reflects in our model. As disclosure of information likely leads to an increased awareness of the issue, we hypothesize that in condition 2 we will see an increased level of task knowledge, that is perceived knowledge, perceived skills or objective knowledge, compared to other conditions.

H12a: Compared to the control condition, meat purchase in condition 2 will be significantly lower due to the disclosure nudge.

H12b: People will report a significantly higher task knowledge in condition 2 compared to the control condition.

Again, the nudge could affect other variables as well, such as influencing attitudes or beliefs towards meat consumption by showing the negative impact of meat towards the environment. However, we hypothesize that the impact of the type 2 nudge starts at task knowledge, and thus caters to the reflective part of the brain, or system 2, and might consequently influence attitudes and beliefs. As the MAO model shows, the influence of ability on beliefs is theorized. However, it will not be part of this research.

Lastly, condition 3 combines both nudges, meaning that we combine meat and meat alternative products in one shelf, and label them with traffic light labels. Through the combined effect of the nudges, we expect the meat quantity to be significantly lower than in the control condition. Furthermore, we also expect an increase in task knowledge as in condition 2, compared to the control condition.

H13a: Compared to the control condition, meat purchase in condition 3 will be significantly lower due to the disclosure and ease and convenience nudge.
H13b: People will report a significantly higher task knowledge in condition 3 compared to the control condition.



In Figure 10 below, an overview of the predicted relationships of our model is shown.

Figure 10: MAO- framework adapted (own illustration)

# **Control Variables:**

Lastly, we want to shortly introduce the control variables and the reason why they need to be monitored. In this research, we exclusively use demographic variables as control variables, namely gender, age, nationality, income, education and employment status.

According to research, women tend to act more pro-environmentally (Allen, 2016), and more years of education tend to indicate a higher knowledge on environmental issues (Kollmuss & Agyeman, 2002). Additionally, income allows individuals to behave more pro-environmentally, as green behaviour is often associated with higher cost (Allen, 2016). Also, the nationality variables allow us to grasp the difference in consumption among different cultures, as meat consumption is deeply ingrained in cultural norms (Kollmuss & Agyeman, 2002).

By employing different nudges and techniques on various respondent groups, we expect to gain insights into the differences in effectiveness and successes of nudging techniques. The next section details how the research was constructed in practice.

## 4. METHODOLOGY

#### 4.1 - Introduction

The following section introduces the reader into how we proceeded to structure our research, which philosophy of science we pursue and how we gathered relevant data.

Following the research "onion" of Saunders, Lewis and Thornhill (2016), this section is structured accordingly, starting with the research philosophy, the theory development, methodological choice, the data strategy, time horizon and finally techniques for data collection and analysis.

#### 4.2 - Research Philosophy & Theory Development

According to Saunders et al. (2016), the research philosophy relates to a system of beliefs and assumptions of how knowledge is developed. Researchers generally differentiate among five major philosophies, namely *positivism, critical realism, interpretivism, postmodernism and pragmatism.* Among all philosophies, our research follows the **Positivism philosophy.** Positivism assumes one true reality (ontology), only relies on measurable and observable facts (epistemology) and conducts a value-free research (axiology). As Collins (2010, p.38) outlines, positivism *"has an atomistic, ontological view of the world as comprising discrete, observable elements and events that interact in an observable, determined and regular manner"*. The role of the researcher is to conduct an independent research with minimal interference with participants and large samples (Dudovsky, n.d.). Furthermore, as we focus on measuring only the observable facts and rely on data collection and interpretation in an objective way through statistical means (Dudovsky, n.d.), we are adopting a positivist research approach. As we are also researching subconscious processes due to the application of non-transparent nudges, first-hand insights would not give sufficient explanation as consumers should not notice the nudging effect.

With regard to the theory development we can differentiate between *inductive* and *deductive* research. Our research clearly follows a **deductive** approach, as we developed hypotheses from established theory (Nudge theory and MAO framework) and test it against observations of a large sample.

## 4.3 - Methodological choice, Research Strategy and Time Horizon

After clarifying the underlying philosophy and theory development, this section focuses on the research design and methodology of the research.

This research follows a strict **quantitative method**, as it seeks to quantify how large the impact of nudges is on meat purchase and to what extent underlying motivation, ability and opportunity are responsible for this choice. This research is not concerned with the underlying reasons or thoughts of participants, but the observable facts, relating again to our positivist and deductive approach.

Furthermore, the nature of the research can either be *exploratory, descriptive, explanatory evaluative*, or a *mix*. As our research aims at explaining the relationship between motivation, habit/ability, opportunity and meat purchase and the effect of nudges on it, we are conducting an **explanatory research** to explain the relationship between the variables, which has not been studied in-depth before.

Following that, the research strategy needs to be defined. We focus on the **experiment** and **questionnaire** as our employed methods. As we mentioned, many researchers work with behavioural intentions as a proxy to behaviour or use self-reported behavioural data. However, we want to measure the actual meat quantity chosen through an experimental setting, and thus be able to measure the effect of nudges.

For the experimental setting, we set up a **between-subjects design** with **four different groups** to test of the effect of several nudges. The first group consists of the control group, where no manipulation is given. The three other treatment groups each have a different nudge employed.

This part of our research is designed to test the difference in meat purchase quantity among the four conditions, as we hypothesize that there will be a significant decrease in meat purchase from the control to the experimental conditions.

The second part of the research consists of a questionnaire. Here, several questions following the MAO framework by Ölander and Thøgersen (1995) are posed to determine participants' motivation and ability regarding meat consumption and environmental concern. The results of the questionnaire and experiment are later cross-referenced to determine whether the employed nudges have an influence on motivation/ability and thus on behaviour. Both the experiment and questionnaire are

conducted together through an online questionnaire. The exact set-up of both are discussed in-depth in the next section.

Lastly, the time horizon of the questionnaire is crucial. Research can be conducted over a longer time period (*longitudinal research*) or describe an event at a certain point of time (*cross-sectional*) (Saunders et al., 2016). Even though a longitudinal research set-up would have been advantageous for our purpose to investigate the long-term effect of nudges on purchase decisions, we did not have the possibilities to accompany participants over a longer time frame. Thus, the research is a **cross-sectional study**, meaning that we sent our questionnaire out at one point in time to the participants.

#### 4.4 - General questionnaire set-up

The online questionnaire consists of two main parts, first the virtual store and second the questions to quantify the MAO framework.

To start the questionnaire, we added a small introduction about ourselves, the purpose of the research and gave first instructions (e.g. using a computer, approximate time duration). As Saunders et al. (2016) explain, this section is crucial as it might have a considerable effect on the response rate and should clearly cover why participants should fill out the questionnaire. We kept the initial statement rather broad (questionnaire on consumer-decision-making), as any insight on the true purpose (meat reduction through nudges) might have influenced the consumer choice. As this poses ethical questions, we gave a more thorough explanation at the end of the questionnaire together with our contact details for further questions.

The questionnaire proceeded with detailed instructions. Participants were instructed to imagine an ordinary shopping situation to buy dinner, together with technical instructions. We gave a specific task to shop for a meal to directly induce a food-related shopping experience and potentially trigger consumer habits.

Following the instructions, the shopping experiment started, which is explained in-depth in the following section. After finishing the first task, participants were thanked and informed that the study would proceed with a short questionnaire, which is also explained in the next section. After that, the participant is thanked again and has the option to reach out should any additional questions arise.

We used the research tool Qualtrics to gather our responses, as it provided the option for designing the online store.

## 4.5 - Experiment set-up

To design a decision-making experiment, several options for this research were considered, e.g. a field research, a lab experiment with a real product shelf, or a virtual store experience. Due to limited resources, it was decided to combine a virtual store with a questionnaire and send it out as an online link to be filled out at home.

The research follows the experimental design of Herpen, Fischer and Trijp (2015), who investigated the impact of the positioning of organic, intermediately sustainable, and conventional meat products. Participants were asked to buy meat for themselves and a friend and could choose in which section they wanted to shop their meat (see in Figure 11, e.g. in condition A: choose among organic meat shelf or conventional and Better Life meat shelf).

Herpen et al. (2015) used three conditions displaying the different positioning of meat products, where they either position organic meat, conventional meat and "intermediately sustainable meat" separately, or mix the "intermediate" meat with either organic or conventional meat. Below you can see the experiment set-up of Herpen et al. (2015) with three conditions. Participants were only exposed to one condition.



Figure 11: Exemplary store layout (Herpen et al., 2015, p. 31)

When selecting one section, a shelf was displayed to the participant, including pictures, verbal description, weight, and price (see Figure 12, Herpen et al., 2015). In that experiment, participants could select a shelf, have a look at all the products and switch back and forth between the sections (similar to a real supermarket). When they wanted to select a product, they could click on it and confirm the choice, after which they would check out and proceed with a questionnaire.



Figure 12: Exemplary meat shelf (Herpen et al., 2015, p. 32)

Similarly, our participants had the task to buy ingredients for a regular dinner in a normal shopping situation. We showed the outline of a regular supermarket rather than only the meat aisle, as we did not want to disclose what product was of interest to our research. Thus, participants did not know that we were actually only interested in their choice of meat products, or the lack thereof. Figure 13 shows the outline of the supermarket as seen by the participants. The store layout was adopted from the Danish supermarket "Meny" in Østerbro.



Figure 13: Virtual store (own illustration)

The participant was able to select a section of the supermarket, where the respective shelf appeared upon selection. These shelves were built by us using PowerPoint and by inserting pack shots from Danish online supermarket stores. Below (Figure 14) you can see an example of a fruit shelf. We followed the shelf building approach by Kleef et al. (2012), who tested the effect of positioning and assortment structure of healthy vs. unhealthy snacks on a shelf (Figure 15).



*Figure 14*: Fruit & Vegetable Shelf (own illustration), *Figure 15*: Exemplary shelf (Kleef et al., 2012, p.4)

METHODOLOGY

In our experiment, the participants could look at the products and choose as many as they wanted by clicking on the product. In total, 12 "decision rounds" were given (11 normal rounds and one extra round if anything was forgotten). However, not all rounds needed to be taken. If the participants were done shopping, they could check-out, confirm the purchase or otherwise return to the store for one extra round. After the last round, the participant left the store automatically. The limitation in trips was given due to technical limitations that slowed down the program considerably when inserting more options. However, our testing showed that participants mostly used less rounds and we also inserted an extra question to write down ingredients if they missed them in the store.

While Herpen et al. (2015) gave detailed information about each product (description, weight) and showed a price, we excluded these aspects deliberately. With regards to the description, we wanted to make it as realistic to a supermarket as possible, where a description is not provided. However, we noticed a limitation relating to that. The products appear quite small in the shelf; therefore some labels cannot be read. As we are only interested in the meat products, which are readable, this should not pose a problem.

Regarding the price, we want to investigate the pure effect of a nudge without the price perception, as it might affect the effect of the nudge considerably. People might decide to choose a product because of the price, not because the nudge worked. This is why we left the price component out.

As mentioned, we have four conditions and thus different supermarket designs. In the control condition, no manipulation is used, and we simply showed the layout and shelves based on the supermarket "Meny". Meat and meat alternative products can be found on different shelves.

In condition 1, we use an ease and convenience nudge, meaning that we placed meat alternatives, such as plant-based products, on the same shelf as meat products. We also named the shelf in the store overview accordingly (Meat + Vegetarian). By providing the alternative to meat products in the same shelf, we provide an increased opportunity to shop alternative products, which is why this nudge acts as our opportunity variable.

We did not add any vegetarian option on the Cold Cuts shelves, as we were focusing on meat to cook dishes with. This nudge followed the research of Herpen et al. (2015), as mentioned previously, but also took insights from De Wijk et al. (2016) on their research of bread positioning in the supermarket and Kleef et al. (2012) on their snack assortment study.

In condition 2 we introduced the disclosure nudge, where we added a small introduction note at the beginning of the experiment, explaining that the supermarket had introduced a new labelling policy regarding GHG emissions. The supermarket layout itself was not changed. Thus, we placed green labels (small green dots) on meat alternative products and red labels on meat products (Cold Cuts and Meat). Again, we only focussed on this product category to give a boundary to the research. Furthermore, we made the simplified assumption that meat products have worse GHG emission than meat alternative products.

The label design, commonly known as traffic light labelling, was taken from the research of Thorndike et al. (2014), who investigated the long-term effect of traffic light labelling in a hospital cafeteria for health purposes.

Lastly, in condition 3 we combined both nudges from condition 1 and 2, meaning that we placed meat alternative products in the same shelf as meat products, and also added the green/red labels. Similarly, Thorndike et al. (2012) implemented traffic light labelling in a canteen and placed "healthy" (green) products and "unhealthy" (yellow and red) products on the same shelf (see Figure 16). In Appendix 4, all shelves can be seen.



Figure 16: Meat shelf with disclosure, and ease and convenience nudge (own illustration)

## Questionnaire

After the experiment, we continued our online questionnaire with a questionnaire collecting data on three main topics: Motivation and Ability as described by Ölander and Thøgersen (1995) and Demographic variables. Regarding demographics, we measured gender, education level, employment status, income level and nationality on nominal scales, and age on a continuous scale (Statsdirect, n.d.). As previously explained, Opportunity is operationalized by the implementation of the nudge.

#### Motivation

The Motivation variable as described by Ölander and Thøgersen (1995) consists of several subvariables: Intention, Attitudes, Beliefs and Social Norm. To operationalize the variables, we used several established scales from other researchers. All statements of our questionnaire can be found in appendix 2.

For the social norm variable, we adapted statements put forward by Thøgersen, Haugaard and Olesen (2010) and Conner, Normann and Bell (2002), such as "*People whose opinion I value want me to follow a flexitarian diet*", which measure the perceived influence of the social environment.

Secondly, the intention variable was also adapted from Conner et al. (2002), with statements such as *"I intend to decrease my meat consumption in the future"*.

Conner et al. (2002) investigated the application of the Theory of Planned behaviour (TPB) on healthy eating, while Thøgersen et al. (2010) researched the adoption of new ecolabels.

Regarding attitudes, we used three different scales to measure attitudes on meat consumption. First, we checked the attitude towards meat with statements of the Meat Attachment Questionnaire (MAQ) established by Graca, Oliveira and Calheiros (2015) with statements such as *"To eat meat is one of the good pleasures in life"*. Graca et al. (2015) established that scale to measure the bond of participants towards meat to enhance the adoption of plant-based diets.

Secondly, we measured attitudes towards environmental issues with the New Environmental Paradigm Scale (Dunlap et al., 2000), e.g. *"We are approaching the limit of the number of people the Earth can support."* 

Thirdly, we quantified environmental concern as last attitude. Here we adapted statements by Thøgersen et al. (2010), such as "*I am concerned about the development of the global environment*".

By measuring three different aspects on attitudes, we hoped to get a more comprehensive picture on the general attitude of meat consumption.

All the above-mentioned scales were presented on a 7-point Likert scale ranging from Totally Disagree to Totally Agree.

Lastly, we measured salient beliefs about flexitarian and meat diets with scales from Povey, Wellens and Conner (2001). Povey et al. (2001) measured in their research the attitudes and beliefs of participants towards their respective diet (e.g. vegetarian or carnivore), based on the TPB. Here we adapted the identified beliefs of the research to our research and let the participants choose the beliefs they associated with the respective diet, e.g. "*cruel and barbaric*" for a meat diet. These items were measured through a multiple-choice scale.

#### Ability

In the model by Ölander and Thøgersen (1995), Ability is conceptualized as habit and task knowledge. While the concept of habit has been explained extensively in the beginning of this paper, task knowledge needs some further operationalization in terms of variables to measure.

Ölander and Thøgersen (1995) explain task knowledge as "some people lacking sufficient information, being unable to understand the message, or forget important information" (p.21). While the authors refer to recycling in the example, we looked at the literature on how to measure this insight. In that regard, we focussed on the study of Vos (2015), which combined the MAO model with a framing nudge in a supermarket.

Here, Vos (2015) operationalized the task knowledge variable as consisting from perceived knowledge and perceived skills, relating to the concept known as self-efficacy (Bos et al., 2015). As Bandura (1982,1989) points out, *"the self-efficacy mechanism (shows how) judgments of personal efficacy influence the courses of action that people choose to undertake, the effort they will expend, and their persistence when confronted with obstacles* (found in Sheeshka et al. (1993, p.3)).

This mechanism indicates that if people believe they know how to and are able to behave in a certain way, they will probably also behave accordingly. This concept is similar to the perceived behavioural control (PBC) by Ajzen and Madden (1986, found in Sheeshka et al., 1993).

To measure perceived skills, we used several items of the 23-item self-efficacy scale, which originally measured the perceived ability to follow healthy eating practices (Sheeshka et al., 1993) and Conner's et al. (2002) measures of PBC. Our adapted statements ranged from "*I can cook meals without using meat*" to "*I would like to eat a flexitarian diet in the future but do not know if I can*".
Regarding perceived or subjective knowledge, we took the questions from Thøgersen et al. (2010) on his research about consumer responses to ecolabels. Here, statements included for instance "When it comes to sustainable food products, I do not know a lot".

In addition to Vos' (2015) conceptualization of Ability, we also wanted to include another aspect of Ability, which Thøgersen et al. (2010) mentions in his work: Objective Knowledge, or "actual" knowledge about the topic at hand. In our case, we measured the extent of knowledge regarding the detrimental effect of meat on the environment. e.g. "*The high amount of livestock held on the planet leads to increased GHG emissions*".

Lastly, the Ability part of the framework also includes habits. While most research measures habits with the FFQ (Food Frequency Questionnaire, e.g. Bos (2015) or Conner et al. (2002)), we used several items of the self-report index of habit strength (Verplanken & Orbell, 2003), e.g. "*Buying meat is something I do frequently*".

All items were measured as statements on a balanced 7-point Likert scale, with the anchors being Totally Agree to Totally Disagree. The overview can be found in appendix 2.

#### **Opportunity**

As we are conducting an online experiment and want to measure actual behaviour, we cannot measure the normal shopping situation of our participants and thus the extent of opportunity to shop sustainably. In our experiment, participants in the control condition all have the same opportunity to purchase meat alternatives by selecting the specific shelf. In condition 1 and 3 however, participants have a higher opportunity compared to the control condition, as the meat alternatives are placed right next to the meat products. By employing the nudge, we can account for the opportunity variable.

In a field research, opportunity should be measured by several different variables, such as distance to a supermarket with meat alternative products, variety of selection etc. However, this will be a task for future research.

In Appendix 5, the questionnaire as displayed to the participants can be seen.

#### 4.6 - Construction of Variables

Firstly, in an effort to create consistency between variables of the questionnaire, we ensured that all statements were worded towards the same direction. All statements which were worded negatively had to be reversed to avoid response bias to construct one variable (Pallant, 2013).

Secondly, we created different variables from our statements in the questionnaire to allow for the testing of our model. Mostly averages of the scores on the statements were computed.

Beliefs were more complicated to compute and essentially followed the approach of Povey et al. (2001). We adopted Povey et al. (2001) distribution of beliefs to either positive or negative beliefs about the respective diet (e.g. unsustainable=negative belief). Then we generated a score for positive (P)/negative (N) beliefs, depending on the amount of beliefs selected. As the number of positive and negative beliefs was not equal, we computed the average value by dividing the positive/negative score by the total number of positive/negative beliefs. Finally, we subtracted positive minus negative beliefs for flexitarian beliefs, and positive minus negative beliefs for meat beliefs. The following formula measures this computation.

$$\mathbf{B}_{\mathrm{C},\mathrm{F}} = \frac{P}{\sum P} - \frac{N}{\sum N}$$

Thus, a positive Flex Beliefs value indicates positive beliefs for flexitarian diets, while a positive Meat Beliefs value indicates positive beliefs about carnivore diets.

For a more comprehensive overview and the exact questionnaire statements, please see appendix 2.

## 4.7 - Assessing the reliability of the questionnaire

We tested the questionnaire for internal consistency using Cronbach's alpha. Essentially, this method tests whether the questionnaire is reliable in that it reports whether the items selected indicate and report on the same attributes. High correlations result in high alphas, which in turn mean strong reliability. The alpha is measured from 0 to 1, and a minimum level of .6 to .7 is recommended to consider a scale reliable (Pallant, 2013). It is important to note, however, that few items in a scale (below 10) can result in lower alphas. Table 3 shows an overview of all values for Cronbach's alpha for all variables in every condition of this study.

Variable	Consists of	Cronbach's alpha
Meat Attitude	Meat Attitude 1, 2, 6, 3 R, 4 R, 5 R, 7 R, 8 R	.738
Environmental Attitudes	Environmental Attitudes 1, 3, 6, 7, 5 R, 4 R, 2 R	.675
Sustainability Attitudes	Sustainability Attitudes 1-5	.742
Objective Knowledge	Objective Knowledge 1-3	.530
Social Norm Done	Social Norm 1-3	.646
Intention Done	intention 1-6	.875
Perceived Knowledge Done	Perceived Knowledge 3 R, 5 R, 4 R, 1, 2	.904
Perceived Skills Done	Perceived Skills 1-2	.721
Habit Done	Habit 1-6	.918

Table 3: Cronbach's alpha (own illustration)

Overall, the above variables show alphas above .6 in all but one instances, signalling a reliable questionnaire.

# 4.8 - Data Collection

# 4.8.1 - Sampling

It was deemed necessary to filter and exclude some participants and responses from our experiment and questionnaire. We had four minimum requirements for each respondent to fulfil. If these were not met, the insufficient response was excluded from the data set.

The four requirements were: Firstly, respondents who have never lived in Denmark were excluded automatically. Considering the fact that the virtual supermarket contained only of Danish products, we eliminated anyone who would not be able to recognise or properly understand the available products. Even though this restriction was given due to the nature of research, this is also an interesting opportunity, as Denmark is one of the countries with a considerable high meat consumption in Europe (WWF, 2014).

Secondly, the questionnaire automatically excluded participants who claimed not to be, at least partly, responsible for grocery shopping at home. This is due to the fact that there are no existing habits for grocery shopping and, as a result, no changes in behaviour can be measured.

Thirdly, respondents already following a vegetarian or vegan diet were not considered for further testing and, as a result, were excluded from the data set. Vegetarians or vegans do not have existing habits of eating meat and therefore there is no effect to be measured from the nudges employed in the experiment. Meat purchase is already non-existent and can therefore not be decreased. Lastly, we excluded any participant who did not fully complete the experiment and questionnaire.

Other than that, there were no restrictions to the target population. As our research comprised no sampling frame, we had to engage in *non-probability sampling*. In that regard, we further engaged in volunteer sampling, meaning that the participants chose whether they wanted to participate, and more specifically used self-selection sampling and convenience sampling. This means that we made our need for participants public, and participants could participate if they wanted to. Furthermore, we asked them to share the questionnaire, engaging in a snowball effect. As we had 4 conditions, we had to randomize the participants to the respective conditions. Thus, we made an overview of all the platforms on social media and alternated the conditions between both researchers and platforms (e.g. LinkedIn each researcher would post a different condition). Randomizing the conditions among both networks ensured a valid respondents base.

This study saw a total of 224 respondents distributed amongst the four testing conditions. Table 4 illustrates the precise number of participants in total, as well as for each specific condition. As the table shows, a rather large number of participants had to be eliminated from the sample. As a result, 108 participants remained for further testing. We used the IBMS SPSS software version 9.6.0.0.

	Total	Control	Cond 1	Cond 2	Cond 3
Respondents	224	63	50	57	54
After filtering	108	25	29	26	28
Excluded	116	38	21	31	26

Table 4: Number of respondents (own illustration)

In order to portray the demographic data of this study in more detail, Table 5 shows an overview of demographic variables such as gender, nationality, age, education, employment and income of each individual condition as well as the total. We used frequency tools in the SPSS software to create an overview of demographic variables of all respondents. This table consists of information of participants of the four conditions as well as a total number. However, some categories do not reach 100% fully, this is simply due to the fact that incomplete questionnaire answers were taken out of the statistics.

Regarding the demographics, male and female respondents were represented almost equally throughout, making up 41,7% and 58,3% respectively. With regards to nationality, there was a tendency towards each condition consisting of mostly Danes and Germans, the totals being 38% and 32,4% respectively. 6.5% of the participants were Italian natives and the remaining respondents are

not represented enough to make up for a separate category, hence they are assigned to the category "Other".

Regarding the age of the participants, our sample was relatively young, with over 50 % being 24 to 26. The mean age was 28 years, and while the youngest respondent was 17 years old, the oldest was 71. At the same time, the sample was highly educated, with 91.7 % of the respondents having either a Master or bachelor's degree. The demographic of employment is categorised into "employed", "student" and "unemployed/retired". "Employed" respondents include part-time, full-time and freelance employment. "Student" includes full-time and part-time studies. While every category is represented in our sample, the majority of our respondents are students (60.2%) or employed (34,3%). Lastly, we considered the income category. Here, we categorised into "low income (0-199.000DKK/an)", "medium income (200.000-499.999DKK/an)" and "high income (500.000+/an)". Most of the respondents fell into the category of "low income" (69,4%), followed by medium income (21,3%). An exhaustive overview of all variables can be found in Appendix 3.1.

	То	Total Control Condition 1		tion 1	Condition 2		Condition 3			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender										
Male	45	41,7	5	20,0	14	46,7	12	46,2	14	50,0
Female	63	58,3	25	80,0	15	51,7	14	53,8	14	50,0
Nationality										
Danish	41	38,0	12	48,0	13	44,8	10	38,5	6	21,4
Norwegian	1	0,9	0	0,0	0	0	0	0	1	3,6
Swedish	1	0,9	0	0,0	1	3,4	0	0	0	0,0
German	35	32,4	8	32,0	10	34,5	7	26,9	10	35,7
Italian	7	6,5	0	0,0	4	13,8	3	11,5	0	0,0
Other	23	21,3	5	20,0	1	3,4	6	23,1	11	39,3
Age										
25 and under	60	55,6	16	64,0	14	50	16	61,5	14	50,0
Above 25	46	42,6	9	36,0	14	50	9	34,6	14	50,0
Education										
Low Education	9	8,3	4	16,0	1	3,3	3	11,5	1	3,6
High Education	99	91,7	21	84,0	28	93,3	23	88,5	27	96,4
Employment										
Employed	37	34,3	13	52,0	12	40,0	7	26,9	5	17,9
Student	65	60,2	10	40,0	15	50,0	18	69,2	22	78,6
Unemployed/Retired	6	5,6	2	8,0	2	6,7	1	3,8	1	3,6
Income										
Low Income	75	69,4	14	56,0	18	60,0	22	84,6	21	75,0
Medium Income	23	21,3	8	32,0	7	23,3	4	15,4	4	14,3
High Income	9	8,3	3	12,0	3	10,0	0	0	3	10,7

Table 5: Overview of demographics (own illustration)

# 4.8.2 - Data collection

Both the experiment and questionnaire were designed in the online questionnaire program Qualtrics. The estimated duration of the questionnaire was approximately 20 minutes due to the store experiment.

After conducting a pilot test with six test persons and adapting the questionnaire accordingly, the Qualtrics questionnaire was then distributed via social media and personal contacts to the participants. Reminders were sent regularly to ensure that participants would fill out the questionnaire. As the questionnaire takes approx. 20 minutes, several reminders were necessary as participants were postponing the participation.

After having introduced the detailed methodology of our research, we will now come to the data analysis, which discusses the statistical methods used to analyse the data. The results are applied to the respective hypotheses in *6.1 Results*.

#### **5. DATA ANALYSIS**

#### 5.1 – Descriptives

As a first step in the data analysis, we evaluated the interval variables (social norm, attitudes, beliefs, intention, task knowledge and habit). Looking at the descriptive statistics, we notice relatively high mean values. This shows a high environmental awareness, knowledge and intention to reduce meat consumption. Table 6 provides an overview of the mean and standard deviation of these variables, divided in different conditions. As can be seen, the conditions do not vary considerably in the mean of the variables. Furthermore, the means of the variables Objective Knowledge, Perceived Skills, and Environmental Attitude seem to be quite high, while Meat Attitudes seem to be positive, as low values indicate positive attitude towards meat. The full table is available in the Appendix 3.2.

	Total		Control Condition		Condition 1		Condition 2		Condition 3	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Motivation										
Intention	4.86	1.11	4.87	1.31	4.95	1.20	4.61	1.02	4.99	0.95
Environmental	5.39	0.80	5.30	0.97	5.36	0.76	5.31	0.65	5.58	0.81
Attitude										
Sustainability	4.90	0.94	5.14	0.89	5.04	0.87	4.56	0.94	4.86	1.02
Attitude										
Meat Attitude	3.76	1.14	3.89	1.21	3.62	1.16	3.54	1.05	3.98	1.12
Flexitarian Diet	0.71	1.23	1.76	2.35	0.43	0.34	0.34	0.33	0.40	0.29
Beliefs										
Meat Diet	-0.27	1.42	-0.56	2.95	-0.18	0.24	-0.21	0.19	-0.14	0.23
Beliefs										
Social Norm	3.49	1.12	3.48	1.08	3.68	1.13	3.17	1.23	3.58	1.03
Ability										
Habit	3.78	1.49	3.89	1.60	3.72	1.32	3.92	1.41	3.60	1.66
Perceived Skills	5.19	1.08	5.14	1.10	5.16	1.02	5.02	0.96	5.44	1.22
Perceived	4.58	1.27	5.02	1.12	4.54	1.10	4.27	1.33	4.51	1.45
Knowledge										
Objective	5.39	0.93	5.32	0.91	5.16	1.07	5.09	0.75	5.95	0.71
Knowledge										

Table 6: Overview of interval variables (own illustration)

Our descriptive analysis also included our main dependent variable, purchased meat quantity. For the sake of a clearer overview, all other purchased items except meat and meat alternative products were deleted, as we were only interested in the reduction of meat quantity. For each participant, a total count quantity was identified. Below you can find Table 7 describing the total amount purchased per condition, the mean per participant and the standard deviation (a full table can be seen in Appendix 3.3). We can see a decrease in meat purchase among the conditions compared to the control condition at first glance. In the next step we verified the significance statistically.

Condition	Meat Quantity	Mean per participant	SD
Control	39	1.56	1.61
Condition 1	23	0.79	0.86
(Ease and Convenience)			
Condition 2 (Disclosure)	27	1.04	0.82
Condition 3	22	0.79	1.03
(Convenience + Disclosure)			

Table 7: Meat quantity chosen per condition (own illustration)

# 5.1.1 - Differences among conditions

To test the difference of the independent variables (attitude, intention, social norm, habit, objective knowledge, perceived skills) between the four conditions to confirm whether there are significant differences, we used ANOVA, after checking for the normality of distribution (Laerd Statistics, n.d.) and homogeneity of variances (SPSS Tutorials, n.d.). For the non-normally distributed cases, we used the Kruskal Wallis test as alternative (SPSS Tutorials, n.d., a), as shown in Table 8.

Variable	Significance
ANOVA	
Habit	p=0.846
Meat Attitude	p=0.431
Kruskal-Wallis	
Environmental Attitude	p=0.692
Sustainability Attitude	p=0.108
Social Norm	p=0.376
Objective Knowledge	p=0.003
Perceived Skills	p=0.480
Intention	p=0.387
Perceived Knowledge	p=0.270
Flex Beliefs	p=0.000
Meat Beliefs	p=0.710

Table 8: Tests for Differences in Mean (own illustration)

As these tests only indicate a difference in mean, but not the exact cause of it, we used additional tests. As we find a statistical difference in the variable Objective Knowledge and Flexitarian Beliefs (not normally distributed), we employed a non-parametric test. To determine the exact difference, we

tested the differences among all conditions with the Mann-Whitney U-test (Grande, 2015b). Additionally, we also tested the differences in mean of the independent variables between demographic variables to test for their effect.

## 5.2 - Data Analysis - the MAO Framework

As a first step, we investigated the relationship between our continuous variables through scatter plots, which indicate a positive linear relationship between intentions as dependent variable and attitudes as independent variables. We could not find a clear linear relationship between intention (dependent variable) and social norm (independent variable), as well as meat attitude (dependent variable) and beliefs (see Appendix 3.4). As our main dependent variable, meat quantity, is not a continuous, but a count variable, we cannot use scatter plots to examine the relationship.

As a next step, correlations are used to further explore the linear relationship between the variables, where several assumptions have to be met.

To inspect linear relationships among variables, and especially in the case of multiple regressions, five assumptions have to be satisfied to qualify the data for the statistical test: normal distribution of the data, homoscedasticity, no autocorrelation, no multicollinearity, and a linear relationship (Statistics Solutions, n.d.).

For the normality assumption, we used the Shapiro-Wilk test, which shows a non-significant result if the variables are normally distributed (Maths Statistics Tutor, n.d.; IntroSpective Mode, 2013; Pallant, 2013). Furthermore, we plotted the residuals on a P-P/Q-Q plot to see whether the residuals follow the line, which indicates normality (IntroSpective Mode, 2013; Grande, 2015). According to the test, most of our interval variables are not normally distributed, which will make the regression analysis more complex. Please find the results in the Appendix 3.2.

For homoscedasticity, we plotted the predicted residuals and predicted values on a scatter plot to check for potential patterns when conducting a linear regression (Statistics Solutions, n.d., a), which should show a cigar shape along the line (Pallant, 2013).

On the multicollinearity assumption, we checked the VIF for each independent variable. The acceptable value should be below 10 (Statistics Solution, n.d., a).

The linearity of the relationship should be given if the data is homoscedastic and normally distributed (Statistics Solutions, n.d., a). However, we also plotted the respective variables on scatter plots to check for the linear relationship (Appendix 3.4). Furthermore, we inspected several outliers. After careful analysis, we left all outliers in the analysis, as they do not seem to impact the linear relationship. Please find an overview over the outliers in the Appendix 3.2.

Before running our regressions, we used Spearman's rho instead of Pearson's r (non-parametric correlation alternative) to determine the strength and direction of the relationship, as many of our variables were not normally distributed. As seen in Table 9, the variable intention correlates significantly to all attitude variables and social norm. Please find the complete correlation in the Appendix 3.5.

	Meat Attitude	Environmental Attitude	Sustainability Attitude	Social Norm	Meat Beliefs	Flex Beliefs
Intention	0.400	0.346	0.598	0.349		
	p=0.000	p=0.000	p=0.000	p=0.000		
Meat Attitude					0.095	0.360
					p=0.330	p=0.000

*Table 9:* Spearman's rho correlation (own illustration)

While the correlations indicate a positive relationship between intention and the respective variables, beliefs do not seem to be correlated to meat consumption attitudes.

After the initial analysis, we started by plotting a normal linear regression model to explore the first component and its sub-parts of the model: Motivation. We treated our Likert Scales as interval data to run a linear regression.

First, we conducted a regression to test for the predictive power of beliefs on meat attitude, by including beliefs towards a carnivore and flexitarian diet as independent variables and meat attitudes as dependent variable. We also controlled for demographic and control variables.

Next, we conducted a hierarchical regression of social norm and attitudes on intention, while controlling for conditions and demographic variables.

To ensure balanced and equally sized groups in the demographic variables, we re-grouped the variables into balanced groups. Age has three groups (under 25, 25-29, 30 and above), as well as Nationality (Danish, German, Other), and Education (Low Education, High Education). We had to collapse employment (Student, Working), and Income (Low Income (0-199K), High Income (200-

750+K)) in two groups, as not enough cases were available to establish three groups. These were included as dummies in the regression.

While checking for normality of residuals with the Shapiro-Wilk Test during this regression, we realised that this assumption was violated. We still proceed with the analysis but have to take the results with care.

As a following step, the relationship between the motivation variable and our final dependent variable, meat quantity, was tested. While other researchers, e.g. Kleef et al. (2012) use Logistic regression (Choice of healthy snack: yes/no), we were deliberately interested in the quantity of meat per purchase, thus dealing with count data.

To fit the data, a Poisson regression was conducted to test the relationship between the overall intention and purchased meat quantity.

To determine whether our data set follows a Poisson distribution, we ran two tests in SPSS.

Firstly, the One-Sample Kolmogorov-Smirnov Test checking for the Poisson distribution was run, which in our case is not significant (p=1). This indicates that the data follows a Poisson distribution (Grande, 2015a). Furthermore, we checked the mean and the variance, as one of the assumptions of the Poisson distribution is the equality of both (Grande, 2015a). Our test result here (Mean: 1.03, Variance: 1.298) indicated some difference, which checked in the Poisson test results itself.

After running the Poisson regression of intention on meat quantity, we looked for over- or under dispersion in the Goodness of Fit-table under deviance (Grande, 2015a). If neither over- nor under dispersion are prevalent, all pre-conditions of a Poisson regression are satisfied. With a Poisson regression, we tested 1) the sole effect of intention 2) intention combined with condition and demographic variables 3) intention, demographic, condition, attitudes and social norm 4) habits, task knowledge 5) intention, demographic, condition, attitudes, social norm, habits, task knowledge on meat quantity.

Looking at the deviance values of the Goodness-of-Fit tables, we had following values: 1) 1.334, 2) 1.171, 3) 1.080, 4) 1.121, 5) 1.043.

While the values for scenario 1), 2) and 4) were not ideal as the value should be 1, we still continued with the analysis using the Poisson regression. Usually, a value above 1 indicates over dispersion, and instead of a Poisson regression, a Negative Binomial regression should be used (Grande, 2015a). However, as our more complex models approach 1, we stuck to the Poisson regression.

As Ölander and Thøgersen (1995) propose, task knowledge/habit is supposed to work as a moderator. We created interaction variables by multiplying the two respective variables: habit\*intention (habit is now re-coded, where low values indicate strong habits, so that both variables go in the same direction) (Almquist, Ashir, & Brännström, 2014) and objective knowledge\*intention. We selected objective knowledge out of the task knowledge variables as we found a significant difference in objective knowledge among conditions. Following the approach of Dawson (2014), we also created interaction dummies by multiplying the condition dummies with intention.

As Dawson (2014) suggests, the means of the independent, continuous variables should be centred to allow for better interpretation. We achieved this by simply subtracting the mean of the respective variable from the values. This procedure needed to be performed for all variables in the regression, thus we centred Meat Attitude, Habit, Intention and Objective Knowledge. The moderators were then included in the Poisson regression, together with their single components.

While this part dealt extensively with our statistical modelling methods, the results of the statistical analysis are reported next.

## 6. DISCUSSION

### 6.1 - Results

Throughout our research, we have investigated the drivers of meat purchase with the help of the MAO model by Ölander and Thøgersen (1995) and conducted an online experiment to determine the effect of nudges on meat purchases.

Our research question thus combined the validity of the MAO model and nudging theory:

How do motivation, ability and opportunity influence consumer behaviour regarding meat purchase and can nudges alter this behaviour?

As our theoretical framework demonstrated, the research can be divided in three parts. Firstly, the relationship between beliefs and attitudes. Secondly, the predictors of intention and lastly the predicting variables of meat purchase.

# <u>6.1.1 - Part 1: Beliefs $\rightarrow$ Attitude</u>

Looking at our hypotheses of the first part, we can see that they mostly followed the indications given by Ölander and Thøgersen (1995).

H1a: People reporting favourable beliefs towards a flexitarian diet will report stronger negative attitudes towards meat consumption than people with unfavourable beliefs.
H1b: People reporting unfavourable beliefs towards a carnivore diet will report stronger negative attitudes towards meat consumption than people with favourable beliefs.

As the scatterplots and correlation analysis showed, we cannot find a clear linear relationship between beliefs and attitudes towards meat consumption (Appendix 3.4 and 3.5). However, the linear regression results still show some significant results (Appendix 3.6.1). The adjusted R2 is 0.137, indicating that only 13.7 % of the variance are explained, while the F-statistic is significant at the 5 % level at p=0.013. Looking at the coefficients, Beliefs about carnivore diets has a coefficient of B=-0.092 (p=0.283), while Beliefs about flexitarian diets show B=0.220 (p=0.025). Thus, if Meat Beliefs increase by one unit and hence become more positive, Meat Attitudes decrease by -0.092 units and

become more positive, as this variable is reversed (low values indicate positive attitudes towards meat). Simply said, positive beliefs about meat diets lead to more positive attitudes about meat.

Additionally, if Flex Beliefs increase by one unit, Meat Attitudes increase by 0.220, meaning that if beliefs about flexitarian diets become more positive, the attitudes towards meat get more negative. Thus, these relationships behave as hypothesized.

Since the coefficient of Flexitarian Beliefs is significant at the 5 % level, we can accept H1a, while H1b needs to be rejected due to the non-significance of the variable.

In this regression, we also find a significant result for the Gender dummy (B=-0.653, p=0.003), indicating that compared to women, men have a lower score of -0.653 meat attitudes. This shows (as the variable is reversed) that men have more positive attitudes towards meat than women. Furthermore, condition 3 shows a significant coefficient (B=0.701, p=0.048), indicating that compared to the control condition, participants in condition 3 have a 0.701 higher meat attitude score. This shows that participants in condition 3 report more negative attitudes towards meat.

## <u>6.1.2 - Part 2: Social Norm, Attitudes $\rightarrow$ Intention</u>

While the first part was specifically investigating the effect of beliefs on attitudes, Part 2 focuses on the predictors of intention, social norm and attitudes. Again, the predicted relationships follow the research of Ölander and Thøgersen (1995).

H2a: People with negative attitudes towards meat consumption will report a higher intention to decrease their meat purchase than people with positive attitudes.

H2b: People reporting high environmental concern will report a higher intention to decrease their meat purchase than people with low environmental concern.

H3: People being subject to strong perceived social norms regarding the decrease of meat consumption will report a higher intention to decrease meat purchase compared to people under weak social norms.

The previous analysis of our data indicated significant correlations between attitudes, social norm and our dependent variable intention. Running a hierarchical regression to control for confounding variables (see Appendix 3.6.2), we find significant results for Social Norm (B=0.254, p=0.005) and Sustainability Attitudes (B=0.408, p=0.002). Thus, when social norm increases by one unit, the intention to decrease meat consumption increases by 0.254 units; and when Sustainability Attitudes increases by 0.408 units.

Environmental Attitudes are still significant at the 10% level (B=0.241, p=0.88), showing that if they increase by one unit, intention will also increase by 0.241 units. Lastly, Meat Attitudes are not significant (B=0.097, p=0.305), but still indicate the correct direction of the relationship. If the attitude towards meat would decrease by one unit, intention to decrease meat consumption would increase by 0.097. The regression shows an adjusted R2 of 0.362, indicating that 36.2% of the variance in intention are predicted through the variables.

According to the regression results, we reject Hypothesis H2a, and accept H2b and H3.

This regression also shows a significant result for Nationality, specifically for Danish participants (B=0.636, p=0.016). Thus, compared to other nationalities, Danes report a 0.636 higher intention, and compared to Germans, a 0.101 higher intention to decrease meat consumption.

#### 6.1.3 - Part 3: Behaviour

While the previous analyses were concentrating on the motivational component of the MAO model, we now analyse the effect of the motivational and moderator variables on meat quantity.

H4: People reporting a high intention to decrease meat purchase will choose less meat products than people reporting low intentions to decrease meat purchase

Running a Poisson regression with only intention as predictor (Appendix 3.6.3), we find that intention is insignificant. The omnibus test, checking if the model with the specified variables is significant, shows a p-value of p=0.461. Furthermore, the intention variable is insignificant at p=0.464, and the coefficient is presenting a positive sign, contrary to our hypothesis (B=0.064, Exp(B)=1.066). Thus, it shows that with a one-point increase in intention to decrease meat consumption, meat consumption actually increases by 6.6%. This is completely contrary to our hypothesis as well as insignificant, which is why we have to reject our hypothesis.

Trying to explain this inverse relationship, there could be the explanation of "guilt" in the participants. As they first chose the meat products and then had to report the intentions, they might have felt guilty because of their choice, and consequently indicate a high intention for future purchases. This could explain the high values for intention and, at the same time, high meat purchase quantities. This finding confirms that intention is not the best predictor of behaviour.

Controlling for the conditions and demographic variables, we find several significant variables, such as the Danish Nationality variable (B=0.678, Exp(B)=1.970, p=0.016), or Male gender (B=0.640, Exp(B)=1.897, p=0.002). Thus, compared to other Nationalities, Danes purchase 97% more meat products, and men purchase 89.7 % more than women. Lastly, all condition coefficients are highly significant, namely Condition 1 (B=-1.115, Exp(B)=0.328, p=0.000), Condition 2 (B=-0.612, Exp(B)=0.542, p=0.026) and Condition 3 (B=-1.075, Exp(B)=0.341, p=0.001). Thus, compared to the control condition, meat quantity is 67.2 %, 45.8% and 63.9% lower in the respective conditions. This model does also show a significant omnibus test (p=0.003), and a lower AIC compared to the singular model.

H5: People being subject to strong perceived social norms regarding the decrease of meat consumption will choose less meat products than people under weak social norms.
H6a: People with negative attitudes regarding meat consumption will choose less meat products than people with positive attitudes.

*H6b: People reporting high environmental concern will choose less meat products than people with low environmental concern.* 

In this case, we included the attitude and social norm variables in the initial Poisson regression with intention (see Appendix 3.6.4). The omnibus test indicates significance (p=0.004), and we find that meat attitude is significant at 5 % (B=-3.40, Exp(B)= 0.712, p=0.000). Thus, for every unit increase in Meat Attitude (becoming more negative towards meat), meat quantity decreases by 28.8%. Intention becomes slightly significant at a 10 % level, with values of B=0.205, Exp(B)=1.227, p=0.089. However, the variable still goes into the wrong direction. Similarly, Environmental Attitude seems to have a positive, unanticipated relationship with meat quantity, as a one unit increase in EA leads to a 11% increase in meat quantity (B=0.105, Exp(B)= 1.110, p= 0.470). Sustainability

Attitudes are not significant but shows the hypothesized direction (B=-0.015, Exp(B), 0.985, p=0.919), which is also the case with social norm (B=-0.073, Exp(B), 0.930, p=0.454). Inserting our control variables, we find similar effects as before. Intention becomes highly insignificant, while Sustainability Attitudes become slightly positive (still not significant). Nationality (Danish), Gender (Male) and the conditions become significant predictors (Condition 2 only at a 10% significance level). Additionally, age (Under 25) becomes significant (B=0.944, Exp(B)=2.570, p=0.019), showing that compared to people older than 30, under 25-year olds purchase 157 % more meat items.

Referring back to our hypothesis, we accept hypothesis H6a, and reject hypotheses H5 and H6b due to insignificance and unexpected signs.

*H7: People reporting strong habits regarding meat purchase will choose more meat products than people with weak meat purchase habits.* 

Constructing a Poisson regression by including habit and the task knowledge variables (see Appendix 3.6.5), we find a highly significant model according to the omnibus test (p=0.000). Looking at the coefficients, we see a highly significant result for habit (B=0.335, Exp(B)=1.398, p=0.000). Consequently, this result indicates that when habit increases by one point, purchased meat quantity will increase by 39.8%. Thus, we can accept hypothesis H7 and confirm the positive direct relationship between habit and meat quantity.

Controlling for demographics and conditions, we can see again that conditions are significant predictors of meat quantity. However, habit remains significant.

*H8: The link between intention and behaviour will be stronger if meat purchase habits are weak.* 

Regarding the moderating effect of habit on intention and meat purchase, we check the moderation graphs (Appendix 3.7.1). It becomes clear that when habit increases, meat quantity increases as well. However, it seems that at high levels of intention, this effect is increased. We could confirm this effect in H4, where a high intention actually leads to more meat purchase. Inserting the interaction term in a Poisson regression with the habit and intention variable (see Appendix 3.6.8), the interaction effect is clearly insignificant (B=0.018, Exp(B)=1.018, p=0.747).

However, the interaction effect shows another effect of intention.

(E) 
$$MQ = e - 0.121 + 0.195 * INT - 0.371 * HBT + 0.018 * INT * HBT$$

When inserting values for this formula, we find that for low habits and high intention, the meat purchase is lower (0.62) than for high habits and low intention (1.609). High habits and high intentions show a value of 2.71, while low habits and low intentions show 0.09. As the variable is not significant, we reject it. However, it seems that habit is moderating the inverse effect of intention on meat quantity.

H9a: People reporting high perceived knowledge on how to decrease meat consumption choose less meat products than people reporting low perceived knowledge.
H9b: People reporting high perceived skills on how to decrease meat consumption will choose less meat products than people reporting low perceived skills.
H9c: People reporting high objective knowledge on the environmental impact of meat consumption will choose less meat products than people reports than people reporting low objective knowledge.

Looking at the coefficients from our Poisson regression of habit and task knowledge (see Appendix 3.6.5), we find that neither objective knowledge (B=0.073, Exp(B)=1.076, p=0.472), perceived knowledge (B=0.031, Exp(B)=1.032, p=0.684) nor perceived skills (B=-0.006, Exp(B)=0.994, p=0.950) are significant. Furthermore, we hypothesized a negative relationship between task knowledge and meat quantity. However, Objective Knowledge and Perceived Knowledge show positive signs, indicating that with a one unit increase of these variables, meat quantity increases by X%. Consequently, we have to reject H9a, H9b and H9c.

When inserting our control variables, perceived knowledge changes the sign (B=-0.007) but is still not significant. Thus, no changes to the hypotheses are made.

H10: The link between intention and behaviour will be stronger if the participant reports high task knowledge.

Evaluating the role of the moderator of objective knowledge, the moderator graphs again showed unclear results (Appendix 3.7.3). Inserting the interaction term in the Poisson regression, together

with intention and objective knowledge as predictors (Appendix 3.6.9), we find a significant result at a 10% significance level (B=-0.211, Exp(B)= 0.810, p=0.057), while the other predictors are not significant.

Inserting values for this relationship, we find that objective knowledge effectively moderates the relationship between intention and behaviour. At low levels of intention and objective knowledge, meat purchase is highest (=.73), while at high intention and high objective knowledge, meat purchase is lowest (=.000). At high intention but low knowledge, we find the value (=.35), while low intention and high knowledge has the value of (=.127). It seems that the strength of objective knowledge effectively moderates intention and behaviour. We can thus confirm this relationship and accept the hypothesis.

# H11a: Compared to the control condition, meat purchase in condition 1 will be significantly lower due to the increased opportunity.

Looking at the results of the previous regression, we could already determine the significance of the conditions. To isolate the effect of the conditions and test for differences among them, a Poisson only with condition variables is run (see Appendix 3.6.7). For condition 1, following values are shown: B=-0.676, Exp(B)=0.508, p=0.010. These results indicate that compared to the control condition, meat purchase is 49.2% lower in condition 1, and significant at 1%. Thus, we can accept hypothesis H11a.

# H11b: The link between intention and behaviour will be stronger if the opportunity to choose alternatives is given.

As in the previous moderator analysis, the moderator graph does not show distinct results (Appendix 3.7.2). Inserting the dummy moderator variables in combination with intention and the condition dummies, we only find non-significant results for the moderators (see Appendix 3.6.10). Specifically, the condition 1 moderator shows the following coefficients (B=0.164, Exp (B)=1.179, p=0.487), while condition 3 shows (B=-0.193, Exp(B)=0.825, p=0.473).

$$E (MQ) = e0.441 + 0.064*INT - 0.728*Cond1 - 0.387*Cond2 - 0.673*Cond3 + 0.164*Cond1*INT + 0.011*Cond2*INT - 0.193*Cond3*INT$$

When inserting the values in the equation, we receive the following results: When intention is high, participants in condition 1 purchase (3.702), and in condition 3 (0.32). However, if low intentions are reported, condition 1 shows the value of (0.943), and condition 3 of (0.69). In the control condition, low intentions result in a value of (0.505), and high intentions in (0.889). While we see a significant decrease in meat quantity from the control condition to condition 3, condition 1 shows completely different values. Furthermore, meat quantity is again higher when intention to decrease meat consumption is high. This relationship is again inverted, as previously established. Additionally, the variables do not have a significant coefficient. Consequently, H11 b is rejected.

H12a: Compared to the control condition, meat purchase in condition 2 will be significantly lower due to the disclosure nudge.

Similar to H11a, we isolate the condition variables in the Poisson regression. For condition 2, the following values are shown: B=-0.407, Exp(B)=0.666, p=0.104. These results show that compared to the control condition, the meat quantity is 33.4 % lower in condition 2. However, the p-value is not significant at this point. Consequently, hypothesis H12a is rejected.

H12b: People will report a significantly higher task knowledge in condition 2 compared to the control condition.

To test this variable, we checked for differences in means of the independent variables among conditions (see Appendix 3.6.6). As explained in the data analysis, we found significant differences in the variable objective knowledge (p=0.003). After further testing, we see that the mean of objective knowledge in condition 3 is significantly different from the other conditions (0-3 p=0.022; 1-3 p=0.004; 2-3 p=0.000). We do not find a significant difference for condition 2, which is why hypothesis H12b is rejected.

H13a: Compared to the control condition, meat purchase in condition 3 will be significantly lower due to the disclosure and ease and convenience nudge.

As already detailed in H11a and H12a, we look at the isolated effect of the condition variables. In the case of condition 3, the values are the following: B=-0.686, Exp(B)=0.504, p=0.10. These results are very similar to condition 1, namely that compared to the control condition, meat purchase decreases by 49.6% in condition 3. Furthermore, the variable is significant at 1%. Consequently, H13a is accepted.

H13b: People will report a significantly higher task knowledge in condition 3 compared to the control condition.

As established in H12b, our data shows a significant difference in mean of objective knowledge for condition 3 compared to the control condition and condition 1 and 2. While there was no significant difference between the control condition and condition 2, condition 3 shows a significant result. It seems that condition 3 increased the objective knowledge considerably and that a combination of the nudges works more effectively. Thus, we accept H13b.

#### 6.2 - Final model

While we tested our hypotheses mostly separately through different regressions, we also wanted to evaluate the best predicting model when combining all variables. By excluding non-significant predictors, our final model shows the following results. Habit (B=0.295, Exp(B)=1.343, p=0.000), Condition 1 (B=-0.700, Exp(B)=0.497, p=0.009), Condition 2 (B=-0.391, Exp(B)=0.677, p=0.123), Condition 3 (B=-0.648, Exp(B)=0.523, p=0.015), Meat Attitude (B=-0.213, Exp(B)=0.808, p=0.058) and Intention (B=0.269, Exp(B)=1.309, p=0.009) are the final variables (see Appendix 3.6.11). Demographic variables did not influence the coefficients of the model significantly. The model is highly significant with an omnibus test of p=0.000 and the lowest AIC of all models (269.753). Even though we rejected Condition 2 and intention as significant predictors previously, they gain significance in this model through the combination of variables. Thus, future research should further investigate the underlying reasons for that.

#	Hypothesis	Coefficients	Accepted/Rejected
1a	+ Flex Beliefs $\rightarrow$ -Meat	B=0.220 (p=0.025).	Accepted
	Attitude		
1b	-Meat Beliefs → -Meat	B=-0.092 (p=0.283)	Rejected
	Attitude		
2a	-Meat Attitudes→ +	(B=0.097, p=0.305)	Rejected
	Intention		
2b	+Environmental	Sustainability Attitude: (B=0.408, p=0.002)	Accepted
	concern $\rightarrow$ + Intention	Environmental Attitudes: (B=0.241, p=0.88)	
2	+Social Norm > +	(B=0.254, m=0.005)	Accorted
3	Thention	(B=0.254, p=0.005)	Accepteu
4	+Intention -> - Meat	(B=0.064  Fxp(B)=1.066  p=0.461)	Rejected
-	Quantity	(D - 0.004, Exp(D) - 1.000, p - 0.401)	Rejected
5	+Social Norm →- Meat	(B=-0.073, Exp(B), 0.930, p=0.454)	Rejected
-	Quantity	(- ·····, -···, (-), ·····, r ·····)	j
6a	-Meat Attitudes 🗲 -	(B=-3.40, Exp(B)= 0.712, p=0.000)	Accepted
	Meat Quantity		-
6b	+Environmental	Environmental Attitudes: (B=0.105, Exp(B)= 1.110, p=	Rejected
	Concern →-Meat	0.470)	
	Quantity	Sustainability Attitudes: (B=-0.015, Exp(B), 0.985,	
		p=0.919)	
7	+Ushita +Most	$(B-0.225 E_{ym}(B)-1.208 n-0.000)$	Acconted
<i>'</i>	-maples	(B-0.555, Exp(B)-1.598, p-0.000)	Accepteu
8	-Habit*+Intention $\rightarrow$ -	(B=0.018  Exp(B)=1.018  p=0.747)	Rejected
Ů	Meat Quantity	(D 0.010, Exp(D) 1.010, p 0.747)	Rejected
9a	+Perceived Knowledge	(B=0.031, Exp (B)=1.032, p=0.684)	Rejected
	$\rightarrow$ -Meat Quantity	(= ·····)=······························	
9b	+Perceived Skills→-	(B=-0.006, Exp(B)=0.994, p=0.950)	Rejected
	Meat Quantity		
9c	+Objective Knowledge	(B=0.073, Exp(B)=1.076, p=0.472)	Rejected
10	→-Meat Quantity	Objective Knowledge	Delected
10	+1 ask Knowledge*+Intention	(B = 0.211  Exp(B) = 0.810  p = 0.057)	Rejected
	- Meat Quantity	(D - 0.211, Exp(D) - 0.010, p - 0.057)	
11a	Opportunity $\rightarrow$ -Meat	B=-6.76, $Exp(B)=0.508$ , $p=0.010$	Accented
	Ouantity		
11b	+Intention*Opportunity	Condition 1: (B=0.164, Exp (B)=1.179, p=0.487)	Rejected
	→-Meat Quantity	Condition 3: (B=-0.193, Exp(B)=0.825, p=0.473)	•
12a	Disclosure →-Meat	B=-0.407, Exp(B)= 0.666, p=0.104	Rejected
	Quantity		
12b	Task Knowledge	0-3 p=0.022	Rejected
	(Cond2)	1-3 p=0.004	
12	Combined Notes N	2-3 p=0.000	A 4 - 3
13a	Combined Nudge →-	B=-0.086, Exp(B)=0.504, p=0.10	Accepted
12h	Tesk Knowledge	0.2 = 0.022	Accord
130	(Cond3)	$1_{-3} p = 0.022$	Accepted
	(Conus)	2-3 = 0.004	
		μ <i>2-3</i> μ=0.000	

n=108

Table 10: Overview hypotheses (own illustration)

## 6.3 - Discussion

Our study investigated *How do motivation, ability and opportunity influence consumer behaviour regarding meat purchase and can nudges alter this behaviour?* 

As we outlined through our aforementioned analysis and results, we can conclude that we find statistical proof for parts of the MAO framework in explaining meat purchase.

Specifically, in the motivation variable, we find that meat attitudes are partly predicted by beliefs about flexitarian diets (H1a); environmental concern and social norm explain intention to decrease meat consumption (H2b, H3); and meat attitude and habit explain directly meat quantity (H6a, H7).

Furthermore, by providing an increased opportunity to shop alternatives to meat through the ease and convenience nudge, meat purchase is significantly decreased. Additionally, the disclosure nudge, specifically combined with the ease and convenience Nudge, leads to decreased meat purchase and shows the strongest effect of all nudges.

Lastly, we find that Danes and male participants choose significantly more meat products than other nationalities and female participants.

Over decades, research has been investigating the underlying factors for pro-environmental behaviour and trying to overcome the attitude-behaviour gap. Our research provided the first application of the MAO model on the issue of meat consumption and shows that habits and attitudes towards meat have a significant impact on this behaviour.

As the literature indicates, attitudes towards environmental issues do not predict pro-environmental behaviour, but rather attitudes towards the specific behaviour itself.

By understanding the underlying factors of meat purchase, attitudes and habits can be specifically targeted to achieve a switch to pro-environmental behaviour.

Our research identified the concept of nudging as one mechanism to overcome barriers to proenvironmental behaviour. The concept of nudging has so far been mostly applied in health studies, e.g. to increase the choice of healthy snacks (Kleef et al., 2012), but has seldomly found its application in the area of sustainable consumer behaviour and how to overcome the infamous attitude-behaviour gap. Through our research, we could prove through an online experiment that nudges are a significant predictor of reduced meat purchase, together with existing attitudes and habits. DISCUSSION

Thus, nudges could be partly the answer to the inherent attitude-behaviour gap and "nudge" the consumer in the right direction to reduce meat, by e.g. offering the alternative choice in the shelf (shelf assortment) and/or showing simplified information, such as traffic light labels.

In this regard, nudges should target the main predictor variables, e.g. aiming at decreasing attitudes about meat or disrupting habits. As we indicated earlier, a change in the usual environment can disrupt habits as predicted by the habit discontinuity theory. Thus, supermarket layout and a change thereof is crucial. Furthermore, the ease and convenience nudge also showed that though an increased opportunity, people are more likely to choose the sustainable alternative. This confirms previous findings about recycling and the importance of nearby trash containers (Ölander & Thøgersen, 1995). However, another approach could consist in nudging the antecedents of meat attitudes, namely flexitarian beliefs, or the antecedents of intention, social norm and environmental concern. These nudges might be less effective but might work in a long-term perspective. However, the role of intention needs to be understood better to proceed with this strategy. As can be seen in our research, where high intentions indicate high meat consumption. We assume that this might be due to the fact that meat eaters are aware of their meat consumption high levels, and thus indicate an intention to lower future consumption. Hence, future studies must pay attention to this detail when designing studies and try to gather first-hand behavioural data.

Based on our results, we expect the future impact of nudging to be tremendous in overcoming barriers to PEB. The impact of the research is not only limited to meat products. Essentially, the results could be adapted for any product category, for instance to reduce milk/ dairy products and opting for the non-dairy alternative; or avoid Q-tips (responsible for plastic pollution) and rather choose its bamboo alternative, as well as quitting plastic straws and buying new, more sustainable paper straws. By providing an alternative to the environmentally harmful product at the point of sale and disclosing the harmful impact, consumers might be nudged into the right direction.

At this point, we would like to highlight the Danish brand Naturli Hakket, which offers a vegetarian minced meat option at comparable prices to the "normal" minced meat (CPH Post, 2017). While there are many meat alternative products on the market today, Naturli Hakket is the only product positioned on the same shelf as minced meat (at least in Denmark) (Danish Supermarket Group, 2018). The

success of this product was enormous after its introduction in January 2018, with continuously empty shelves.

This real example only sketches what a simple positioning strategy, coupled with a good meat alternative at competitive prices, can achieve, which we could also demonstrate with our research at hand.

However, it has to be noted at this point, that even though nudges should inherently be used to promote welfare and nudge consumers to behave as better citizens of the planet, the risk of exploitation is prevalent. Nudges are suspected to be misused by the private sector to enhance consumerism. Thus, the concept of nudges should be closely monitored by respective institutions to avoid any misconduct.

By conceptualizing the MAO model, we hope to have shed further light on this model in the current research about consumer decision-making and introduce nudging as viable strategy to model and direct consumer behaviour towards sustainability. While this research will hopefully contribute to the scientific research, we also want to make policy makers/public sector and producers of meat alternatives/private sector aware of our results.

# Public Sector

Even though international institutions, such as the UN and its sub committees, work hard to streamline sustainable measures to national governments, these struggle at implementing specific nation-wide policies, e.g. a meat tax.

However, after the success of the book "Nudge" by Thaler et al. (2008), several governments started nudge task forces, to determine the applicability of different nudges.

According to the results of our research, we recommend governments to explore the use of traffic light labels to educate consumers in a simplified way about their choices. By disclosing the actual impact of meat products in term of GHG emissions (or alternatively any other environmental impact, such as acidification), a visual stimulus is used to 1) educate customers and 2) make them question their habitual choices and change existing attitudes.

These labels should be compulsory and nation-wide, to guarantee a true change throughout the entire population.

## Private Sector

Meat producers and new companies alike are exploring the development of alternative meat products and seek to improve the product quality to resemble "real meat".

While the market is constantly receiving new creations to further mimic real meat, we show through this research that the positioning of products should not be underestimated. According to our results, providers of sustainable products, such as Naturli, should position their products next to the product they want to replace to directly provide an increased opportunity to shop for them, as consumers want products that are easily accessible and do not want to spend time searching for green products (Padel & Foster, 2005).

Through the change of the normal meat shelf with alternative products, the habit might be interrupted and pose the opportunity to break meat consumption habits.

While this research only tested the impact on the reduction of meat products, we assume that not only the reduction of meat products could be achieved, but also the increase of its alternatives.

Furthermore, our research indicated that Males choose significantly more meat products. Thus, future marketing campaigns promoting meat alternatives should be specifically tailored to females, e.g. as they might be more susceptible to these products.

Through these measures we could increase the share of people adopting flexitarian diets, and thus decrease the overconsumption of meat products.

By implementing these measures, we hope to contribute to the sustainable development goals, specifically goal 12 of consuming and producing sustainably and having a less detrimental impact on our planet in general.

As Stern (2000, p.410) outlines, "the environmental impact of any individual's personal behaviour, however, is small. Such individual behaviours have environmentally significant impact only in the aggregate, when many people independently do the same things."

## 7. CONCLUSION

Finally, this section summarises our study by first identifying the key findings of our work and identifies academic as well as private and public-sector contributions.

As previously established, meat has been identified as one of the frontrunners of climate change due to the high GHG Emissions associated with production. Internationally, the public sector has attempted to tackle the issue of increasing meat consumption by, for instance, introducing the UN Sustainable Development Goals.

The role and responsibility of consumer behaviour in the successful completion of these goals is undeniable. However, consumer decision-making is a complex matter on which no consensus in research is available. More specifically, past research has struggled in explaining and understanding the so-called attitude-behaviour gap, where consumers are seen to have intentions of behaving in certain ways but actual behaviour not following these intentions. This issue is also represented in the meat industry, where intentions of behaving more sustainably are widespread, however corresponding behaviour is still underrepresented.

One possible barrier of shifting behaviour towards more sustainable choices has been identified as habits. Further, various heuristics and biases facing consumers have been found to influence behaviour to be more flawed and at times irrational.

This is where the theory of nudging gains relevance. Nudges make use of flaws in decision-making and aim at steering consumers into welfare-promoting directions by following the philosophy of Libertarian Paternalism. While nudges do not assume consumer irrationality, they rely on flawed decision-making and aim at simplifying life for consumers without limiting their freedom of choice. Given the simplicity and cost-effectiveness of nudges, the concept has become a widespread, international phenomenon, even used in governments such as the UK or USA.

This research took departure in the MAO framework by Ölander and Thøgersen, including motivation, ability and opportunity as determinants of behaviour. The model was chosen due to its integrative nature, incorporating both internal and external factors and therefore providing a holistic view of behaviour. The MAO model was used to create an understanding of underlying determinants

and influences on behaviour, since recognising the nature of behaviour allows for a more concise and successful targeting and changing thereof.

Following the in-depth understanding of the MAO framework and its' relationships, we employed two types of nudges (ease and convenience & disclosure) to examine whether these techniques could have an effect on behaviour and close the attitude-behaviour gap with regards to meat purchase. Hence, the research question was formed as follows: *How do motivation, ability and opportunity influence consumer behaviour regarding meat purchase and can nudges alter this behaviour*?

This research made use of a deductive and quantitative research approach, measuring the quantitative difference nudges make on meat purchase, and to what extent underlying motivation, ability and opportunity are responsible for this change. The study included a virtual supermarket experiment paired with a questionnaire in order to measure actual differences in quantity while simultaneously understanding underlying drivers of observed behaviour.

When testing the MAO framework, this study was able to confirm some of the relationships put forward by Ölander and Thøgersen. With regards to motivation, we found environmental concern and social norms to be the most relevant in explaining intention to decrease meat consumption. However, when looking at the model in general, intention proved not to be a strong predictor of behaviour, confirming the problem to equal intention and behaviour in other research approaches. However, meat attitude was identified as significant predictor of behaviour. For ability, habit proved to be a good predictor of behaviour. An increased opportunity to shop meat alternatives with the help of an ease and convenience nudge also had a significant impact on meat quantity.

Overall, attitudes and habits were able to explain the purchase of meat most significantly.

With regards to the employed nudges, a significant reduction in meat quantity was found from control to experimental conditions, suggesting a success in the effectiveness of the manipulations. Specifically, the combination of both nudges proved to be most effective, followed by ease and convenience and lastly the disclosure nudge. Conclusively, this study was able to confirm the fact that nudges can reduce meat purchase drastically at the point of sale.

Following the summary of this study, this section will now briefly focus on key academic contributions. Firstly, this study has aimed at contributing to explain and understand the attitude-

CONCLUSION

behaviour gap further and attempted to employ nudges which help in closing the gap. This was done by measuring actual behaviour and following up with a questionnaire. By measuring actual behaviour rather than fully relying on a questionnaire, this research sets itself apart and follows the recommendations of Bamberg and Möser (2007). Secondly, by linking the theory of nudging and pro-environmental behaviour to the MAO framework and testing and validating these relationships, this study is, to our knowledge, the first to do so. Thirdly, this study is the first in using the MAO model on meat consumption and showing that habits and attitudes have a predominant effect on behaviour. Lastly, the concept of nudging has mostly been applied to health issues in the past, but rarely in changing consumer behaviour to overcome the attitude-behaviour gap, which is precisely the topic of the research at hand.

Contributions of this work can also be found for the public and private sector, and the individual level. Firstly, policy makers can use insights of this work to help achieve more sustainable lifestyles by putting forward legislation which requires the use of traffic light labelling at the point of sale. By using this technique, consumers are given clear, concise and easy to understand guidelines to their behaviour which this study has proven to help in making more sustainable choices.

Secondly, producers of meat alternatives can use our findings when considering point of sale options. As the study shows, purchase of meat products decreases when employing disclosure and ease and convenience nudges. We recommend future research to investigate whether and how this leads to sales increase of meat alternatives at the point of sale. If producers of meat alternatives make use of nudging techniques, unsustainable behaviour could be overcome, and a sustainable future could possibly be secured.

Lastly, we hope to have shed a light on pressing challenges and solutions which can contribute to achieving the Sustainable Development Goal 12 of consuming and producing sustainably.

Conclusively, we attempted to shed light on a pressing environmental challenge of today and contribute in shaping solutions that can secure a more sustainable future through the use of nudging.

#### 8. LIMITATIONS AND RESEARCH OUTLOOK

Although this study was prepared with much deliberation and thought, we are aware of certain limitations of the research presented. This section will introduce these shortcomings and address possible ways of avoiding them for future research.

Given financial and time constraints, the experiment of the virtual supermarket is limited in certain areas. Firstly, due to the necessary simplification of the supermarket, we were unable to accommodate a price component on the product shelves. Therefore, participants had to make purchase decisions solely based on visual aspects of the product, possibly changing the outcome of the decisions made. Secondly, as mentioned previously, all supermarket shelves were made on PowerPoint and pictures hereof were used as supermarket shelves in the experiment. Participants were unable to zoom in on the shelves and specific products and this might have caused limited visibility. Product choices could have been influenced by this low visibility and therefore this constitutes as a possible weakness of the experiment. Further, we identified a possible limitation with the product placement in the virtual supermarket. More specifically, vegetarian and meat products were placed on the lower and higher end of the shelf, respectively. Previous research has proven that product shelf placement does have an effect on decision-making (Kleef et al, 2010). However, this study does not account for that. Thirdly, the setup of the virtual supermarket was rather complicated, and instructions might not have been clear to all participants, despite our best efforts to explain in detail what to do. This was an issue we were unfortunately not able to accommodate and improve due to the software used (Qualtrics). All of the above limitations are directly related to the research design of the virtual supermarket. While we aimed at keeping these issues as minimal as possible, due to the nature of our experiment being online, these were mostly unavoidable.

For future research, we recommend repeating the experiment in a physical store over a longer time frame to inspect the effect of nudges in a real-life setting and observe the effect of the experiment over time. In that regard, opportunity could also be measured differently by letting participants report distances to supermarkets and describing the offer and positioning of meat alternative products. Alternatively, to control for several variables, researchers could investigate the use of virtual reality, to simulate the shopping experience in a controlled environment. To investigate further the effect of the ease and convenience nudge, research could also apply eye-tracking technology to investigate

the attention given to meat alternative products in the shelf and the impact of positioning (top vs. bottom, left vs. right). An interesting addition to the research could be the inclusion of the effect of price and controlling purchasing power as opportunity variable.

Additionally, we identified a possible limitation with the use of traffic light labels. While traffic light labelling usually consists of three colour signals on products, we chose to only employ two in our study. The colours chosen for our study were red and green, signalling low environmental impact on meat alternative products (green) and high environmental impact on meat products (red). This simplification was made given time constraints and feasibility considerations for this experiment, prohibiting us from assessing each meat product and categorising it into medium or high environmental impact. The point and signal effectively remained unchanged.

For future research, we recommend repeating the study with more detailed traffic light labels to validate results further. Furthermore, researchers should test the associations of participants with the specific labels, e.g. what participants think when seeing the label.

With regards to the data collected in this study, we see potential limitations in the sample. Participants of this study came predominantly from high educational backgrounds, were rather young and mainly students, possibly having an effect on results measured. Further, although our samples were of decent size, having larger sample sizes would have benefited us in providing more precise and valid results given the quantitative nature of our research. Moreover, the questionnaire of this research consisted of some questions relying on self-reported data, e.g. regarding habits. While self-reported data was needed in this particular study, we acknowledge the fact that this could possibly result in certain unavoidable bias. Future research should find a more balanced sample in terms of age, occupation and education to test the effect of nudges among a representative sample of the population.

Further, when measuring the independent variables, this study focused solely on consumers decreasing their meat consumption due to environmental reasons. However, we acknowledge that other factors such as health benefits or animal welfare are major influencing factors in meat consumption as well.

Furthermore, similar to other research in consumer behaviour, we tried to operationalize relatively broad variables, such as attitudes. While we tried to be as specific as possible in their construction,

we were likely not able to capture the entire essence. This could also explain the unexpected signs for intention.

To understand these variables better, research should repeat the measurement of the variables and cross-reference results.

Lastly, when testing the MAO model statistically, we did not test all the possible combinations of variables or moderations. For instance, we could hypothesize that the nudges change normal consumption habits, or that traffic light labelling changes beliefs about meat consumption, and thus attitudes; or impacts attitudes directly. Thus, further research is needed to understand the exact role of nudges, how they act and how they influence existing motivational or ability components.

Concluding this section, this research can be seen as the starting point for more comprehensive research about nudging and the effect on pro-environmental research, which we hope will form part of the sustainability discussion in the years to come.

#### REFERENCES

- Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behaviour: Attitudes, intentions, and perceived behavioural control. *Journal of Experimental Social Psychology*, 22(5), 453-474. doi:10.1016/0022-1031(86)90045-4
- Almquist, Y. B., Ashir, S., & Brännström, L. (2014). *A guide to quantitative methods*. Stockholm: CHESS.
- Allen, M. (2016). Understanding Pro-Environmental behaviour: Models and Messages. In Strategic communication for sustainable organizations: Theory and practice. doi:10.1007/978-3-319-18005-2\_4
- Apostolidis, C., & McLeay, F. (2016). Should we stop meating like this? Reducing meat consumption through substitution. *Food Policy*, 65, 74-89. doi:10.1016/j.foodpol.2016.11.002
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14-25. doi:10.1016/j.jenvp.2006.12.002
- Borden, R. J., & Francis, J. L. (1978). Who cares about ecology? Personality and sex differences in environmental concern. *Journal of Personality*, 46(1), 190-203. doi:10.1111/j.1467-6494.1978.tb00610.x
- Bos, C., Van der Lans, I. A., Van Rijnsoever, F. J., & Van Trijp, H. C. (2015).
   Heterogeneity in barriers regarding the motivation, the opportunity and the ability to choose low-calorie snack foods and beverages: associations with real-life choices.
   *Public Health Nutrition*,19(09), 1584-1597. doi:10.1017/s1368980015002517
- Burlingame, B., & Dernini, S. (2010). Sustainable Diets and Biodiversity. Retrieved from http://www.fao.org/docrep/016/i3004e/i3004e.pdf
- Chambers, T., Porritt, J., & Price-Thomas, P. (2008). Sustainable wealth creation: Within environmental limits. *London: Forum for the Future*.
- Collins, H. (2010). Creative research: The theory and practice of research for the creative industries. *AVA Publications*.

- Conner, M., Norman, P., & Bell, R. (2002). The theory of planned behaviour and healthy eating. *Health Psychology*, *21*(2), 194-201. doi:10.1037//0278-6133.21.2.194
- CPH Post. (2017, December 12). Danish supermarkets ready with sensational vegetarian option. Retrieved from http://cphpost.dk/news/danish-supermarkets-ready-with-sensational-vegetarian-option.html
- Danish Supermarket Group. (2018, January 5). Hakket plantefars storsælger | Salling Group. Retrieved from https://via.ritzau.dk/pressemeddelelse/hakket-plantefarsstorsaelger?publisherId=3307957&releaseId=12038862
- Dawson, J. F. (2014). Moderation in Management Research: What, Why, When, and How. *Journal of Business and Psychology*, 29(1), 1-19. doi:10.1007/s10869-013-9308-7
- Dayan, E., & Bar-Hillel, M. (2011). Nudge to nobesity II:Menu positions influence food orders. *Judgment*, 6(4), 333–342.
- De Wijk, R. A., Maaskant, A. J., Polet, I. A., Holthuysen, N. T., Van Kleef, E., & Vingerhoeds, M. H. (2016). An In-Store Experiment on the Effect of Accessibility on Sales of Wholegrain and White Bread in Supermarkets. *PLOS ONE*, *11*(3). doi:10.1371/journal.pone.0151915
- Defra. (2008). A Framework for Pro-Environmental behaviour.
- Delaney, E. (n.d.). What is a flexitarian diet? Retrieved from https://www.bbcgoodfood.com/howto/guide/what-flexitarian-diet
- Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental Values. *Annual Review of Environment and Resources*, *30*, 335-372.
- Dudovsky. (n.d.). Positivism Research Methodology. Retrieved from https://researchmethodology.net/research-philosophy/positivism
- Dunlap, R., & Van Liere, K. (1978). The new environmental paradigm A proposed measuring instrument and preliminary results. *Journal of Environmental Education*, 9(4), 10-19.
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, 56(3), 425-442. doi:10.1111/0022-4537.00176
- EC. (n.d.). Paris Agreement Climate Action European Commission. Retrieved from https://ec.europa.eu/clima/policies/international/negotiations/paris\_en

FAO. (2017). The future of Food and Agriculture: Trends and Challenges.

- Graça, J., Calheiros, M. M., & Oliveira, A. (2015). Attached to meat? (Un)Willingness and intentions to adopt a more plant-based diet. *Appetite*,95, 113-125. doi:10.1016/j.appet.2015.06.024
- Graham, T., & Abrahamse, W. (2017). Communicating the climate impacts of meat consumption: The effect of values and message framing. *Global Environmental Change*, 44, 98-108. doi:10.1016/j.gloenvcha.2017.03.004
- Grande, T. (2015, December 6). Testing the Normality of Residuals in a Regression using SPSS[Video file]. Retrieved from https://www.youtube.com/watch?v=liiDHEeEH\_I
- Grande, T. (2015, September 20). Poisson Regression Analysis in SPSS with Assumption Testing[Video file]. Retrieved from https://www.youtube.com/watch?v=OQJXuvjuFLM
- Grande, T. (2015, January 21). Mann-Whitney U Test in SPSS[Video file]. Retrieved from https://www.youtube.com/watch?v=rM0m1mAbPiU
- Halpern, D. (2015). The Rise of Psychology in Policy: The UK's de facto Council of Psychological Science Advisers. *Perspectives on Psychological Science*, 10(6), 768– 771. https://doi.org/10.1177/1745691615609917
- Hansen, P. G., & Jespersen, A. M. (2013). Nudge and the Manipulation of Choice. *European Journal of Risk Regulation*, 4(1), 3–28. https://doi.org/10.1017/S1867299X00002762
- Hanks, A. S., Just, D. R., Smith, L. E., & Wansink, B. (2012). Healthy convenience: Nudging students toward healthier choices in the lunchroom. *Journal of Public Health (United Kingdom)*, 34(3), 370–376.
- Hausman, D. M., & Welch, B. (2010). Debate: To nudge or not to nudge. *Journal of Political Philosophy*, 18(1), 123–136.
- Hayek, Friedrich (1943). The road to serfdom. Chicago: University of Chicago Press
- Hines, J., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and Synthesis of Research on Responsible Environmental Behaviour: A Meta-Analysis. *The Journal of Environmental Education*, 18(2), 1-8.
- Hung, K., & Petrick, J. E. (2016). Investigating the role of motivation, opportunity and ability (MOA) on travel intentions: An application of the MOA model in cruise

tourism. Tourism Travel and Research Association: Advancing Tourism Research Globally, 55.

- IntroSpective Mode. (2013). Data Assumptions: It's about the residuals, and not the variables' raw data | IntroSpective Mode. Retrieved from http://www.introspective-mode.org/assumptions-residuals-variables/
- Jackson, T. (2005). Motivating Sustainable Consumption: A review of evidence on consumer behaviour and behavioural change.
- Kahneman, D. (2011). Thinking, fast and slow. New York, NY: Farrar, Straus and Giroux.
- Kahneman, D. (2003). Maps of Bounded Rationality: Psychology for Behavioural Economics. *American Economic Review*,93(5), 1449-1475. doi:10.1257/000282803322655392
- Kenward, E. (2017, March 7). Special Report: The Rise in 'Flexitarian? Lifestyles. Retrieved from http://www.foodingredientsfirst.com/news/special-report-the-rise-inflexitarian-lifestyles.html
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research*, 8(3), 239-260. doi:10.1080/13504620220145401
- Laerd Statistics. (n.d.). One-way ANOVA in SPSS Statistics Understanding and reporting the output. Retrieved from https://statistics.laerd.com/spss-tutorials/one-way-anovausing-spss-statistics-2.php
- Laerd Statistics. (n.d.). Testing for Normality using SPSS Statistics when you have only one independent variable. Retrieved from https://statistics.laerd.com/spss-tutorials/testing-for-normality-using-spss-statistics.php
- Lehner, M., Mont, O., & Heiskanen, E. (2016). Nudging A promising tool for sustainable consumption behaviour? *Journal of Cleaner Production*, 134, 166-177. doi:10.1016/j.jclepro.2015.11.086
- Lieber, M. (2018). New Dutch law to make all adults organ donors unless they opt out. CNN. Retrieved from: https://edition.cnn.com/2018/02/14/health/new-dutch-laworgan-donors-bn-intl/index.html
- MacInnis, D. J., Moorman, C., & Jaworski, B. J. (1991). Enhancing and Measuring
   Consumers' Motivation, Opportunity, and Ability to Process Brand Information from
   Ads. *Journal of Marketing*, 55(4), 32-53. doi:10.2307/1251955
- Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow:
  Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. *Appetite*, *96*, 487-493. doi:10.1016/j.appet.2015.10.011
- Mathios, A. D. (2000). The impact of mandatory disclosure laws on product choices: An analysis of the salad dressing market. *The Journal of Law and Economics*, 43(2), 651–678.
- Maths Statistics Tutor. (n.d.). Normality test in SPSS. Retrieved from http://www.mathsstatistics-tutor.com/normality\_test\_pasw\_spss.php
- McMichael, A. J., Powles, J. W., Butler, C. D., & Uauy, R. (2007). Food, livestock production, energy, climate change, and health. *Lancet*,370, 1253-63. doi:10.1016/S0140- 6736(07)61256-2
- Milfont, T. L., & Markowitz, E. (2016). Sustainable consumer behaviour: a multilevel perspective. *Current Opinion in Psychology*, 10, 112-117. doi:10.1016/j.copsyc.2015.12.016
- Moseley, A., & Stoker, G. (2013). Nudging citizens? Prospects and pitfalls confronting a new heuristic. *Resources, Conservation and Recycling*, *79*, 4–10.
- Nielsen, A. S. E., Sand, H., Sørensen, P., Knutsson, M., Martinsson, P., Persson, E., & Wollbrant, C. (2016). Nudging and pro-environmental behaviour.
- Ölander, F., & Thøgersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. Journal of Consumer Policy, 18(4), 345-385. doi:10.1007/bf01024160
- Oxford Reference. (n.d.). Dominant social paradigm Oxford Reference. Retrieved from http://www.oxfordreference.com/view/10.1093/oi/authority.20110803095725868
- Padel, S., & Foster, C. (2005). Exploring the gap between attitudes and behaviour. *British Food Journal*, 107(8), 606-625. doi:10.1108/00070700510611002
- Pallant, J. (2013). SPSS survival manual: A step by step guide to data analysis using SPSS for windows. London, UK: *McGraw-Hill*.
- Prothero, A., Dobscha, S., Freund, J., Kilbourne, W. E., Luchs, M. G., Ozanne, L. K., & Thøgersen, J. (2011). Sustainable Consumption: Opportunities for Consumer Research and Public Policy. *Journal of Public Policy & Marketing*, 30(1), 31-38. doi:10.1509/jppm.30.1.31

- Povey, R., Wellens, B., & Conner, M. (2001). Attitudes towards following meat, vegetarian and vegan diets: an examination of the role of ambivalence. *Appetite*,37(1), 15-26. doi:10.1006/appe.2001.0406
- Ranganathan, J. (2013, December 3). The Global Food Challenge Explained in 18 Graphics | World Resources Institute. Retrieved from http://www.wri.org/blog/2013/12/global-food-challenge-explained-18-graphics
- Real Statistics. (n.d.). Significance of variables on regression model | Real Statistics Using Excel. Retrieved from http://www.real-statistics.com/multiple-regression/testingsignificance-extra-variables-regression-model/
- Reisch, L. A., & Thøgersen, J. (2015). Handbook of research on sustainable consumption. Cheltenham, UK: *Edward Elgar Publishing, Inc.*
- Reisch, L. A., & Thøgersen, J. (2015). Consumer habits and sustainable consumption. In Handbook of research on sustainable consumption. Cheltenham, UK: Edward Elgar Publishing, Inc.
- Reisch, L. A., Sunstein, C. R., & Gwozdz, W. (2017). Beyond carrots and sticks: Europeans support health nudges. *Food Policy*, 69, 1–10.
- Robinson, J. (2004). Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics*, 48(4), 369-384. doi:10.1016/j.ecolecon.2003.10.017
- Rothschild, M. L. (1999). Carrots, Sticks, and Promises: A Conceptual Framework for the Management of Public Health and Social Issue behaviours. *Journal of Marketing*, 63, 24-37. doi:10.1080/15245004.2000.9961146
- Rozin, P., Scott, S., Dingley, M., Urbanek, J. K., Jiang, H., & Kaltenbach, M. (2011). Nudge to nobesity I: Minor changes in accessibility decrease food intake. *Judgment and Decision Making*, 6(4), 323–332.
- Saunders, M., Lewis, P., & Thornhill, A. (2016). Research Methods for Business Students (7th ed.). Harlow (Essex): *Pearson*.
- Scarborough, P., Appleby, P. N., Mizdrak, A., Briggs, A. D., Travis, R. C., Bradbury, K. E., & Key, T. J. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change*, *125*(2), 179-192. doi:10.1007/s10584-014-1169-1

- Schubert, C. (2017). Green nudges: Do they work? Are they ethical? *Ecological Economics*, *132*, 329–342.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309-317. doi:10.1016/j.jenvp.2008.10.004
- Schwartz, S. H. (1977). Normative Influences on Altruism. Advances in Experimental Social Psychology, 221-279. doi:10.1016/s0065-2601(08)60358-5
- Sheeshka, J. D., Woolcott, D. M., & Mackinnon, N. J. (1993). Social Cognitive Theory as a Framework to Explain Intentions to Practice Healthy Eating behaviours 1. *Journal of Applied Social Psychology*, 23(19), 1547-1573. doi:10.1111/j.1559-1816.1993.tb01047.x
- Selinger, E., & Whyte, K. (2011). Is There a Right Way to Nudge? The Practice and Ethics of choice architecture. *Sociology Compass*, 5(10), 923–935. https://doi.org/10.1111/j.1751-9020.2011.00413.x
- Smith, K. (2018, September 10). \$6.5 Billion in Global Vegan Meat Sales Expected By 2026. Retrieved from https://www.livekindly.co/vegan-meat-market-6-5-billion-2026/
- Spiller, A., & Nitzko, S. (2014). Peak meat: the role of meat in sustainable consumption. Handbook of Research on Sustainable Consumption, 192-208. doi:10.4337/9781783471270.00022
- SPSS Tutorials. (n.d.). How to Run Levene's Test in SPSS? Retrieved from https://www.spss-tutorials.com/levenes-test-in-spss/
- SPSS Tutorials. (n.d.). SPSS Kruskal-Wallis Test Quick Tutorial. Retrieved from https://www.spss-tutorials.com/spss-kruskal-wallis-test-simple-tutorial-withexample/
- Staats, H. (2003). Understanding Pro-environmental Attitudes and Behaviour: an analysis and review of research based on the theory of planned behaviour, Bonnes, M, T Lee and M Bonaiuto (eds). In *Psychological Theories for Environmental Issues*. Aldershot: Ashgate Publishing.
- Statistics Solutions. (n.d.). Assumptions of Linear Regression Statistics Solutions. Retrieved from http://www.statisticssolutions.com/assumptions-of-linear-regression/

- Statistics Solutions. (n.d.). Testing Assumptions of Linear Regression in SPSS Statistics Solutions. Retrieved from http://www.statisticssolutions.com/testing-assumptionsof-linear-regression-in-spss/
- Statistics Solutions. (n.d.). The Multiple Linear Regression Analysis in SPSS Statistics Solutions. Retrieved from http://www.statisticssolutions.com/the-multiple-linearregression-analysis-in-spss/
- Statsdirect. (n.d.). Measurement Scales and Data Types StatsDirect. Retrieved from https://www.statsdirect.com/help/basics/measurement\_scales.htm
- Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behaviour. *Journal of Social Issues*, 56(3), 407-424. doi:10.1111/0022-4537.00175
- Stern, P., Dietz, T., Abel, T., Guagnano, G., & Kalof, L. (1999). A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Human Ecology Review*, 6, 81-97.
- Sunstein, C. R. (2014). Nudging: A Very Short Guide Cass. Igarss 2014, (1), 1-5.
- Sunstein, C. R. (2016). The Ethics of Influence: Government in the Age of behavioural Science. Cambridge Studies in Economics, Choice, and Society. https://doi.org/10.1017/CBO9781316493021
- Sunstein, C. R. (2014). The Ethics of Nudging. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2526341
- Sustainable development goals. (n.d.). Retrieved February 27, 2018, from http://www.un.org/sustainabledevelopment/sustainable-development-goals/
- Sutton, C., & Dibb, S. (2013). Prime cuts. Valuing the meat we eat. Retrieved from Discussion Paper for WWF-UK and the Food Ethics Council. website: http://assets.wwf.org.uk/downloads/prime\_cuts\_food\_report\_feb2013.pdf
- Swartz, J. J., Braxton, D., & Viera, A. J. (2011). Calorie menu labelling on quick-service restaurant menus: An updated systematic review of the literature. *International Journal of behavioural Nutrition and Physical Activity*.
- Terlau, W., & Hirsch, D. (2015). Sustainable Consumption and the Attitude-Behaviour-Gap Phenomenon - Causes and Measurements towards a Sustainable Development. doi:10.18461/ijfsd.v6i3.634

- Thaler, R. H., Sunstein, C. R., & Pratt, S. (2008). Nudge: Improving decisions about health, wealth, and happiness. New Haven: *Yale University Press*.
- Thaler, R. H., & Sunstein, C. R. (2003). Libertarian paternalism. In American Economic Review (Vol. 93, pp. 175–179).
- Thaler, R. H., Sunstein, C. R., & Balz, J. P. (2010). Choice architecture. Social Science Research Network, (APRIL), 428–439.
- Thorndike, A. N., Riis, J., Sonnenberg, L. M., & Levy, D. E. (2014). Traffic-Light Labels and choice architecture: Promoting healthy food choices. *American Journal of Preventive Medicine*, 46(2), 143-149. doi:10.1016/j.amepre.2013.10.002
- Thorndike, A. N., Sonnenberg, L., Riis, J., Barraclough, S., & Levy, D. E. (2012). A 2-Phase Labelling and choice architecture Intervention to Improve Healthy Food and Beverage Choices. *American Journal of Public Health*, 102(3), 527-533. doi:10.2105/ajph.2011.300391
- Thøgersen, J. (2010). Pro-environmental consumption. In K.M Ekström (Ed), Consumer Behaviour - A Nordic perspective. Lund: Studentlitteratur AB
- Thøgersen, J. (2014). Unsustainable Consumption: Basic Causes and Implications for Policy. *European Psychologist*, 19(2), 84-95. doi:10.1027/1016-9040/a000176
- Thøgersen, J., Haugaard, P., & Olesen, A. (2010). Consumer responses to ecolabels. *European Journal of Marketing*, 44(11/12), 1787-1810. doi:10.1108/03090561011079882
- UN. (2005, October 24). Resolution adopted by the General Assembly. Retrieved from http://www.un.org/womenwatch/ods/A-RES-60-1-E.pdf
- UN. (n.d., a). Sustainable consumption and production. Sustainable Development Knowledge Platform. Retrieved from https://sustainabledevelopment.un.org/topics/sustainableconsumptionandproduction
- UN. (n.d., b). Transforming our world: the 2030 Agenda for Sustainable Development. Retrieved from

https://sustainabledevelopment.un.org/post2015/transformingourworld

UN. (n.d., c). United Nations sustainable development agenda. Retrieved from http://www.un.org/sustainabledevelopment/development-agenda/

- Van Herpen, E., Fischer, A. R., & Van Trijp, H. C. (2015). How to position 'mildly sustainable' products: The joint impact of assortment displays and price setting. *Food Quality and Preference*, 46, 26-32. doi:10.1016/j.foodqual.2015.06.018
- Van Gestel, L. C., Kroese, F. M., & De Ridder, D. T. D. (2017). Nudging at the checkout counter – A longitudinal study of the effect of a food repositioning nudge on healthy food choice. *Psychology & Health*, 446(January 2018), 1–10.
- Van Kleef, E., Otten, K., & Van Trijp, H. C. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC Public Health*, 12(1). doi:10.1186/1471-2458-12-1072
- Verplanken, B., & Orbell, S. (2003). Reflections on past behaviour: a self-report measure of habit strength. *Journal of Applied Social Psychology*, 33, 1313-1330. doi:10.1037/e536932011-097
- Verplanken, B., & Roy, D. (2015). Consumer habits and sustainable consumption. Handbook of Research on Sustainable Consumption, 243-253. doi:10.4337/9781783471270.00026
- Verplanken, B., & Wood, W. (2006). Interventions to Break and Create Consumer Habits. *Journal of Public Policy & Marketing*, 25(1), 90-103. doi:10.1509/jppm.25.1.90
- Vos, G. (2015). Nudging healthier food choices in the supermarket(*Master's thesis, Wageningen University*, NL).
- WCED. (n.d.). Our Common Future, Chapter 2: Towards Sustainable Development -A/42/427 Annex, Chapter 2 - UN Documents: Gathering a body of global agreements. Retrieved from http://www.un-documents.net/ocf-02.htm
- Wilson, A. L., Buckley, E., Buckley, J. D., & Bogomolova, S. (2016). Nudging healthier food and beverage choices through salience and priming. Evidence from a systematic review. *Food Quality and Preference*, *51*, 47-64. doi:10.1016/j.foodqual.2016.02.009
- Wood, W., & Neal, D. T. (2009). The habitual consumer. *Journal of Consumer Psychology*, *19*(4), 579-592. doi:10.1016/j.jcps.2009.08.003
- WWF UK. (2013). Prime Cuts- Valuing the meat we eat. Retrieved from Report Summary website: http://assets.wwf.org.uk/downloads/prime\_cuts\_food\_report\_feb2013.pdf
- WWF. (2014). Living Planet Report. Retrieved from http://assets.worldwildlife.org/publications/723/files/original/WWF-LPR2014-

low\_res.pdf?1413912230&\_ga=2.256578760.25939363.1536855995-1439332150.1536855995

- York, R., & Gossard, M. H. (2004). Cross-national meat and fish consumption: exploring the effects of modernization and ecological context. *Ecological Economics*, 48(3), 293-302. doi:10.1016/j.ecolecon.2003.10.009
- Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: green consumer behaviour when purchasing products. *Sustainable Development*, 18, 20-31. doi:10.1002/sd.394

## **REFERENCES FIGURES & TABLES**

- Hansen, P. G., & Jespersen, A. M. (2013). Nudge and the Manipulation of Choice. *European Journal of Risk Regulation*, 4(1), 3–28. https://doi.org/10.1017/S1867299X00002762
- Jackson, T. (2005). Motivating Sustainable Consumption: A review of evidence on consumer behaviour and behavioural change.
- Van Herpen, E., Fischer, A. R., & Van Trijp, H. C. (2015). How to position 'mildly sustainable' products: The joint impact of assortment displays and price setting. *Food Quality and Preference*, 46, 26-32. doi:10.1016/j.foodqual.2015.06.018
- Van Kleef, E., Otten, K., & Van Trijp, H. C. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC Public Health*, 12(1). doi:10.1186/1471-2458-12-1072
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research*, 8(3), 239-260. doi:10.1080/13504620220145401
- Ölander, F., & Thøgersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. Journal of Consumer Policy, 18(4), 345-385. doi:10.1007/bf01024160
- Stoll-Kleemann, S., & Schmidt, U. J. (2016). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, 17(5), 1261-1277. doi:10.1007/s10113-016-1057-5

REFERENCES

REFERENCES