

# **‘Nudging’ Sustainable Food Choices**

*The Role of Defaults, Frames,  
Habits and Nature Relatedness*

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## Abstract

Reduced consumption of meat could help mitigate climate change and health problems. ‘Nudging’ is one approach to individual behavior change. By nudging, the choice context is designed to facilitate certain decisions. In the present field experiment, three different nudges were tested, aiming at increasing vegetarian food selection among 353 customers in a café. The menu was changed so that the vegetarian food options were either presented as the dish of the day (DEFAULT) or given a more attractive name (FRAMING). Additionally, a combination of the two (DEFAULT+FRAMING) was tested. To investigate whether the effect of the nudges depended on individual factors, the customers filled out a survey in which they reported their meat consumption habits and their sense of connection to the natural world (Nature Relatedness). When looking at all customers, the nudges showed no effect on food choice. However, two of the three nudges had an effect for customers with low Nature Relatedness. Moreover, customers with high meat consumption in their daily lives were more likely to select vegetarian food in DEFAULT+FRAMING. Hence, the findings indicate that by giving vegetarian food a more attractive name and salient presentation, it can appeal to customers otherwise unlikely to select vegetarian food.

*Keywords:* nudging, choice architecture, default rules, framing, nature relatedness, habits, sustainable consumption, pro-environmental behavior, food choices.

## **Aim of Study**

Reducing meat consumption is an effective way to reduce greenhouse gasses and other forms of environmental degradation (Reisch, Eberle, & Lorek, 2013). Reducing meat consumption, however, means that we need to change the behavior of people. One approach to creating such behavioral change is *nudging*, a concept derived from decision theory (Thaler & Sunstein, 2008). Nudging is the act of designing choice situations in such a way that they facilitate certain preferred behaviors without restricting the individual's freedom of choice (Thaler & Sunstein, 2008). Some studies have explored the potential of increasing selection of vegetarian dishes through nudging (Campbell-Arvai, Arvai, & Kalof, 2014), but none have tested this in a real-life situation. I therefore took it upon me to set up a field experiment. I wanted to explore whether I could increase the proportion of vegetarian food sold in a café by creating new menus in which the vegetarian dishes were presented in a more salient and attractive way. Personal factors such as habits and a person's sense of connectedness to nature are strongly related to environmental friendly behavior, including sustainable food choices (Klößner & Verplanken, 2013; Mayer & Frantz, 2004; Nisbet, Zelenski, & Murphy, 2009). Therefore, I gave the customers a survey to test whether the new menus would work differently for different customers, depending on their personal meat habits and connection to nature. To measure connection to nature in the survey I used the Nature Relatedness scale developed by Nisbet et al. (2009). Before presenting this study's hypotheses and results, the following sections will describe the climate effects of meat production, and present three psychological barriers to environmental behavior. Nudging as a mean to reduce these barriers and facilitate more sustainable food consumption will then be introduced. Finally, I will discuss Nature Relatedness as a potential moderator of the nudges.

## **The Environmental and Health Impacts of Meat**

There is common agreement that climate change is the world's biggest challenge (N. H. Stern, Britain, & Treasury, 2006; Utenriksdepartementet, 2011). Food systems contribute between one fifth and one third of human-caused greenhouse gas emissions (Vermeulen, Campbell, & Ingram, 2012), and livestock has been estimated to contribute 18 percent of emissions (Steinfeld, Gerber, Wassenaar, Castel, & de Haan, 2006). Some claim that livestock and their byproducts account for even larger amounts, up to 51 percent of annual worldwide emissions (Goodland & Anhang, 2009). Regardless of the variation in these estimates, meat consumption makes up one of the private consumption areas with the largest impact on the environment (Reisch et al., 2013).



## EFFECTS OF NUDGING ON SUSTAINABLE FOOD CONSUMPTION

In most cases, meat production accounts for far more greenhouse gas emissions and environmental degradation per calorie than vegetable farming (Carlsson-Kanyama & González, 2009). 1 kilo of beef accounts for approximately 80 times more emissions of greenhouse gases than 1 kilo of Norwegian carrot, pumpkin or squash (Nymoén & Hille, 2012). When Hedenus, Wirsenius, and Johansson (2014) compared different options for agriculture to mitigate greenhouse gas emissions, they concluded that reducing emissions by production and technology changes only will not be enough to limit the global average surface temperatures from increasing by more than 2 °C above pre-industrial levels. Reduced ruminant meat and dairy consumption is necessary to reach the 2 °C target with a high probability.

A diet consisting of less red meat and more vegetables is also a healthier diet. A high intake of red meat is associated with increased risk of overall mortality, cardiovascular disease mortality and cancer mortality, whereas a high intake of nuts, legumes and fruits is associated with lower risk of various forms of cancer, diabetes, hypertension and arthritis (Fraser, 1999; Pan et al., 2012; Sinha, Cross, Graubard, Leitzmann, & Schatzkin, 2009). In spite of this, meat consumption in industrialized countries steadily increases. Whereas an average Norwegian ate 44 kilos of meat in 1970, the annual consumption was 75 kilos in 2011 (Helsedirektoratet, 2012). How can we influence the behavior of people so that they get a more sustainable and at the same time healthier diet, by eating less meat?

### **Pro-Environmental Behavior**

An extensive amount of research within the field of environmental psychology has investigated what factors are important to make individuals act environmental friendly, and different terms have been coined for such behavior. This paper will use the term pro-environmental behavior (PEB), which can be defined as behavior that minimizes the negative impact of one's action on the environment, or even benefits it (Steg & Vlek, 2009). By this definition, PEB is not necessarily motivated by environmental goals. Hence, people can act pro-environmentally without intentions to do so.

When a person chooses to act or not act in a pro-environmental way, her behavior is a product of both individual and external factors. Individual factors might be a person's knowledge, emotions, values, attitudes and norms. External predictors include physical infrastructure, availability, product characteristics, and social, economic and cultural factors (Kollmuss & Agyeman, 2002; Steg & Vlek, 2009; P. C. Stern, 2000). For instance, whether an individual eats sustainable food such as vegetarian, local or organic food could depend on her knowledge of the environmental impact of different diets, her personal norms and specific

attitudes towards these food types and toward environmental causes in general, as well as her more overarching value system (De Groot & Steg, 2008; Kollmuss & Agyeman, 2002; P. C. Stern, Dietz, Abel, Guagnano, & Kalof, 1999). However, contextual factors such as prices and availability of these foods in her local supermarket, information about carbon footprints or organic certification on the label of the product, the diets of her friends and family, and what kind of food that is common and acceptable in her culture, could also play an important role (Kollmuss & Agyeman, 2002; Steg & Vlek, 2009). In addition to being predicted by individual and contextual factors, several theorists understand personal habits as a separate barrier to PEB, as we shall see.

### **Psychological Barriers to Pro-Environmental Behavior**

Early models of PEB assumed that better knowledge of environmental issues would lead to pro-environmental attitudes, which would in turn result in PEB (Kollmuss & Agyeman, 2002; Schultz, 2002b). The expectation was that educating people about environmental issues and consequences of behaviors automatically would lead to more PEB. This knowledge-deficit model seems to be the rationale behind many information and attitude campaigns, which remain a widely used method to increase peoples' PEB. This model assumes that people are rational actors. In general, research on PEB is dominated by such rational choice models, in which perceived consequences of behavior are seen as the motivators of PEB (Schultz, 2002b; Steg & Vlek, 2009).

Over the past decades psychologists and economists have questioned the rationality of human judgments and decisions (Simon, 1955; Thaler & Sunstein, 2003). The knowledge-deficit model of PEB was soon proven to be too simplistic (Kollmuss & Agyeman, 2002). It is now accepted that only a small fraction of PEB can be explained by environmental knowledge and awareness, and research indicates that information alone is not very effective to foster PEB (Kollmuss & Agyeman, 2002; Schultz, 2002b). A substantial body of research has revealed that decisions are not primarily rational, partly because they are influenced by limited cognitive resources, incomplete information and *heuristics* that lead individuals to make systematic blunders (Kahneman, Knetsch, & Thaler, 1991; Thaler, 1990; Thaler & Sunstein, 2008; Tversky & Kahneman, 1974). Heuristics are mental shortcuts that individuals are thought to rely on, "which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors." (Tversky & Kahneman, 1974, p. 1124). Heuristic reasoning can lead to cognitive biases, which means that one

reasons in a way which is not in accordance with norms of logic and probability (Kahneman & Tversky, 1979). For instance, the so-called *optimistic bias* makes people believe that they are less vulnerable to threats related to both climate change and health problems than the average person (Gifford, 2011; Gifford et al., 2009; Pahl, Harris, Todd, & Rutter, 2005; Weinstein, 1980, 1982, 1987). The bias is associated with the belief that if something has not yet happened; it is unlikely to happen also in the future (Weinstein, 1987).

### **Two Minds: System 1 and System 2**

Departures from rationality can partly be understood by the two distinct cognitive processes thought to underlie human reasoning, namely System 1 and System 2 (Kahneman, 2003). The operations of System 1 are automatic, heuristic-based, intuitive, fast, effortless, associative, not available to introspection, and often emotionally charged. Because these processes are often guided by habits, they can be hard to control or change. In contrast, it is possible to consciously monitor and control the operations of System 2. These operations are slower, effortful, analytic and flexible (Kahneman, 2003). Contrary to System 1, System 2 permits abstract reasoning and reasons according to logical standards. System 2 is thus known as the rational system (Evans, 2003).

Rational theories of choice such as the knowledge-deficit model discussed above imply that people always use the effortful and rational System 2 to process information and make decisions. However, System 2 processing requires attention and cognitive effort, which is often scarce in a complex and time-pressed world. Human decisions are therefore more often guided by the fast System 1, and might for that reason be unconscious and influenced by external and emotional factors (Kahneman, 2003; Knoll, 2010). As a result, individuals sometimes make decisions that are not beneficial to them, defined by normative standards. They do things that they would not have done if they possessed all information, had paid full attention, had unlimited cognitive abilities and perfect self-control (Ariely, 2008; Milkman, Rogers, & Bazerman, 2008; Thaler & Sunstein, 2008; Tversky & Kahneman, 1974).

One example of this could be when people pursue an unsustainable lifestyle despite their knowledge that our present consumption patterns will contribute to degrading the environment for future generations. Another example is food choices. How come so many people in the Western world are obese, and a majority of dieters fail to keep their weight low (Hill, 2009)? Research suggests that eating and drinking are some of the most mindless actions we do (Wansink & Sobal, 2007). Many of us simply eat what is put in front of us. For instance, people tend to eat more than they want to eat, they do not know when they are full, they eat more when the TV is on, and they eat more when portion sizes are large, even when

they dislike the food (!) (Kallbekken & Sælen, 2013; Skov et al., 2013; Wansink & Cheney, 2005; Wansink, Just, & Payne, 2009; Wansink & Kim, 2005; Wansink & Sobal, 2007).

Hence, food choices seem to be largely ruled by the “autopilot” processes of System 1 rather than rational considerations (D. Cohen & Farley, 2008). Information about environmental or health consequences of the food, which would require System 2 processing, might therefore play a smaller role when selecting food and eating. On the other hand, intuitive, effortless responses to situational cues and automatic habits might have a larger impact (D. Cohen & Farley, 2008; Olstad, Goonewardene, McCargar, & Raine, 2014).

This leads us to the factor often understood as the main barrier to PEB, namely personal habits (Kollmuss & Agyeman, 2002). In the following section I wish to explore how habits, as well as the related mechanisms of cognitive dissonance and denial could be seen as three facets of human cognitive processes that hinder PEB.

### **Habits: The Same Procedure as Last Year, Miss Sophie?**

Recycling, taking the bus to work or buying the same lunch as every day are examples of habits that are rarely considered at all. Verplanken and Aarts (1999) define habits as “learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states” (p. 104). Since habitual behavior is guided by automatic cognitive processes rather than conscious reasoning, they do not require much attention (Verplanken, Aarts, & Van Knippenberg, 1997), but they can also be irrational behaviors, in the sense that they do not always lead to optimal decisions in terms of maximized utility (Hastie & Dawes, 2010).

Habits work as barriers to PEB for several reasons. First of all because many behavior changes require breaking old habits and establishing new ones (Dahlstrand & Biel, 1997), but research suggests that the stronger the personal habit, the less likely is behavior change (Fujii, Gärling, & Kitamura, 2001; Gifford, 2011; Klöckner & Verplanken, 2013).

Second, habits weaken the connection between intentions and behavior (Verplanken, Aarts, van Knippenberg, & Moonen, 1998). Thus, intentions to act in an environmental way might not suffice, if the non-environmental habit is strong. Likewise, food choice is better predicted by habits than by attitudes and intentions (Köster, 2009), and habits are extra important for food purchasing decisions under time pressure (Biel, Dahlstrand, & Grankvist, 2005).

Third, habits can lead to selective attention and misperceptions, because they make people focus on information that confirms their choices, and neglect information that is not in line with their habits. This “habitual mindset” contributes to the maintenance of habits (Steg

& Vlek, 2009; Verplanken & Aarts, 1999). For instance, the stronger habit people have for driving, the less information they seek about other travel modes (Verplanken et al., 1997). Besides, drivers who commute frequently by car overestimate the time it will take to commute by public transport (Fujii et al., 2001). Thus, individuals with strong habits may lack both accurate knowledge about other alternatives and motivation to look for it.

However, it is possible for habits to change when major contextual changes occur. Fujii et al. (2001) surveyed car drivers before and during an eight-day freeway closure in Japan, which made their habit of driving behavior impossible. The drivers who drove frequently prior to the freeway closure were more likely to travel by public transport in the future if they had largely overestimated the commuting time by public transport. That is; if riding the bus turned out to be faster than they had anticipated, they were more likely to keep riding by bus also in the future, than if there were small differences between expected and experienced commuting time (Fujii et al., 2001). Thus, temporary structural changes might catalyze durable behavioral change, especially if the new, non-habitual experience is surprisingly positive. This is where nudging comes in, as we shall see later.

### **Cognitive Dissonance: Thoughts and Behavior in Harmony**

Cognitive dissonance is related to habits and can be understood as a second barrier to PEB. Cognitive dissonance was introduced as a theory of attitude change, and the basic idea is that individuals seek consistency within themselves (Festinger, 1962). When cognitions such as knowledge, opinions or beliefs about the environment, about ourselves, or about our behavior—are inconsistent, the individual will experience psychological discomfort. This distress will motivate the individual not only to reduce the dissonance, but also to avoid information and situations that are likely to increase the dissonance (Festinger, 1962). This theory can help explain the behavior of the car drivers previously mentioned who did not seek out information about other travel modes (Verplanken et al., 1997), maybe because this could have lead to discomfort if they realized that other alternatives were better than their habitual behavior, driving.

Festinger (1962) points at different strategies used to increase the consistency. As we shall see, these techniques can potentially hinder environmental consciousness and behavior. For instance, a person who eats a lot of meat might experience cognitive dissonance when she learns that meat production has negative impacts on the environment. As a response to this, she might simply change her action, and reduce or stop meat intake. This will restore balance between her knowledge and actions. There are strategies, however, for avoiding such dissonance without having to change meat consumption. She might instead *choose* to believe

that meat production is not *that* bad for the environment, or focus on information saying that meat production is a small problem compared to other issues, especially in Norway where animals spend a lot of time outdoors on grass that could not be used for food cultivation anyway, et cetera. She could also rationalize her behavior by thinking that she needs meat to be healthy, by saying that other people eat more meat than her, or by thinking that she already does her environmental duty by using public transport and recycling. The ultimate strategy would simply be to avoid news and conversations about the issue.

Thus, cognitive dissonance represent a barrier to PEB because it can produce a filter through which information is processed. Information threatening existing beliefs or behaviors will be more difficult to accept. The theory can therefore help explain the gap often found between environmental knowledge and behavior (Kollmuss & Agyeman, 2002; Schultz, 2002b)

### **Denial: “Knowing and Not Knowing”**

The concept of denial originates from psychoanalysis, and was one of the defense mechanisms proposed by Sigmund Freud (Hall, 1966). It refers to a refusal to accept reality (Kollmuss & Agyeman, 2002). While both cognitive dissonance and denial can lead to refusal to acknowledge climate problems, these concepts can be understood as different mechanisms. Stoknes (2014) suggests that denial can be *fuelled* by dissonance, but represents a stronger barrier because it involves refusing the issue completely. Feelings of powerlessness can lead to denial, such as when people feel that they alone can do nothing to mitigate climate change (Stoll-Kleemann, O’Riordan, & Jaeger, 2001). Pessimistic climate prospects can be too frightening and bothersome for individuals to take in over time, and once people realize there are no easy solutions, they might stop paying attention to climate issues (Stoknes, 2014).

S. Cohen (2001) proposes three varieties of denial, which have been used by among other Norgaard (2011) to understand denial of climate change. *Literal denial* is the assertion that something did not happen or is not true, à la “The climate isn’t changing.” In *interpretive denial*, the facts are not denied, but interpreted in a different way. Euphemisms, technical jargon and word changing can be reinterpreting tools, visible in justifications such as “Climate change might happen, but it is not caused by humans”, or “The alternative to *clean* Norwegian oil is dirty foreign coal.” The last form of denial is *implicatory denial*, in which we do not reject that something is happening, but we fail to integrate the knowledge into everyday life or transform it into action: “I know that climate change happens, and that it is has human causes. But I have my life to live...” What is minimized here is not information, but “the psychological, political or moral implications that conventionally follow” (Cohen,

2001, p. 8). Norgaard's (2011) ethnographic study of Norwegian small town residents' way of coping with climate issues indicates that implicatory denial is widespread in Norway. Norgaard (2011) observed that people she interviewed could talk about the weather in general, but were unwilling or unable to talk about climate change in serious ways. She describes their way of confronting climate issues as "knowing and not knowing, seeing but not seeing" (p. 104). Thus, implicatory denial gives us the prospect of a situation in which people have knowledge about the facts of climate change, but live their lives as if they did not. Thus, as opposed to what rational choice theory predicts, in such states of denial, information in itself will not suffice to encourage the pro-environmental behavior we are seeking.

### **Facilitating Pro-Environmental Behavior through Nudging**

How can individuals overcome the barriers made up by habits, cognitive dissonance and denial, and make more pro-environmental food choices? In order to promote sustainable food systems, Reisch et al. (2013) suggest that policy instruments include information-based, market-based and regulatory instruments, as well as the latest addition to the political toolbox: *nudging*. Giving people a small 'nudge' in the right direction can help individuals make better decisions for themselves and the environment, as proposed by Thaler and Sunstein (2008). We have already seen that the information-based approach might have limited potential, partly due to the barriers made up by habits, cognitive dissonance and denial. Market-based and regulatory instruments are beyond the scope of this paper. I will therefore discuss nudging, which is focused on as tool to increase sustainable behavior in the present study.

Thaler and Sunstein (2008) propose that the context in which choices are made, the *choice architecture*, largely affects decisions. We have already seen how food choices are affected by situational cues, such as a TV that is on during food consumption or the size of the food portions. But other decisions are also affected by choice architecture, such as which alternative is presented as the default choice, order of presentation and framing of information (Kallbekken, Sælen, & Hermansen, 2013; Thaler & Sunstein, 2003; Tversky & Kahneman, 1986).

This leads us to the next concept defined by Thaler and Sunstein (2008), namely *nudging*. While rational theories of decision making focus on how the effortful System 2 makes decisions, and assume decisions to be coherent and constant over time (Tversky & Kahneman, 1986), nudge techniques are based on the notion that System 1 often governs decision-making, and that many decisions therefore are automatic and dependent on

situational cues (Thaler, Sunstein, & Balz, 2010). The verb *nudge* means “to push gently” (“nudge,” n.d.). Nudging involves using choice architecture to alter “people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives” (Thaler & Sunstein, 2008, p. 6). Nudges still allow for people to make their own choices, as they are easy interventions that are easy to avoid. Sunstein and Thaler (2003) call this *libertarian paternalism*.

Sunstein and Reisch (2013) propose that choice architecture opens up new possibilities for environmental protection, and that the potential of nudging in promoting PEB might be even more effective than the standard tools used so far: economic incentives, mandates and bans. Because food decisions often involve automatic reasoning, and less rational judgment (Wansink, 2013), these could be especially influenced by a nudge. Therefore, in order to promote sustainable food choices, it could be promising to design eating environments in such a way that peoples’ instinctive actions are biased towards the sustainable food, which is often also the healthy food. Sunstein (2013) mentions different types of nudges to promote PEB. The next section presents two of these approaches, namely *default choices* and the technique of increasing the salience of certain factors and variables, which I will call *framing* in this paper.

### **Defaults: The Path of Least Resistance**

Defaults are the option that will be selected or the settings that apply when an individual make no active choice. Defaults have proven to have a large influence on behavior (Johnson & Goldstein, 2003), especially when people have little knowledge about a product (Sunstein & Thaler, 2003).

Pichert and Katsikopoulos (2008) found that most participants chose a green (renewable) electricity utility when this was presented as the standard option, while the majority chose a grey (fossil) utility when this was the default option. Food choices are likewise affected by defaults. When Campbell-Arvai et al. (2014) made attractive, vegetarian dishes the default choices, a majority (90%) of the participants chose a vegetarian dish, compared to less than half (40%) when the vegetarian dishes were presented together with meat dishes in the menu. The study also indicates that defaults are more powerful motivators than information, as providing information about the environmental impact of meat did not affect vegetarian food selection, neither when presented alone, nor in combination with the defaults (Campbell-Arvai et al., 2014).

There are several reasons why defaults affect choices. Some of the effect can be explained by inertia, or what Thaler and Sunstein (2008) name the “yeah, whatever” heuristic.



People might simply choose this option because it requires effort to gather information about all the other possible choices, or because they do not pay attention when choosing (Johnson & Goldstein, 2012). Considering the fact that an average person makes more than 200 choices a day concerning food (Wansink & Sobal, 2007), it would simply not be possible to spend a lot of cognitive effort on each decision. Food defaults could therefore be easily accepted. Further time pressure could lead to particularly reduced attention, making default choices extra influential. Another reason why defaults could be influential is *implied endorsement* (Johnson & Goldstein, 2012). The decision maker will assume that this alternative is the default for a reason. Because someone chose this to be first option, people will perceive it as the recommended course of action (McKenzie, Liersch, & Finkelstein, 2006).

### **Naming as Framing: Half-full or Half-empty**

Framing, or the wording of possible options, is also found to strongly influence judgment and choices (Sunstein & Thaler, 2003). In decision research, the term *frame* refers to “the decision maker’s conception of the acts, outcomes, and contingencies associated with a particular choice” (Tversky & Kahneman, 1981, p. 453). An illustration of the framing effect is the different “attractiveness” of a medical treatment depending on whether it is framed in terms of mortality or survival. Both patients and physicians are more positive to surgery as treatment if they are informed that the one-month *survival* rate is 90 percent, than if told the more frightening-sounding fact that there is 10 percent *mortality* in the first month after surgery (McNeil, Pauker, Sox Jr, & Tversky, 1982).

Kahneman (2003) defines framing effects as discrepancies between choice problems that people after reflection will consider identical. Therefore, I understand the concept of framing to include also the way in which a choice is presented, such as a product’s name. Clearly, a name does not change a product, but it might make it appear different for System 1.

Why does framing affect choices? A central assumption in rational choice theory is *invariance* in decision making, which means that people will prefer the same options regardless of the manner in which they are presented (Tversky & Kahneman, 1986). Accordingly, different frames should not affect choices. However, because decisions often rely on the processes of System 1, and because these often are emotionally charged and influenced by situational cues, individuals will process information differently depending on how it is framed (Kahneman, 2003). The reflective System 2 does not do sufficient work to find out whether reframing a question would provide a different answer (Thaler and Sunstein, 2008), or whether a product would still be the same with a different name.

## EFFECTS OF NUDGING ON SUSTAINABLE FOOD CONSUMPTION

Brian Wansink has conducted a series of studies that illustrate how food menu labels affect food selection and sensory perceptions. In one study, a number of dishes were given either regular names like “Seafood Filet” and “Red Beans with Rice”, or descriptive names like “Succulent Italian Seafood Filet” and “Traditional Cajun Red Beans with Rice”. The descriptive labels increased sales, the customers’ intentions to repurchase the dish and the amount they were willing to spend on the dish (Wansink, Painter, & Van Ittersum, 2001). Furthermore, customers who ate dishes with descriptive names rated the food as more appealing, tastier, more satisfying and even more caloric than those who ate the less descriptively named counterparts (Wansink, Van Ittersum, & Painter, 2005).

Despite the encouraging results of increasing selection and sensory appeal by giving food attractive menu labels, vegetarian food is still often simply named “Vegetarian” or “Vegan” in canteens and restaurants. How will consumers perceive this name? If they are not familiar to vegetarian food, this is a neutral name that says little about taste. Because it is so general—it can mean all food that is not meat—it is not likely to produce any pleasant memories or taste associations. The basic impression the name could invoke is that this dish does *not* contain meat. It frames the food in terms of what it is *missing*. In addition, people who eat meat hold negative beliefs towards vegetarian and vegan diets (Povey, Wellens, & Conner, 2001). When meat eaters were asked to rate different diets, many described a vegetarian diet as healthy, but also as nutritionally unbalanced, boring/bland and low in fat. A vegan diet was in addition described as extreme, restrictive and unnatural (Povey et al., 2001). It could therefore be expected that meat eaters will assume that dishes named “Vegetarian” or “Vegan” are boring and bland, and rather jump to the rest of the menu.

Moreover, food is an important part of identity (Belasco, 2008), and food habits and preferences are shaped by personal food experience (Reisch et al., 2013). For people who are not used to eating vegetarian foods, and do not identify as vegetarians, the name “Vegetarian”/“Vegan” might give associations of something they “are not”, maybe something that is “extreme”, as if these food items were meant only for vegetarian customers. Framing the vegetarian dishes with a name that describes what they actually contain could possibly make also non-vegetarian customers perceive them as more attractive and non-exclusive choices.

### **Nature Connectedness**

The last section described how nudges might increase PEB. As already mentioned, PEB is determined not only by external factors, which nudging would be an example of, but

also by factors within the individual. Stern (2000) underscores that these factors play together; so contextual factors can have different meanings to people with different attitudes or beliefs. But to the best of my knowledge, little is known about whether nudges work differently for different individuals.

One important individual factor to PEB seems to be the degree to which the individual feels connected to the natural world. *Ecopsychology* hypothesizes that people who value and feel concern for nature will be more willing to protect it (Gomes, Roszak, & Kanner, 1995), and Schultz (2002a) suggests that the very source of environmental concern is peoples' belief of being a part of nature. When environmentalists were asked to describe the sources of their environmental engagement, experiences in nature and of environmental destruction were among the factors mentioned most often (Chawla, 1999). Thus, emotional connection to nature seems to be important in sowing environmental awareness and concern.

The link between emotional involvement with nature and PEB has been examined quantitatively in larger samples as well, and an individual's sense of nature connection is found to strongly predict sustainable attitudes and behaviors (Mayer & Frantz, 2004; Nisbet et al., 2009). *Nature Relatedness* (NR) is one of the constructs used to describe such nature connection, and can be defined as individual differences in cognitive, affective, and experiential connection with nature. NR is understood to be similar to a personality trait that is relatively stable over time and across situations (Nisbet et al., 2009; Zelenski & Nisbet, 2014). The trait is similar to an *ecological identity* or an *ecological self*, a term coined by Arne Næss (1973), philosopher and founder of deep ecology. NR comprises both an internalized identification with nature and an external perspective, which is a sense of agency concerning human actions and their impact on other living things. It also reflects actual experiences in and familiarity with nature (Nisbet et al., 2009).

NR is found to be positively related to environmentalism, vegetarianism, participation in environmental organizations, fair trade and organic purchasing habits, while negatively related to consumerist behavior (Mayer & Frantz, 2004; Nisbet et al., 2009). It seems like people who feel that they are a part of nature want to protect it.

Thus, individuals' sense of belonging to the natural world might play an important role in shaping PEB, and especially when it comes to purchase behavior and meat consumption. Therefore the present study asks the question: Does the individual factor Nature Relatedness and the contextual factor nudging influence vegetarian food purchase in interaction?

## **Design of the Study and Hypotheses**

Given the theories mentioned in the previous sections, it can be assumed that an individual's meat consumption will be affected by both external factors such as choice architecture, individual factors such as nature relatedness, as well as cognitive barriers such as personal habits, cognitive dissonance and denial. The aim of the present study is to explore whether altering the situation in which food choices are made can increase the selection of vegetarian food, even for people with a strong meat habit. I will also investigate whether these changes in food presentation will work differently depending on the customers' nature relatedness. Three nudges will be tested: I will first make the vegetarian dish default choice, second I will give it a more descriptive name, and third I will test the default presentation in combination with the descriptive name.

To the best of my knowledge, only Campbell-Arvai et al. (2014) have tested the effect of making vegetarian dishes the default choices. Their results indicated that a large majority chose the vegetarian alternative when this was presented as the default. However, their study was an experiment conducted in an artificial setting, with a main menu that consisted of only vegetarian dishes. Thus, available research does not provide a profound understanding of how food choices are altered by the presentation of the vegetarian options in a real-life setting. The present study will therefore test the effect of different nudges in a more natural setting in which meat dishes are easily available choices as well.

The first nudge is to present the vegetarian dish as the default choice. Sunstein and Reisch (2013) advice choice architects who want to avoid a absolute default rule but nonetheless want to promote selection of a green option, to "list it first, or use bold or a large font, or adopt verbal descriptions that make it especially salient or appealing" (p. 22). In the nudge DEFAULT, I will therefore present the vegetarian dish as the dish of the day, and give it an extra salient presentation. Thus, the customers are still able to make other choices from the rest of the menu. This can be considered a "soft" default.

In the second nudge FRAMING I will present the vegetarian option more attractively by a descriptive name instead of the general name "Vegetarian". As previously seen, Wansink et al. (2001) increased the sale of different dishes by giving them more descriptive and attractive names. It could therefore be expected that giving vegetarian dishes more descriptive and attractive names would increase their selection. Wansink et al. (2001) suggest different ways to generate descriptive menu labels, including geographical labels ("Italian"), affective labels ("home-style"), sensory labels ("tender") or a mix of these. Because the vegetarian dishes in the present study are wraps with taco beans, tomato salsa and cilantro, the name

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“Mexican Style” will be tested. The aim is to produce associations of the exotic, tasty and spicy features of the dish, rather than framing it as a “non-meat” alternative. Olstad et al. (2014) suggest that nudges might be more powerful if they are implemented in combination. To explore the extent to which a combination of the default and framing is more potent than the two nudges alone, the third intervention is a combined *DEFAULT+FRAME* nudge.

P. C. Stern (2000) argues that researchers should investigate how interventions aiming at increasing PEB work in interaction with personal attitudes or beliefs. Little is known about whether the effect of nudging differs with individual factors. As already mentioned, Nature Relatedness is associated with pro-environmental attitudes and behaviors like vegetarianism (Nisbet et al., 2009), and could therefore be assumed to predict vegetarian purchase in the present study. But could there also be an interaction effect between nudging and NR, and what could this effect look like?

ABC theory predicts personal attitudes to be strongly influential on PEB when context is neutral – that is, when the situation neither hinders nor favors the PEB (P. C. Stern, 2000). In contrast, the attitude-behavior relation becomes close to zero if the situation highly encourages or discourages the PEB, for instance when the PEB is very difficult, time-consuming or expensive to pursue, or in contrast; if the PEB is very easy, convenient and lucrative. The nudges in the present study aim to make it easier to choose the vegetarian dish. Hence, personal attitudes and worldview, such as NR, could be expected to play the largest role for food selection in the “neutral” control condition. Customers with *low* NR – those with the lowest sense of nature connection – should therefore have the lowest chance of selecting vegetarian in the control condition. But in the nudge conditions, the context will encourage vegetarian selection. According to ABC theory, personal variables should then become unimportant. There is therefore a chance that customers with low NR will increase their selection of vegetarian food in the nudge conditions. Customers with low NR should consequently be the most affected by the nudge. This is also the most important group to encourage to PEB, as they are the least likely to be environmentalists or vegetarians (Nisbet et al., 2009). Customers with *high* NR, on the other hand, could be expected to have an equal chance of selecting vegetarian food in all conditions, and hence be less affected by the nudge. That is; in the control condition their personal attitudes towards nature should encourage them to select vegetarian, and in the nudge conditions both their NR and the context will favor vegetarian selection.

Last, could it be that the nudges could help break the barrier to PEB made up by personal habits, and increase the likelihood that also customers who usually eat much meat

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select vegetarian? We have seen that food decisions often rely on the automatic System 1 (D. Cohen & Farley, 2008), and that System 1 is habit-driven (Kahneman, 2003). Habits are especially strong predictors of food purchase under time pressure (Biel et al., 2005). Buying a meal in a café usually involves time pressure. It can therefore be predicted that customers with habits to consume much meat will be less likely to select a vegetarian wrap. But System 1 also relies on heuristics and is highly influenced by situational cues (Kahneman, 2003). The nudges represent a change of situational cues, such that customers' instinctive judgment and heuristics should be biased towards the vegetarian food. Therefore, it could be expected that customers with a strong meat consumption habit are more likely to select vegetarian when "nudged". If this is the case, we could expect to find that customers who select a vegetarian wrap in the nudge condition will report higher average meat consumption than customers who select a vegetarian wrap in the control condition.

*Hypothesis 1a:* The nudge DEFAULT will positively affect the selection of vegetarian wraps.

*Hypothesis 1b:* The nudge FRAMING will positively affect the selection of vegetarian wraps.

*Hypothesis 1c:* The nudge DEFAULT+FRAME will positively affect the selection of vegetarian wraps.

*Hypothesis 2:* Nature Relatedness will moderate the effect of the nudges. Specifically, nudging can be expected to be particularly effective among individuals with low Nature Relatedness.

*Hypothesis 3:* The meat consumption habits of customers who selected a vegetarian wrap will differ across the nudges. Specifically, customers who choose a vegetarian wrap in the nudge conditions could be expected to have a stronger meat consumption habit than customers in the control condition.

## Method and Materials

A field experiment was conducted in a café at a Norwegian university selling wraps, pizzas and other dishes. I, the researcher, approached the customers that had bought a wrap and asked them to fill out a survey. A total of 353 wrap buyers completed the survey, of which approximately half were men (51.7%). The participants' age spanned from 14 to 53 years ( $M = 25.04$ ,  $SD = 5.59$ )<sup>1</sup>.

All respondents were informed about the purpose of the study and its confidentiality in advance of answering. They were reminded about their right to withdraw from the study at any time. The participants did not know that they participated in an experiment, as revealing the purpose of the experiment in advance could possibly affect customers' choices. The changing of the food presentation was not considered a serious deception that could harm the participants in any way. However, the participants were informed about the possibility to contact the researcher in case of questions, or if they wanted to know the full purpose and the results of the study. Moreover, as an incentive to answer the questionnaire, each participant had the possibility to take part in the drawing of a 1000 Norwegian Kroner voucher.

## Design and Procedure

A between-subjects design with four experimental groups (*DEFAULT*, *FRAMING*, *DEFAULT+FRAME* and *CONTROL*) randomly rotating the menu presentation of the vegetarian wraps from day to day was used. Each condition was tested on two different weekdays<sup>2</sup> within a period of three weeks in October and November 2013.

Four different posters were designed by the researcher and printed in two copies each. They were created in the same design as the original posters in the café. Wrap prices were equal for all wraps (46 NOK). In every condition, two identical posters were placed on the long counter in the café: one by the entrance and one where the ordering and payment took place. For every condition, the text was changed on the posters and at two blackboards placed behind the counter, one at eye level (Blackboard 1), and one closer to the ceiling (Blackboard 2) (See Appendix 1).

In the *CONTROL* condition (see Figure 1), the poster presented nine different types of wraps without highlighting any specific type. The meat-free choices were explicitly named "Vegan" and "Vegetarian". The ingredients of each wrap were listed below the name. These

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<sup>1</sup> 5 individuals did not report their gender, 8 individuals did not report their age.

<sup>2</sup> Of 10 experimental days, two days were omitted from analysis. The first day was omitted because it was a Friday. Fridays were excluded because this was the only day in which the competing neighbour café did not offer a proper vegetarian meal, and because there were few customers on Fridays. The second day was excluded because the café was sold out of vegetarian wraps at 2.30 PM.

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wrap names were also written on Blackboard 1. Blackboard 2 contained the text “Wraps. Try our cold/warm wraps, chipotle style”. This condition was similar to how wraps were usually presented in this café.

In the FRAMING condition (Figure 2), the name of the vegan and the vegetarian wraps were changed to “Mexican Style”, on both the poster and the blackboards.

In DEFAULT (Figure 3), vegetarian wraps were again called “Vegan” and “Vegetarian” but, importantly, made the wraps of the day, and therefore constituted the default choice on that day. The other wrap types were presented in small font at the bottom of the poster. Blackboard 1 said: “Wrap of the day: Vegetarian”, with a line circling the text. The names of all other wrap types were written below. Blackboard 2 said: “Wraps. Try our cold/warm wraps. Wrap of the day: Vegetarian”.

The DEFAULT+FRAME condition (Figure 4) was similar to DEFAULT, except that the names “Vegetarian” and “Vegan” were changed to “Mexican Style” as in the FRAMING condition.



Figure 1. CONTROL poster. Vegetarian wraps are named “Vegetarian” and “Vegan”. No wrap options are highlighted.



Figure 2. FRAMING poster. Vegetarian wraps are named “Mexican Style”. No wrap options are highlighted. Dashed line in the figure highlights difference to CONTROL condition but was not part of the original poster.





Figure 3. DEFAULT poster. Vegetarian wraps are named “Vegetarian” (hot and cold) and made the wrap of the day. Other wrap options are stated below.



Figure 4. DEFAULT+FRAME poster. Vegetarian wraps are named “Mexican Style” (hot and cold) and made the wrap of the day. Other wrap options are stated below. Dashed line in the figure highlights difference to DEFAULT condition but was not part of the original poster.

## Survey

After having ordered their wrap, all wrap buyers received an identical survey. All participants were asked if they had answered the survey before, to ensure that no customers participated more than once. The survey took approximately 15 minutes to complete and had been pilot-tested on a small group ( $N = 10$ ). Because the instruments originally were in English, they were translated to Norwegian by the researcher and then back-translated by a native Norwegian speaker with a university degree in English language. The order of the instruments was randomized to reduce potential interactions. The following questions and instruments were included in the survey.<sup>3</sup>

**Demographics.** The respondents reported their gender and age.

<sup>3</sup> The questionnaire contained other instruments that will not be further discussed in this paper. See Appendix B for a copy of the full questionnaire in Norwegian

**Meat consumption habit.** Two items aimed at measuring the participants' present consumption of meat and vegetarian food. To be able to control for general food preferences, participants were asked to indicate whether they considered themselves to be omnivore, pescetarian, vegetarian or vegan. These answers were recoded to a binary variable "vegetarian", where 0 = eats meat, 1 = does not eat meat (vegetarians, pescetarians and vegans combined).

Moreover, they were asked to indicate the number of their dinners that contain meat over an average week. The question was phrased: "During an average week, how many of the dinners that you eat contain meat? E.g.: If you normally eat meat for dinner every day, write 7. If you never eat meat for dinner, write 0."

**Nature Relatedness.** Several scales and measures exist that assess individuals' nature connectedness. Tam (2013) did an empirical examination of nine different measures, and found strong convergence among the concepts. They were strongly inter-correlated, converged to a single factor, shared similar correlations with criterion variables, and showed little unique predictive power. Tam (2013) concludes that the measures can be considered markers of the same underlying construct. Of the various measures, the multidimensional Nature Relatedness (NR) scale (Nisbet et al., 2009) proved to be among the best measures (Tam, 2013). The scale has been found to have good internal reliability and test-retest stability, and has been validated against similar measures (Nisbet et al., 2009; Tam, 2013).

Thus, a 20-item version of the NR scale was used to assess participants' relationship to nature. One item from the original scale was not included in the questionnaire because it has been found to have very weak factor loadings to the rest of the scale (Nisbet et al., 2009). The original scale has been found to have three subscales. NR-Self reflects the degree to which people identify with the natural environment, representing an internal, ecological identity (example item: "My relationship to nature is an important part of who I am."). NR-Perspective represents an external, nature-related worldview, indicating how one's relation with nature is manifested through attitude and behavior (example item: "Animals, birds and plants have fewer rights than humans", reversed). The last subscale, NR-Experience, is indicative of the familiarity people have with nature, reflecting both comfort with and desire to be out in nature (example item: "I enjoy being outdoors, even in unpleasant weather"). (Nisbet et al., 2009)

The items were rated using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), such that higher scores represent stronger connection to nature. About half of the items are negatively worded, and were reverse scored before analyses. The

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confirmatory maximum likelihood factor analysis supported the threefactor solution (see Appendix C) found by Nisbet et al. (2009). Two items were excluded based on low loadings in the factor analysis, and as this resulted in an increased reliability of the subscales. Hence, 18 items were computed into three subscales and a total scale. The reliability estimated by Cronbach’s alpha was satisfactory for the full scale ( $\alpha = .84$ ) and for the subscales NR-Experience, consisting of 6 items ( $\alpha = .78$ ) and NR-Self, consisting of 7 items ( $\alpha = .81$ ), but not satisfactory for NR-Perspective, consisting of 5 items ( $\alpha = .48$ ). The unsatisfactory low reliability was kept in mind during further analyses, and analyses were conducted both with the three subscale and with the total scale, as Nisbet et al. (2009) suggests that the scale will need revision to work optimally as a multifactorial scale. See Table 1 for psychometric properties of the different NR-scales.

**Wrap.** At the end of the questionnaire, the participants were asked to respond to questions about their wrap habits and satisfaction. They were asked to indicate which wrap they had just bought, from a list containing all available wraps. For the vegetarian options, the names on the list were “Vegan / Mexican style (hot)” and “Vegetarian / Mexican style (cold)”.

Last, participants indicated to which extent they enjoyed their wrap, on a 6-point scale ranging from 1 = *very much*, to 5 = *not at all*. In addition there was an option 6 = *I have not eaten it yet*. Before analysis, responses 6 were excluded.

Table 1

*Psychometric Properties of the Study Variables*

Variable	M	SD	Range		Skew	$\alpha$	N
			Possible	Observed			
Meat Dinners per Week	4.55	2.19	0 - 7	0 - 7	-.826	-	342
Nature Relatedness Total	3.46	.583	1 - 5	1.78 - 4.72	-.269	.837	344
Nature Relatedness Experience	3.30	.824	1 - 5	1.00 - 4.83	-.356	.780	344
Nature Relatedness Self	3.35	.754	1 - 5	1.14 - 5.00	-.370	.808	344
Nature Relatedness Perspective	3.80	.680	1 - 5	2.00 - 5.00	-.167	.477	344

### Analysis

Before running the main analyses, a missing value analysis was performed for the NR items. 9 subjects were excluded from this analysis because they only answered to the questions regarding food habits and wrap choice, and thus had missing values for the rest of the survey. All items had missing values, with the lowest percentage being 0.6% missing. The item NR\_Perspective\_1 had the largest amount of missing values, with 10 subjects (2.9%) not responding. The result of Little's MCAR test was non-significant ( $p = .14$ ), indicating that the missing data was missing at random. Missing values were thus replaced using the expectation-maximization (EM) method. EM estimates the parameters by maximizing the complete data log likelihood function (Dong & Peng, 2013).

All analyses were conducted with SPSS Version 21. After a descriptive analysis of characteristics of the customers, the wrap choices of the customers in each nudging condition were explored descriptively in crosstabs. A chi-square test was used to determine whether wrap choice differed by nudge condition. Next, binary logistic regressions with interaction terms were used to test whether Nature Relatedness moderated the effect of nudge condition on wrap choice. Last, as logistic regression could not be used to test whether habits moderated the effect of nudge on wrap selection—because meat habits differed significantly across the experimental groups ( $F(3, 342) = 7.77, p < .001$ )—analysis of variance (ANOVA) was used to test for differences in meat habits between the nudge groups and between the customers who bought a vegetarian wrap versus meat wrap.

### Results

In terms of self-reported food consumption habits, most participants categorized themselves as omnivores (89.5%). The remaining participants avoided animal products to different extents, self-identifying either as vegetarian (5.7%), vegan (1.4%) or pescetarian (3.4%). In further analysis, the three meat-avoidant categories are combined in one category called “vegetarians” (10.5%).

Wrap satisfaction did not differ between customers who bought vegetarian wraps and meat wraps ( $F(1, 247) = .05, p = .63$ ); or between the nudge conditions  $F(3, 247) = 1.40, p = .24$ . Furthermore, the interaction effect was non-significant ( $F(3, 247) = .58, p = .53$ ), indicating that the effect of wrap choice on wrap satisfaction did not differ by nudge condition (see Figure 5). Vegetarians were excluded in this analysis. For more information about the customers, see Appendix C.

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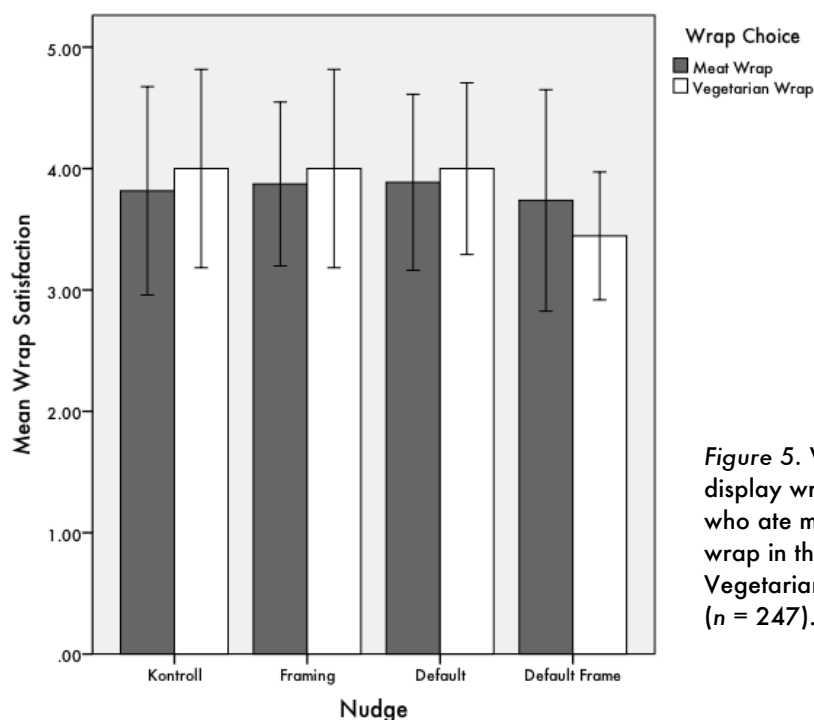


Figure 5. Wrap Satisfaction. The bars display wrap satisfaction for customers who ate meat wrap versus vegetarian wrap in the different nudge conditions. Vegetarian customers are excluded ( $n = 247$ ). Error bars indicate  $\pm 1$  SD.

### Hypothesis 1: Wrap Selection by Nudge

The first hypotheses were that the three nudges would positively affect the selection of vegetarian wraps. The percentage of customers selecting a vegetarian wrap in the different conditions is displayed in Figure 6 and Table 2.

These analyses were run only for meat eating participants, as no change in meat consumption was plausible for vegetarians. A chi-square test of independence was performed to examine the relation between

nudge condition and wrap choice. The test was initially performed for nudge condition in general, and then separately for each condition compared with control, to examine the effect of each nudge to the baseline condition. There was a marginally significant difference between the percentage of vegetarian wrap buyers by nudge  $\chi^2(3, n = 315) = 7.36, p = .06$ . However, following up on this effect, no difference in the percentage of customers eating vegetarian was observed in the DEFAULT,  $\chi^2(1, n = 144) = 0.28, p = .87$ . FRAMING,

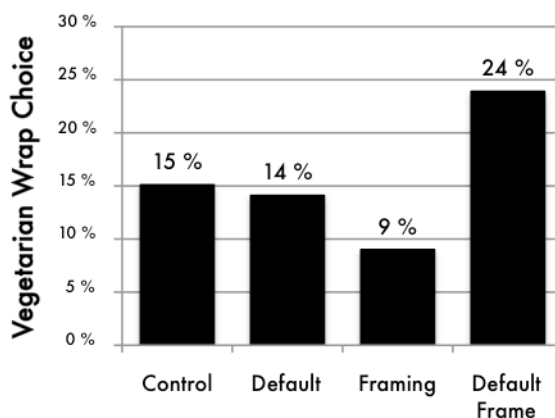


Figure 6. Vegetarian Wrap Selection. Percentage of omnivore customers who bought a vegetarian wrap in the different nudge conditions. ( $n = 315$ ).

$\chi^2(1, n = 173) = 1.52, p = .22$ , or DEFAULT+FRAME condition,  $\chi^2(1, n = 144) = 1.81, p = .18$ , compared to the control group. In contrast, a significant difference was only observed between DEFAULT+FRAME and FRAMING,  $\chi^2(1, n = 171) = 7.20, p = .01$ , with more customers selecting vegetarian in DEFAULT+FRAME.

Summing up, although Figure 6 suggests that the highest percentage of customers ate vegetarian in the DEFAULT+FRAME condition, no statistically significant differences were observed comparing the nudge conditions with the control group.

### Hypothesis 2: Nature Relatedness as Moderator

The second hypothesis was that customers' NR score would moderate the effect of nudge condition on wrap choice, in such a way that the nudge would have a positive effect on vegetarian choice when NR was low. The moderation effect was tested with separate moderated logistic regressions for each nudge with wrap choice as dependent variable. In each regression, the experimental condition was coded as a binary categorical variable, so each condition (FRAMING and DEFAULT+FRAME, coded 1) was tested against the CONTROL condition (coded 0). The logistic regression model of the DEFAULT nudge is not reported, because no direct effect or interaction effect of the nudge was found, and the model had poor goodness of fit. It can, however, be found in Appendix D.

In the first step of the regression, NR Perspective, NR Experience and NR Self,<sup>4</sup> and nudge condition (FRAMING/DEFAULT+FRAME) were predictors of wrap choice. The continuous NR variables were mean centered to facilitate interpretation. The variable vegetarianism (0 = no, 1 = yes) was included as covariate to control for general food preferences. In the second step, interaction terms of the nudge conditions and the respective NR variables were added. There was no difference in NR between the different experimental conditions, neither for NR-Perspective ( $F(3, 344) = .04, p = .97$ ), NR-Experience

Table 2

Nudge Condition and Wrap Choice.  $n = 315$

	Wrap choice		Total wraps Count (%)
	Meat wrap Count (%)	Vegetarian wrap Count (%)	
Control	62 (84.9%)	11 (15.1%)	73 (100%)
Default	61(85.9%)	10 (14.1%)	71 (100%)
Framing	91 (91.0%)	9 (9.0%)	100 (100%)
Default Frame	54 (76.1%)	17 (23.9%)	71 (100%)
Total	268 (100%)	47 (100%)	315 (100%)

Note. Vegetarian customers are excluded.

<sup>4</sup> The model was also run with the total NR scale as predictor. See Appendix C for this logistic regression model.

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( $F(3, 344) = .55, p = .65$ ) or NR-Self ( $F(3, 344) = 1.41, p = .24$ ), and NR could therefore be included in the model.

**DEFAULT+FRAME.** The main assumptions for logistic regression are absence of multicollinearity and outliers, and a sufficiently large sample size (Pallant, 2010). As advised by Field (2009) the model with the same variables was ran in linear regression to check for multicollinearity, and yielded no problems of correlation between the predictor variables. Two cases had high standardized residuals (larger than +/- 3), and were as advised by Pallant (2010) checked. These were considered to look probable. The analysis was tried repeated without the cases. However, because the new model yielded a weaker classification accuracy rate than the model with all cases included, all cases were retained.

Including interaction terms in the model increased the explained variance from the model, from between 27.5% (Cox & Snell  $R^2$ ) and 40.2% (Nagelkerke  $R^2$ ) to between 34.4 and 50.2% respectively. The accuracy rate rose from 84.3% correctly identified cases to 86.8%. A non-significant Hosmer and Lemeshow test ( $p = .07$ ) indicated satisfactory fit of the model.

Table 3

*Binary Logistic Regression of Vegetarian Wrap Selection in Control versus Default Frame Condition. n = 159*

	B	SE (B)	Wald	df	p	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Constant	-2.45	.50	23.95	1	.000	.09		
Default Frame nudge	1.03	.58	3.12	1	.077	2.81	.89	8.81
NR Perspective	2.54	.80	10.17	1	.001	12.63	2.66	60.03
NR Experience	.24	.60	.16	1	.687	1.27	.39	4.12
NR Self	.37	.71	.28	1	.599	1.45	.36	5.81
Vegetarianism	4.81	1.24	15.01	1	.000	122.79	10.77	1400.24
NR Perspective x Default Frame	-2.79	.90	9.68	1	.002	.06	.01	.36
NR Experience x Default Frame	-.15	.74	.04	1	.834	.86	.20	3.64
NR Self x Default Frame	-.78	.83	.88	1	.347	.46	.09	2.33

Note:  $R^2 = .07$  (Hosmer & Lemeshow), .34 (Cox and Snell), .50 (Nagelkerke). Model  $\chi^2(8) = 67.00, p < .001$ .

The full model (Table 3) containing all predictors was statistically significant,  $\chi^2(8, n = 159) = 67.00, p < .001$ , indicating that the model was able to distinguish between respondents who bought and did not buy a vegetarian wrap. Only two of the independent variables by themselves made a unique statistically significant contribution to the model.

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Little surprisingly, vegetarianism was the strongest predictor of choosing a vegetarian wrap. Moreover, NR Perspective was positively related to buying a vegetarian wrap. Here, for every additional point at the NR Perspective score (ranging from 1 to 5), customers were almost 13 times more likely to select a vegetarian wrap. The DEFAULT+FRAME nudge by itself marginally predicted vegetarian wrap selection. Customers who bought a wrap in this condition were almost 3 times more likely to buy a vegetarian wrap, controlling for all other factors in the model. This means that although cross-tabs were insignificant, participants in this conditions did seem to have a higher likelihood to buy the vegetarian wrap when the other variables were controlled for.

Supporting my predictions, there was a significant interaction effect between NR Perspective and the DEFAULT+FRAME nudge. As illustrated in Figure 7, participants with low NR Perspective had higher probability of selecting a vegetarian wrap in DEFAULT+FRAME. Also participants with medium NR Perspective had a higher probability of selecting a meat wrap in DEFAULT+FRAME, although this difference was only marginally significant.

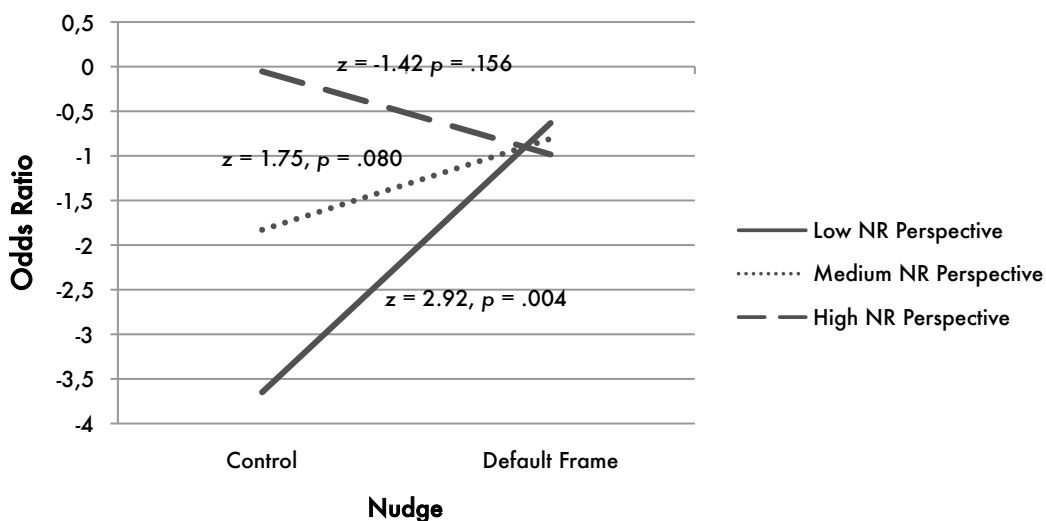


Figure 7. Interaction of Nature Relatedness Experience and Nudge Condition on Wrap Selection. Simple slopes of probability for buying a vegetarian wrap in DEFAULT+FRAME vs. CONTROL: respondents with high ( $M + 1SD$ ), medium ( $M$ ) and low ( $M - 1SD$ ) NR Perspective.

**FRAMING.** Assumptions for logistic regression were met. Multicollinearity was not present. There were some highly influential cases, but these were checked and considered probable. I tried to run the model excluding potential outliers that had high standardized values and Cook's distance above the advised values (Pallant, 2010). However, because this



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yielded only trivial changes in the accuracy rate of the model, the original model was estimated.

The full model (Table 4) containing all predictors was statistically significant,  $\chi^2 (8, n = 192) = 95.39, p < .001$ . In Step 1, the model explained between 35.4% (Cox & Snell  $R^2$ ) and 56.2% (Nagelkerke  $R^2$ ) of the variance, and correctly classified 89.6% of cases. Including interaction terms increased explained variance from the model, from between 39.2% (Cox & Snell  $R^2$ ) and 62.1% (Nagelkerke  $R^2$ ). The accuracy rate rose to 92.7% correctly identified cases. Hosmer and Lemeshow test was not significant ( $p = .57$ ), indicating good fit of the full model.

Table 4

*Binary Logistic Regression of Vegetarian Wrap Selection in the Control Versus the Framing Condition.*  
*n = 192*

	B	SE (B)	Wald	df	p	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Constant	-2.43	.50	23.65	1	.000	.09		
Framing nudge	-.38	.72	.28	1	.597	.68	.17	2.80
NR Perspective	2.50	.79	10.02	1	.002	12.22	2.59	57.58
NR Experience	.24	.59	.16	1	.687	1.27	.40	4.07
NR Self	.38	.70	.30	1	.585	1.47	.37	5.80
Vegetarianism	4.65	1.27	13.34	1	.000	104.86	8.64	1272.81
NR Perspective x Framing	-1.52	1.01	2.24	1	.135	.22	.03	1.61
NR Experience x Framing	-2.52	1.03	6.02	1	.014	.08	.01	.60
NR Self x Framing	2.66	1.24	4.57	1	.033	14.29	1.25	163.71

Note:  $R^2 = .57$  (Hosmer & Lemeshow),  $.39$  (Cox and Snell),  $.62$  (Nagelkerke). Model  $\chi^2 (8) = 95.39, p < .001$ .

As shown in Table 4, two of the independent variables made a significant contribution to the model by themselves (NR-Perspective and Vegetarianism). As in the first model, vegetarians were more likely to buy a vegetarian wrap than meat eaters, and for every additional point at the NR Perspective score, buying a vegetarian wrap was 12 times as likely. The FRAMING nudge was not a significant predictor. There was an interaction effect between both NR Experience and the FRAMING nudge (Figure 8), and between NR Self and FRAMING (Figure 9). People with low NR Experience had higher probability of selecting a vegetarian wrap in FRAMING, whereas customers with high NR Experience had lower probability of selecting vegetarian in this condition. Both effects were marginally significant. The interaction effect of NR Self was the other way around: Customers with high NR Self were more likely to select vegetarian in FRAMING than in CONTROL, whereas customers with low NR Self were less likely. Also these effects were only marginally significant.

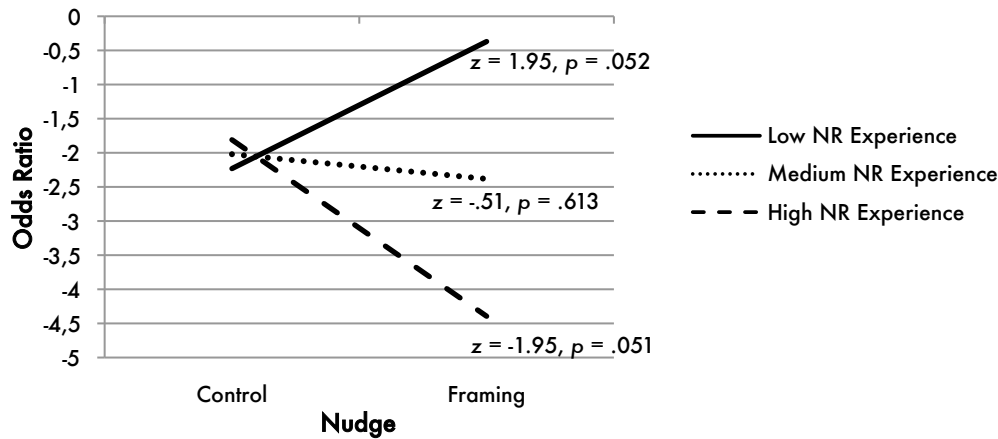


Figure 8. Interaction of Nature Relatedness Experience and Nudge Condition on Wrap Selection. Simple slopes of probability for buying a vegetarian wrap in FRAMING vs. CONTROL: respondents with high ( $M + 1SD$ ), medium ( $M$ ) and low ( $M - 1SD$ ) NR Perspective.

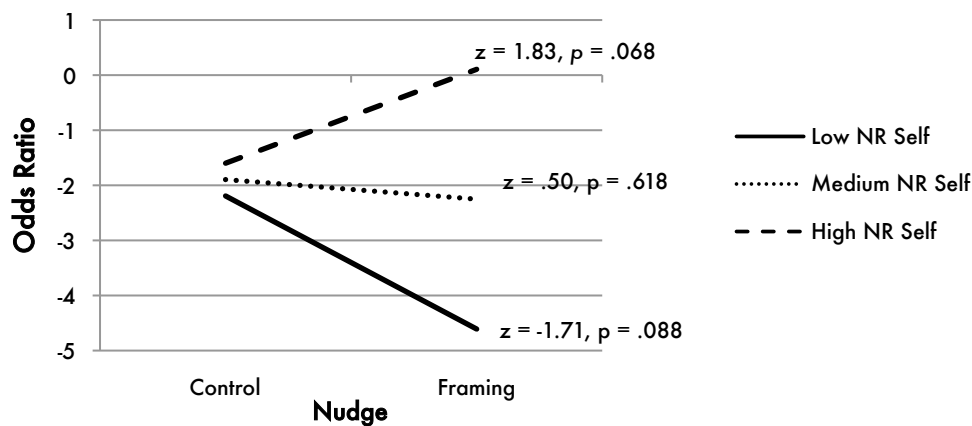


Figure 9. Interaction of Nature Relatedness Self and Framing Nudge on Wrap Selection. Simple slopes of probability for buying a vegetarian wrap in FRAMING vs. CONTROL: respondents with high ( $M + 1SD$ ), medium ( $M$ ) and low ( $M - 1SD$ ) NR Perspective.

Summing up, customers' Nature Relatedness score seemed to affect wrap choice both directly and in interaction with the FRAMING and DEFAULT+FRAME nudges, but these interactions were only partly consistent with the hypothesis.

### Hypothesis 3: Meat Habits of the Customers

The third hypothesis was that the meat consumption habits of participants who selected a vegetarian wrap would differ across the nudge conditions. Customers who ate a vegetarian wrap in the control condition were expected to have a habit to eat less meat than customers who ate a vegetarian wrap in the nudge conditions. A 4 (Nudge: CONTROL, FRAMING, DEFAULT, DEFAULT+FRAME) x 2 (Wrap choice: Meat, Vegetarian)

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ANOVA was conducted with meat consumption habit per week as independent variable, controlling for whether participants were vegetarian or not. The results showed that both nudge ( $F(3, 342) = 7.77, p < .001, \eta^2 = .07$ ), wrap choice ( $F(1, 342) = 38.97, p < .001, \eta^2 = .11$ ) and the interaction between nudge and wrap choice ( $F(3, 342) = 6.57, p < .001, \eta^2 = .06$ ) significantly predicted how often participants ate meat per week. Following up on the indirect effect, Figure 10 shows that only in the DEFAULT+FRAME condition participants who bought the vegetarian wrap ( $M = 4.78, SE = .30$ ) did not report a *generally* lower tendency to eat meat in their daily lives than their peers buying a meat wrap ( $M = 4.87, SE = .20$ ). In all the other conditions, participants who bought a vegetarian wrap (control:  $M = 2.74, SE = .33$ ; framing:  $M = 3.22, SE = .40$ ; default:  $M = 2.81, SE = .37$ ) were those who generally used to eat less meat in their daily lives than those buying a meat wrap (control:  $M = 4.73, SE = .19$ ; framing:  $M = 5.23, SE = .16$ ; default:  $M = 4.70, SE = .19$ ).

When results were considered separately for the four experimental groups, there was a significant difference ( $p < .001$ ) in meat consumption between customers who ate vegetarian versus meat wrap in FRAMING, DEFAULT and the control group. However, there was *no* significant difference between the wrap customers in DEFAULT+FRAME,  $F(1, 71) = 6.40, p = .43$ , indicating that customers who ate vegetarian or meat wrap were equal in terms of their usual eating habits.

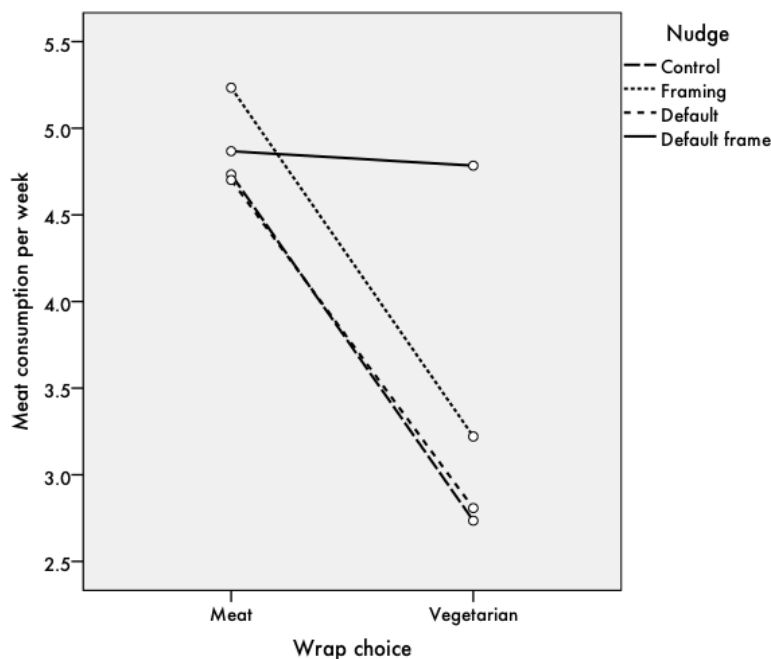


Figure 10. Customers' Meat Consumption Habit. The simple slopes illustrate the reported meat consumption of customers who ate a vegetarian wrap compared to customers who ate a meat wrap, in the different nudge conditions. Meat consumption is the reported number of dinners containing meat over an average week. Vegetarianism is controlled for.  $N = 342$ .

### Discussion

The first objective of this study was to test three nudges in a real situation. In the first nudge, vegetarian wraps were set up as “wrap of the day”, and thus made default choice. In nudge number two the names of the vegetarian wraps were changed from “Vegan” and “Vegetarian” to “Mexican Style”. In the third nudge a combination was tested, such that “Mexican Style” was made the wrap of the day. All nudges were expected to lead to increased sales of vegetarian wraps relative to meat wraps. Moreover, the study aimed to explore whether the effect of the nudges was moderated by the customers’ sense of connection to nature. The nudges were expected to be particularly effective among individuals with low Nature Relatedness. Another aim was to investigate whether the nudges could encourage vegetarian food selection also among customers with a strong meat consumption habit. It was therefore hypothesized that customers who were nudged to select vegetarian would eat more meat in their daily life, than customers who bought a vegetarian wrap in the control condition.

Was there an effect of these nudges? In short, no and yes. The nudges themselves had no statistically significant effect on the overall frequency of vegetarian food selection. Thus, the first hypotheses (1a, 1b and 1c) were rejected. However, when the results are broken down by the answers given by customers in the questionnaire, it becomes evident that the nudges worked differently for different people. That is to say, customers’ position on the Nature Relatedness scale moderated the effects of two of the nudges, such that customers with low connection to nature were more prone to be affected by the DEFAULT+FRAME and partly by the FRAMING nudge. Thus, the second hypothesis was partly supported for two of the nudges. Moreover, the DEFAULT+FRAME nudge seemed to attract a different type of customers to select vegetarian than the other conditions. Customers who were nudged to select a vegetarian wrap reported to eat the same amount of meat in their daily life as those who bought a meat wrap, something that indicates that customers with strong meat consumption habits were more likely to select vegetarian in this nudge. The third hypothesis was therefore also supported, but only for the DEFAULT+FRAME nudge.

I will first discuss the effects of the nudge interventions separately, before I turn to the moderation effect of the customers’ nature relatedness. Then follows a discussion on the relation between nudging and habits, before a general discussion of nudging as a mean to reduce psychological barriers to PEB. Last I will point to some implications and suggest a path for future research, before I look at the strengths and limits of the present study.

### **The Effect of the Nudges**

**Default.** Presenting the vegetarian wraps named “Vegetarian” as the default choice did not increase the percentage of customers who selected this wrap. Thus, merely presenting the vegetarian dish as the dish of the day does not seem to be enough to motivate more individuals to choose vegetarian. This is contrary to the result of Campbell-Arvai et al.’s (2014) study, in which a majority of those nudged chose a vegetarian dish when it was presented as default.

Their study, however, differed from the present study in a number of ways. First of all, it was a lab experiment with limited field validity. The participants were taken to an artificial setting, a room where they were asked to select a dish *as if* they were ordering their actual lunch or dinner (Campbell-Arvai et al., 2014). Their choices were likely influenced by the fact that they neither were going to pay for the dish nor eat it. Moreover, reactivity bias is a common research problem in which participants alter behavior due to the awareness that they are observed. Some participants were given a menu consisting of only vegetarian dishes, but had to consult a different menu placed 3,5 meters away from their table if they wanted a meat dish. Whereas more customers would possibly want to seek out the meat menu in a real-life situation, social desirability bias or expectation bias could encourage participants to choose an item of the menu they were given first by the researcher, especially because they were not going to get the dish anyway. What is more, the study did not give the participants in the default condition a real choice, as the menu only displayed vegetarian dishes, and no meat. This could be said to counter a central point in nudging, namely that a nudge should not restrict freedom of choice (Thaler & Sunstein, 2008). Besides, if a café’s menu gives the impression of offering only vegetarian dishes, meat-loving customers might not choose to go to eat in this café in the first place.

The present study was a realistic field experiment where participants actually selected and paid for the food, without knowledge of participating in a study, and meat dishes were easily available choices. The results of the present study could indicate that it is more difficult to enhance vegetarian selection through default nudges in a real-life situation than in an experimentally controlled setting. It could also be, however, that the default menu in Campbell-Arvai et al.’s (2014) study worked better because it presented five different vegetarian dishes, whereas only two highly similar vegetarian options were available in the present study. A wider range of vegetarian default dishes could have led more customers to select a vegetarian dish.

We could also surmise that very attractive vegetarian dishes would be preferred by most customers. In Campbell-Arvai et al.'s (2014) experiment, vegetarian dishes rated as very attractive were selected far more often than their non-attractive counterparts. It could be that the vegetarian bean wraps in the present study simply were found less attractive for other reasons than the fact that they represented a vegetarian option.

Importantly, people who eat meat can hold negative attitudes towards a vegetarian diet, and believe it to be boring and low in fat (Povey et al., 2001). As reasoned earlier, the name "Vegetarian" might only attract customers already familiar with and positive to vegetarian food, and thus not making a difference in selection for other customers, even when it is made the wrap of the day.

In addition to attractiveness, the salience of the default option, for instance the background rate of how many chooses the dish of the day compared to all other menu options, can be important. In the present study, the menu consisted of seven non-vegetarian dishes in addition to the vegetarian wraps of the day. "Wrap of the day" might therefore not be a very "strong" default, given that customers could find many other wrap options in the menu. More vegetarian dishes relative to meat dishes would maybe represent a stronger default.

**Framing.** Would more customers select a vegetarian wrap when it was given the name Mexican Style instead of the less attractive names Vegetarian/Vegan? This nudge also failed to produce any significant change in selection. The result deviates from previous studies that have found attractive and descriptive food names to increase selection (Wansink, Just, Payne, & Klinger, 2012; Wansink et al., 2001). On the other hand, there are other studies that have found no impact of framing through descriptive menu labels on healthy food selection (Olstad et al., 2014). The effectiveness of food labels likely depends on several factors in the choice situation, as well as the name that is tested. "Mexican Style" was not a very well thought out name, nor tested. To increase the attractiveness food labels should give customers associations of something they know is tasteful (Wansink et al., 2001), it is uncertain to what degree Mexican Style managed to do this. Optimally, the study should have used pilot-tested names.

Before the experiment the vegetarian wraps in the café were named "Vegetarian" and "Vegan". One additional possibility is therefore that those who normally chose these wraps did not understand that "Mexican Style" was the same wrap, and thus resorted to order something else instead. If this happened, it could have helped nullify the effect of those who actually were affected by the nudge. I will return to this point later.

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**Default Frame.** Would more customers select the vegetarian wrap when it was both named Mexican Style and presented as the wrap of the day? The percentage of customers who chose a vegetarian wrap in DEFAULT+FRAME did not differ significantly from the control condition. But looking at the percentages there seemed to be at least a tendency towards more sales of vegetarian wraps with this nudge. Indeed, when controlling for Nature Relatedness in the logistic regression, DEFAULT+FRAME had a direct, marginally significant effect on vegetarian wrap selection. It is also notable that significantly more customers chose a vegetarian wrap in DEFAULT+FRAME compared to the FRAMING, indicating that it was more effective than the FRAMING-only nudge.

Why did the combination seem slightly more potent than the two other nudges separately? It is possible that the name Vegetarian in the DEFAULT nudge was so unappealing that this option was not considered despite its eye-catching presentation. What is more, simply presenting the wrap as Mexican Style in the FRAMING nudge might have attracted little attention from customers when other dishes well known to the regular customers were given equal attention on the menu. The combination, however, could have succeeded in both making the dish sound more appetizing and of interest for all customers, as well as making it more visible. The result could be that customers paid more attention to the dish, and maybe selected it because of convenience or laziness – the “yeah whatever” heuristic (Thaler & Sunstein, 2008).

A high number of regular customers could have weakened the effect of the nudges. Defaults are more effective when customers have little knowledge about a product (Sunstein & Thaler, 2003). Since habits are strongly predictive of food purchase (Biel et al., 2005), it is possible that the effect of the nudges was reduced because many customers were familiar with the café’s menu. Almost half of the participants reported to be visiting the café at least 2-3 times a month, and more than half reported that they bought the same wrap “sometimes”, “often” or “every time” they visited. 14% bought the same wrap every time. Many customers probably ordered without even looking at the menu, thus bypassing the nudge.

It is also possible that “Mexican Style” attracted the customers because it was a new name, and therefore appeared to be a new item in the menu. Ideally, the experiment should have been held for a longer time period to investigate whether the results reflected a novelty effect that eventually would decrease.

To sum up, although none of the nudges significantly increased vegetarian food selection, DEFAULT+FRAME seemed to be the most powerful nudge among the three. This indicates that in order to enhance vegetarian food choice, it may not be enough to simply

change one aspect of the choice situation. As suggested by Olstad et al. (2014), nudges could be more efficient in combination, or along with other incentives.

### **Interaction between Nature Relatedness and the Nudges**

While the nudges alone seemed to have limited effect on customers' food choice, results from the logistic regression analysis, partly supporting Hypothesis 2, were more encouraging. The results reveal that a certain type of customers—the customers who scored low on one of the three NR scales, namely NR Perspective—were more prone to be affected by the DEFAULT+FRAME nudge. That is, customers who reported *the least* nature-related attitudes and behaviors, such as care about other species, had a *higher* probability of selecting a vegetarian wrap when it was called Mexican Style and presented as the wrap of the day than in the control condition. Customers with *medium* NR-Perspective were also more likely to choose vegetarian when nudged, although this effect was only marginally significant. In contrast, individuals with *high* NR-Perspective—those who possess a highly nature-related worldview—were *not* affected by the nudge. These customers were equally likely to select a vegetarian wrap whether they were nudged or not.

This is a noteworthy finding regarding choice architecture, as it indicates that nudging might be most effective for those who are otherwise the least likely to act in a pro-environmental way. NR-Perspective was, as anticipated, a strong predictor of vegetarian purchase by itself in all conditions in the present study. This was no surprise, as NR-Perspective “reflects an external, nature-related worldview, a sense of agency concerning individual human actions and their impact on all living things” (Nisbet et al. “2009), p. 723), and is related to love of animals, vegetarianism and environmentalism (Nisbet et al., 2009). The fact that participants with low NR-Perspective were more affected by the nudge therefore implies that the nudge worked on people who are otherwise unlikely to eat vegetarian or care about the environment. This finding represents, to my knowledge, new and important understanding of how nudges can be expected to work.

Though not tested in this study, an other way to understand the results could be that the nudge downplays the effect of NR, such that NR no longer predicts food choice when the vegetarian food is presented with the DEFAULT+FRAME nudge. The nudge increases the influences of contextual factors on choice at the expense of personal factors. This is in line with the ABC theory, which assumes that personal variables such as attitudes will predict PEB when the context is neutral, while attitudes will be less important if the behavior is highly supported by the context (P. C. Stern, 2000).



Considering all results together, the DEFAULT+FRAME seemed to be the most promising nudge, especially for groups otherwise less likely to select a vegetarian meal. But the logistic regression found support for two more interaction effects, which indicate that also the FRAMING nudge increased vegetarian wrap selection among certain customers. These effects were partly contrary to the theoretical expectations, as customers with high NR-Self actually were *less* likely to select vegetarian when nudged. We can only speculate why this happened, but it could be because the customers were not aware that “Mexican Style” was vegetarian, as I will discuss in a while. Because FRAMING did not affect overall wrap selection, and because the effects of the NR scales were unclear and only marginally significant, I will not discuss these results in further detail. What all the interaction effects point to, however, is that nudges work differently for different people. The results underscore P. C. Stern’s (2000) concern that contextual factors aiming at promoting PEB should be investigated in relation to individual factors to reveal their dependence on personal attitudes or beliefs.

It should also be noted that the results contribute to the understanding of NR, as they reveal that personal relationship to nature is important for *actual* PEB, and not only for self-reported PEB, as previous studies have shown (Nisbet et al., 2009). Interestingly, only NR-Perspective was predictive of vegetarian purchase, but that could be specific for this particular behavior, as NR-Perspective specifically reflects attitudes towards animals. The other NR scales could be equally important for other forms of PEB, such as identifying as an environmentalist, as other studies has found (Nisbet et al., 2009).

Individuals with high NR-Perspective had a stable preference to buy a vegetarian dish regardless of the way in which it was presented, while people with low NR-Perspective bought it more often when it was presented more attractively and as the default choice. Therefore, while nudging can give people a small push towards the sustainable choice in the decision moment, increasing peoples’ overall connection to nature may provide a deeper, more intrinsic motivational force to protect nature and the environment in the long run and across different contexts, as suggested in ecopsychology and by several theorists (Crompton & Kasser, 2009; Gomes et al., 1995; Schultz, 2002a).

### **Breaking Meat Habits with a Nudge**

The third hypothesis was that customers who were nudged to buy a vegetarian wrap would have generally stronger meat consumption habits than customers who bought a vegetarian wrap in the control condition. This hypothesis was supported, but only for the DEFAULT+FRAME nudge. That is; in all conditions except DEFAULT+FRAME, there was

a significant difference in average meat consumption between customers who ate a vegetarian wrap and customers who ate a meat wrap. Customers who selected a vegetarian wrap generally ate small amounts of meat in their daily lives, while those who selected a meat wrap ate larger amounts of meat in their daily lives. This is not surprising, since habits are strong determinants for food behavior (Biel et al., 2005; Köster, 2009).

But in the DEFAULT+FRAME condition, customers who ate vegetarian wraps reported to eat in average *the same amount* of meat in their daily lives as customers who chose a meat wrap. Meat habit no longer seemed to be related to wrap choice, and it therefore seems like DEFAULT+FRAME made “high-meat eaters” consider the vegetarian choice more often. This indicates that the “Wrap of the day: Mexican Style” appealed to a different group of customers than the other menus that were tested.

This finding might have several explanations. The food-judging processes of System 1 rely on both habits and situational cues (D. Cohen & Farley, 2008; Kahneman, 2003). The nudges represent situational cues. It is possible that the DEFAULT+FRAME nudge outweighed the strong effect of personal habits on food purchase, and therefore made even customers with a strong meat habit consider the vegetarian wrap out of convenience.

As discussed previously, the menu item “Vegetarian” could push away meat-loving customers, because they might associate “Vegetarian” with a boring and non-satisfying dish, thinking that is meant exclusively for vegetarian customers. The name “Mexican Style”, in combination with a more visible presentation, could have helped the vegetarian food appear more interesting especially for meat-lovers.

Nevertheless, it needs to be considered that the customers who ordered Mexican Style might not have been aware that it was vegetarian, as this was not explicitly stated in the menu. A larger percentage of customers reported to be vegetarian in the control condition (21.9%) than in the nudge conditions (FRAMING: 6.0%, DEFAULT: 11.2%, DEFAULT FRAME: 9.8%). These percentages indicate that less vegetarians bought a wrap overall in the nudge conditions than in the control condition. Even though there were few vegetarians also in DEFAULT, when the vegetarian wrap was explicitly named “Vegetarian”, these percentages could imply that some vegetarians did not understand that “Mexican Style” was vegetarian, and instead bought something else in the café, such as the explicitly named “Vegetarian pizza”. If vegetarians misunderstood the posters, non-vegetarians most likely could have done so too. Even though the wrap ingredients were stated clearly, we know that food selection is a quick and almost mindless process (D. Cohen & Farley, 2008; Wansink & Sobal, 2007). Many customers probably made the decision of which wrap to buy after a short glimpse at the

menu, and some might have missed the fact that this dish did not contain meat. Though not empirically supported, there seems to be a dominant norm in our society that food should contain meat to be a proper meal. Especially men tend to view meat as an essential part of a meal (Kubberød, Ueland, Tronstad, & Risvik, 2002). It is therefore possible that customers assumed that the “wrap of the day” *had to* contain meat, because someone had made it the default choice. In spite of this, customers were equally satisfied whether they ate a vegetarian wrap or meat wrap, and whether the wrap was named “Vegetarian” or “Mexican style”. Therefore, even if someone was not aware that they bought a vegetarian wrap, this does not seem to have affected their satisfaction with the wrap.

### **Implications**

**Implications for society.** The so-called “libertarian paternalistic” method of nudging could in some situations be seen a more acceptable approach to behavioral change than coercion, and possibly represent a compromise between those who want to decrease high environmental exposures and libertarians who advocate free choice (Campbell-Arvai et al., 2014). Nudging could also be a more effective tool for promoting PEB than traditional tools like information provision. Information about the environmental impacts of food has been found ineffective in reducing selection of meat dishes (Campbell-Arvai et al., 2014). According to theory of cognitive dissonance (Festinger, 1962), such information is likely to be especially ineffective for customers with strong meat habits and low NR-Perspective, as it would conflict their existing beliefs and behavior. People with low NR-Perspective agree to that humans should rule over other species, and they also believe that nothing they do will change problems on other places on the planet (Nisbet et al., 2009). In light of theory of cognitive dissonance, individuals with low NR-Perspective are therefore not likely to be affected by information questioning the ethical aspects of eating animals, or about environmental problems related to meat production, since it would contradict their way of understanding the world. Likewise, for high-meat eaters’, meat constitutes an important part of the daily diet. Negative information about meat will come into conflict with their strong habits, and would for that reason be downplayed (Festinger, 1962).

Choice architecture could therefore, as the present results suggest, be more efficient in promoting vegetarian food choice particularly for people with non-vegetarian habits and low NR worldviews. A nudge could represent a shortcut to sustainable food choice, bypassing considerations of the reflective System 2 that would be negative towards behavioral change, and instead making it attractive to System 1. As pointed out by Campbell-Arvai et al. (2014) nudges could counter individuals’ tendency to choose the option accompanied with short-term

benefits, such as taste or to satisfy a habit, at the expense of the choices that give more long-time benefits, such as better health or environment. This could be helpful for both individuals and environment, since the optimistic bias can lead people to underestimate their risk of being harmed by a health or environmental problem (Pahl, Harris, Todd, & Rutter, 2005; Weinstein, 1987).

As previously mentioned, habits and cognitive dissonance are related to denial (Stoknes, 2014). Could nudging help break all these three barriers, as proposed by Stoknes (2014), and represent a way towards more PEB also in the long run? Not only are people with strong meat consumption habits prone to downplay negative information about meat. Since people with strong habits are less likely to seek information about alternative courses of action (Verplanken et al., 1997), high-meat eaters could also be unlikely to seek information about vegetarian food. But as this study shows, nudges could make high-meat eaters more willing to test vegetarian food. Whether they will continue to buy vegetarian food in the future will likely depend on their satisfaction with the food, given that hedonic appreciation and past experience are important determinants for food choice (Campbell-Arvai et al., 2012; Köster, 2009). Fujii et al. (2001) found that individuals who were forced to break a habit for a short period of time were more likely to keep doing the new, non-habitual behavior also in the future, if their experience of the new behavior was more pleasant than they had expected. Maybe high-meat eaters can be more positive to eat vegetarian food in the future if they are nudged to *try* it and experience it to be more tasteful and fulfilling than anticipated.

Furthermore, if people are nudged to act more environmental-friendly, it can be plausibly argued that cognitive dissonance and denial concerning climate issues could be mitigated (Stoknes, 2014). Theory of cognitive dissonance predicts that individuals who are nudged to eat less meat will experience less dissonance when confronted with information about environmental problems related to meat consumption, because what they *do* will now be better harmonized with the new information. They could therefore become more open to information saying that a more plant-based diet is more sustainable and healthful, and be motivated to continue to eat less meat. If their behavior changes, their attitudes could also change.

Nudging could also be a way out of implicative denial. Denial of climate issues can stem from feelings of hopelessness and personal powerlessness (Stoll-Kleemann et al., 2001). If nudging succeeds in making sustainable options easy to choose, people could become more aware of possible sustainable courses of actions, and thereby feel more empowered

confronted with climate issues. This could contribute to reduce powerlessness, climate denial and reinforce hope.

I therefore suggest that nudging might have the potential to change pro-environmental attitudes and behavior also in the long run, but this remains a hypothesis that needs to be further tested. Habits in general, and especially eating habits, are extremely resistant to permanent change (Gifford, 2011; Klöckner & Verplanken, 2013). The present study only indicates that nudging might alter choices and break habits in the moment of decision. Little is known about how nudges affect future behavior, but one study suggests that the effect decays quickly when the nudge is removed (Allcott & Rogers, 2012). However, if repeated regularly, participants' PEB was gradually kept more stable over time, meaning that nudges could change habits when repeated (Allcott & Rogers, 2012).

Nevertheless, Raihani (2013) underlines the need for choice architects to be aware that nudges might lead to behavior change that is limited to a specific context, or even produce negative spillovers, and thereby negate the original positive effect. Especially for decisions that are performed more than once, such as food selection, there is a risk that habits might go “back to start” in the future (Raihani, 2013). Hence, even though nudges might help reduce barriers to PEB, more research is needed to understand how they work over time.

In spite of these uncertainties, the present study has some implications for “food choice architects”—that is, those who design menus and decide how food is presented. The explicit menu label “Vegetarian” seems to appeal mostly to customers who already eat little meat in their daily life. On the other hand, vegetarian dishes that are given more attractive and descriptive names, and are presented as the default dish, seem to become attractive also for customers who usually eat much meat and have low internal motivation to select vegetarian food. A more appealing food name could describe the actual ingredients and reflect the taste of the dish, and should give pleasant associations (Wansink et al., 2001). At the same time, it seems important to make it clear that it is a vegetarian dish by stating the ingredients clearly, such that vegetarian as well as meat-hungry customers can easily orientate.

Presenting vegetarian dishes more saliently and attractively is from a commercial perspective a low-cost—or even net profitable—intervention. All it requires is making new posters or menus. In addition, all dishes were equally priced in this experiment. These small changes will therefore not lead to decreased profit of the café if people select more vegetarian food and less meat. There is rather a potential of increased profit, as beans are cheaper than meat. Thus, a small, well-designed non-intrusive nudge towards the vegetarian dishes could give triple benefits to the company, the customers' health and the environment.

Last it needs to be stated that in order to bring about the kind of behavioral changes required to solve climate problems and achieve sustainable food systems, nudging is clearly not enough. However, such end-user interventions could be part of the systemic solution, together with information-based, market-based and regulatory instruments (Reisch et al., 2013).

**Implications for research.** The present results indicate that future research on nudging would benefit from changing the question from *if* nudging is efficient; to *for whom* it is efficient. Future research should aim at including individual factors when testing nudges, to get a better understanding of what nudges are most effective for what groups. Different individual moderators of nudges could be tested, such as demographic and socioeconomic variables, as well as personal environmental measures such as attitudes, habits and values.

This study also points to new nudges that could be tested. A focus group could have been set up to discuss possible names for vegetarian dishes, and participants could have rated the attractiveness of different names, in order to tailor names that sound appetizing to both vegetarians and omnivores. One way to ensure that customers understand that a dish is vegetarian, but at the same time evaluate it as more attractive, could be to let the name reflect specifically what the dish contains, such as “Mexican Bean Style” or “The Real Mexican Style, with Beans”. A small green leaf at the side of the vegetarian dishes could be a way to facilitate the choice for vegetarian customers. Other frames should be tested as well, such as framing the vegetarian options as the healthiest, most popular or trendy dish.

Vegetarian dishes could be made default choices in a number of ways. An intervention that could be tested could be that all dishes were vegetarian per default, so customers who wanted meat needed to ask for this in addition, and maybe pay an extra charge. This would represent a stronger default than the one tested in this study. In the present study the “Dish of the day” was equally priced with the other dishes. A reduced price could have made it more attractive, as it is suggested that nudges may be more potent when implemented along with more powerful economical motives (Olstad et al., 2014), and research shows that price reductions on healthy foods can increase both their purchase and consumption (An, 2013). Future research should also include and test a various range of vegetarian options.

Because choice architecture is a relatively new concept and technique, more research is needed to be better understand when different techniques are effective. The efficacy of nudging seems to be complex and context-specific (Olstad et al., 2014). Working out nudges is a trial-and-error process, and it is unlikely to find nudges that work across all contexts. Therefore, research should test diverse nudges in various contexts and for different PEB.

Last, little is known about how nudges affect future behavior and attitudes (Raihani, 2013). Using longitudinal designs including self-reporting apps, researchers should further explore the link between nudging and habits, and explore whether behavior drops back to the habitual when the nudge is taken away. Can the nudge work in such a way that people open up their eyes to vegetarian food, and choose it more often also in the future? Possible spillover effects – both positive and negative – should also be tested. If some nudges can change habits over time, then how many and how frequent nudges are needed to change behavior? And more, can nudges through changing habits decrease cognitive dissonance and denial in the long run?

### **Ethics of Nudging**

The nudges implemented in this study are techniques that impact consumers' choices without their awareness. Can this be considered ethical? Nudge tactics have been criticized for being a subtle form of manipulation, or even coercion, and Goodwin (2012) argues that nudging in policymaking needs to be altogether rejected. However, it can be argued that there will always be a social background that affects our decisions, and some paternalism, in the form of effects on individual decisions, is almost unavoidable (Sunstein, 2014). Further, the huge marketing industry is already employing a long range of these tactics to increase product sales. Airports, for instance, are nudging people by having all passengers to walk through liquor stores on their way to the departure gates. Thaler and Sunstein (2003) state that "[w]hen paternalism seems absent, it is usually because the starting point appears so natural and obvious that its preference-shaping effects are invisible to most observers. But those effects are nonetheless there" (Thaler & Sunstein, 2003, p. 177).

Consider the present study. In the "neutral" control condition, the vegetarian dishes were named "Vegetarian" and "Vegan". This cannot really be considered a neutral situation, as these particular names are likely to form customers' expectations and desires to select these products. A menu has to call the dishes *something*, and if there is a dish of the day, one dish needs to be selected for this role. And all these features are likely to affect customers' choices. So: what criterions should be decisive of which foods we select as defaults, and how we frame them? Sunstein and Thaler (2003) propose that there exist different criterions for choosing. Should we do it in such a way that we maximize the profit of the café? Or should the alternatives be presented completely at random? Or maybe the choice architecture should make customers choose what they would have chosen if there was no choice architecture? But if it is true that some choice architecture will always be present, it is impossible to imagine such a true, unbiased preference. Not only will the present choice architecture shape

decisions, but also our habits were most likely once formed by some choice situation. A different alternative will be to design the choice situation in such a way that the customers do what is in their best interest in the long term (Thaler & Sunstein, 2003). As previously stated, most of us would benefit from a more plant-based diet, both from a health perspective (Fraser, 1999; Pan et al., 2012; Sinha et al., 2009) and environmental perspective (Hedenus et al., 2014; Reisch et al., 2013). Thus, making it easier to choose sustainable food should be in everybody's interest.

Furthermore, many people might know that their behavior is harming the environment and *want to* act in a sustainable way, but habits might hinder them (Verplanken et al., 1998). In this situation, information or instructions will not help, since people already perform the behavior despite the knowledge that it is harmful (Bolderdijk, Lehman, & Geller, 2013). People may also be hindered to act sustainably because of lack of cognitive capacities. Duffy and Verges (2009) nudged people to recycle, and suggest that many people *intend* to recycle, but might fail from doing so because of limited cognitive capacity. Equally, people might intend to eat more sustainable food, but find their cognitive capacity occupied by hunger, time pressure or a conversation in the decision moment, so environmental considerations regarding the food are hindered. They might instead choose a habitual meat dish, even if they in retrospect would have been satisfied with the vegetarian choice. The right nudge could make it easier to choose according to environmental intentions.

However, it is essential not to restrict choices, and in general it is important to let the nudges be transparent, such that they are easy to detect and easy to avoid (Hansen & Jespersen, 2013; Sunstein, 2014). Manipulating people to eat vegetarian food against their will would not only be unethical, but could also cause negative spillovers in the future (Raihani, 2013), and a nudge that appears to be coercion might lead to the opposite behavior (Bolderdijk et al., 2013). These are examples of what may be termed “bad” choice architecture.

### **Strengths and Limitations**

The aim of this field experiment was to understand how nudging works in real-life situations. Because it was conducted in a natural setting, the field validity is thought to be good. But since it was a field experiment, not all variables could be controlled, and there are several limitations that warrant consideration. It is possible that the effects found in this study are specific to the particular sample. The sample consisted of mostly university students, and many of them were returning customers in the café. Moreover, this study was limited to



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vegetarian food choice, and cannot necessarily be generalized to other forms of environmental behavior or food choices.

Furthermore, the results of the study, and especially the main effect of the nudges, could have been clearer with a larger sample. However, this was a field experiment. The customers did not know that the wrap posters changed from day to day and was part of the experiment. I was concerned that they might begin to notice if the experiment lasted for much longer, as some customers came back several times. If rumor spread that there was an experiment in the café, this could have affected customers' choices. For that reason, I decided to end data collection after 10 days. Future research will benefit from a larger sample.

A problem of the data collection was that the participants were given the survey *after* selecting wrap. Thus, the experimental variable (nudge condition) was presented and the outcome (wrap selection) had taken place *before* the measurement of the moderator variable (NR). Nudge condition and wrap selection could therefore have affected responses to the NR measure. Although no such effects were observed statistically, in future studies, NR should also have been measured first to see if there are any interaction effects. However, it would be difficult to do it otherwise. The very goal was to see what wrap the participants selected when they did not know that they participated in an experiment, so their choices would not be affected by experiment bias.

In spite of Nisbet et al.'s (2009) suggestion that the NR measure will need modifications to work optimally as a multi-factorial scale, it was used as a multi-factorial solution in this study, as the factor analysis clearly yielded a three-factor solution, and the logistic regression with the subscales gave the most interpretable model. Still, the reliability of NR-Perspective was not satisfactory, meaning that the validity of these results is unclear. Considering the low reliability of the subscale, the present results support the need of a revised scale. They also suggest that a multi-factorial scale could be the most promising solution, as the NR scales seemed to predict different outcomes and therefore be different constructs.

When participants were asked to indicate the number of their dinners that contain meat over an average week, the survey did not specify whether "meat" included fish. Participants could therefore interpret this question differently. Some added "fish included" to their response, whereas those who asked the researcher about the question, were told that fish was *not* included. This number can therefore not be interpreted as a reliable number of meat consumption in the sample. However, because the answers are thought to be equally biased across conditions, it was considered acceptable to include the measure.

### **Conclusion**

This experiment tried to nudge more café customers into choosing vegetarian wraps instead of meat wraps. In order to do so, three different nudge interventions were applied. The first of these was to rename and frame the wraps called "Vegan" and "Vegetarian" to the more attractive "Mexican Style". In the second nudge the Vegetarian wrap was made the dish of the day, or default choice. The third intervention applied both of these nudges by making the "Mexican style" the dish of the day. Neither of the three nudges helped increase the sale of vegetarian wraps overall, but interestingly they did seem to have a different effect on different customers, depending on the customer's self-reported degree of Nature Relatedness. The customers who reported to have a less nature-related worldview were unlikely to select the wrap called "Vegetarian", but more likely to select the renamed version "Mexican Style" when it was presented as the dish of the day. This way of presenting the vegetarian dish also made customers who usually ate much meat select it more often. The study thus illustrates that food choices are affected by both internal factors such as personal nature connectedness and meat consumption habits, as well as external factors such as the way in which dishes are presented. The right nudge might be a powerful tool to increase vegetarian food selection among people who are otherwise unlikely to select vegetarian food. By building on new knowledge and in combination with focus groups and pilot testing, it is likely that more effective nudges can be designed in future research.

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Appendix A

Wrap Presentation in the Field Experiment



Figure A.1. The Wrap Presentation in the DEFAULT+FRAME Condition. Blackboard 1 to the right and Blackboard 2 to the upper left. Poster on the counter.

Appendix B

Survey

**SPØRRESKJEMA OM MATVANER**

Dette spørreskjemaet har som formål å undersøke matvaner og folks holdninger til samfunnsmessige spørsmål. Det vil ta ca. 10-15 minutter å fylle ut. Alle som svarer, er med i trekningen av et gavekort på 1000 kroner.

Deltakelse er frivillig, og du kan trekke deg når som helst uten å oppgi noen forklaring. Alle dine svar vil være fullstendig anonyme. Opplysninger om deg vil holdes konfidensielle, og ingen enkeltpersoner vil kunne gjenkjennes i den ferdige oppgaven.

Noen spørsmål kan være ganske like. Det er likevel viktig at du svarer på hvert enkelt av dem. Forsøk å svare så spontant som mulig. Unngå å tenke lenge gjennom hvert spørsmål, men svar det som er din umiddelbare følelse. **Og husk: Vi er interessert i dine synspunkter. Det finnes ingen riktige eller gale svar.** Svar derfor slik som du virkelig føler, ikke tenk på hva du tror "folk flest" føler. Svar bare så ærlig og oppriktig som mulig på alle spørsmålene. Les nøye gjennom påstandene og teksten før spørsmålene, så du er sikker på at du har forstått hva det spørres etter.

Dersom du har spørsmål angående studien, eller ønsker å vite de endelige resultatene, er du velkommen til å kontakte meg på e-post: [sigrimho@student.sv.uio.no](mailto:sigrimho@student.sv.uio.no).

Med vennlig hilsen

Sigrid Møyner Hohle, masterstudent ved Universitetet i Oslo

**I løpet av en gjennomsnittlig uke, hvor mange av middagene du spiser inneholder kjøtt?**

*For eksempel: Hvis du vanligvis spiser kjøtt til middag hver dag, skriv 7. Hvis du aldri spiser kjøtt til middag, skriv 0.*

Antall middager

**Angi i hvilken grad du er enig i de neste påstandene, ved å sette ett kryss ved siden av hver påstand.**

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
1. Styresmaktene bør kontrollere i hvilket tempo råvarer brukes, for å sikre at de varer så lenge som mulig.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. Jeg er i mot styresmakter som prøver å få råvarer til å vare lenger ved å kontrollere og regulere hvordan de brukes.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. En av de viktigste grunnene til å holde innsjøer og elver rene, er at mennesker da har et sted å kjøre båt, bade, padle, dykke etc.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4. Vi må holde elver og innsjøer rene for å beskytte miljøet, IKKE for å sikre steder hvor mennesker kan kjøre båt, bade, padle, dykke etc.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5. Jeg er IKKE en person som anstrenger meg for å spare naturressurser.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6. Når det er mulig, prøver jeg å spare naturressurser.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7. Det er viktigere å bevare arbeidsplasser enn å beskytte miljøet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8. Å beskytte miljøet er viktigere enn å sikre fortsatt økonomisk vekst.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

**De neste påstandene handler om dine matvaner. Angi i hvilken grad du er enig, ved å sette et kryss ved siden av hver påstand.**

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
1. Jeg har tenkt å spise mye vegetarisk mat i framtiden.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. I framtiden tror jeg de fleste middagene jeg spiser, vil inneholde kjøtt.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. Jeg vil prøve å lage mange vegetarmåltider i tiden framover.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4. I tiden framover tror jeg at jeg kommer til å spise mye kjøtt.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

**I løpet av den neste uken, hvor mange av middagene du spiser tror du vil inneholde kjøtt?**

*For eksempel: Hvis du tror du kommer til å spise kjøtt til middag hver dag, skriv 7. Hvis du tror du ikke kommer til å spise kjøtt til middag noen dag, skriv 0.*

Antall middager

Det fins mange arter i verden, blant annet mennesker og andre pattedyr. Hvor enig er du i følgende påstander om arter generelt? Angi i hvilken grad du er enig, ved å sette ett kryss ved siden av hver påstand.

Husk at mennesket også er en art.

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
1. Visse arter er rett og slett underlegne andre.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. For å oppnå det man vil, er det noen ganger nødvendig å bruke makt mot andre arter.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. Det er greit at noen arter er bedre stilt i livet enn andre.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4. Ingen arter burde få dominere på jorda.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5. Alle arter bør ha like muligheter i livet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6. Det er nok bra at visse arter er overlegne og andre underlegne.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7. Det hadde vært bra om arter var likeverdige.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8. Noen ganger må andre arter holdes på plassen sin.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
9. Vi bør gjøre det vi kan for å skape like vilkår for ulike arter.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10. Vi ville hatt færre problemer dersom vi behandlet alle arter mer likt.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

**Det fins mange typer grupper i verden: menn og kvinner, etniske og religiøse grupper, nasjonaliteter og politiske grupper. Hvor enig er du i følgende påstander om grupper generelt? Angi i hvilken grad du er enig, ved å sette ett kryss ved siden av hver påstand.**

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
1. Visse menneskegrupper er rett og slett underlegne andre.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. For å oppnå det man vil, er det noen ganger nødvendig å bruke makt mot andre grupper.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. Det er greit at noen grupper er bedre stilt i livet enn andre.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4. Ingen grupper burde få dominere i samfunnet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5. Alle grupper bør gis like muligheter i livet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6. Det er nok bra at visse grupper er overlegne og andre underlegne.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7. Det hadde vært bra om grupper var likeverdige.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8. Noen ganger må andre grupper holdes på plassen sin.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
9. Vi bør gjøre det vi kan for å skape like vilkår for forskjellige grupper.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10. Vi ville hatt færre problemer dersom vi behandlet alle mennesker mer likt.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
11. Alle grupper bør stå sammen for det felles beste.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
12. Alle typer grupper bør stå sammen samlet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
13. Sammen bør alle grupper være som én stor familie.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
14. Forholdet mellom forskjellige grupper bør være én for alle og alle for én.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

## EFFECTS OF NUDGING ON SUSTAINABLE FOOD CONSUMPTION

Angi i hvilken grad du er enig i de neste påstandene, ved å sette ett kryss ved siden av hver påstand.

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
1. Det er meningen at menneskene skal herske over resten av naturen.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. Menneskene er blitt skapt eller har utviklet seg for å dominere over resten av naturen.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. Planter og dyr har like mye rett til å eksistere som mennesker.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4. Planter og dyr eksisterer først og fremst for å bli brukt av mennesker.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5. Mennesker er en del av økosystemet i like stor grad som andre dyr.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6. Mennesker er ikke noe viktigere i naturen enn andre levende vesener.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7. Naturen eksisterer først og fremst for at mennesker skal kunne bruke den.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8. Naturen i alle sine former bør kontrolleres av mennesker.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
9. Jeg tror IKKE at mennesker ble skapt eller utviklet seg for å dominere over resten av naturen.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10. Mennesker er ikke viktigere enn andre arter.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

Angi i hvilken grad du er enig i de neste påstandene, ved å sette ett kryss ved siden av hver påstand.

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
1. Jeg liker å være utendørs, selv i dårlig vær.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. Noen arter er det rett og slett meningen at skal dø ut eller bli utryddet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. Vi mennesker har rett til å bruke naturressurser som vi vil.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

## EFFECTS OF NUDGING ON SUSTAINABLE FOOD CONSUMPTION

	Sterkt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Sterkt enig
4. Mitt drømmeferiested er et øde sted i villmarka.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5. Jeg tenker alltid på hvordan handlingene mine påvirker miljøet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6. Jeg liker å grave i jorda og få jord på hendene.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7. Min tilknytning til naturen og miljøet er en del av min åndelighet.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8. Jeg er veldig bevisst på miljøproblemer.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
9. Jeg legger merke til dyre- og planteliv uansett hvor jeg er.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10. Jeg drar ikke ofte ut i naturen.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
11. Ikke noe jeg gjør, kan forandre problemer andre steder på kloden.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
12. Jeg er ikke atskilt fra naturen, men en del av naturen.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
13. Tanken på å være dypt inne i skogen, unna sivilisasjonen, er skremmende.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
14. Mine følelser for naturen påvirker ikke hvordan jeg lever livet mitt.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
15. Dyr, fugler og planter burde ha færre rettigheter enn mennesker.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
16. Jeg legger merke til naturen rundt meg til og med når jeg er midt i byen.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
17. Mitt forhold til naturen er en viktig del av hvem jeg er.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
18. Det er unødvendig å verne natur og miljø, for naturen klarer å komme seg etter en hvilken som helst menneskelig påvirkning.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
19. Jeg tenker mye på dyrs lidelser.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
20. Jeg føler meg veldig forbundet med jorda og med alt levende.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

**Kjønn:**

Kvinne     Mann



Alder:  år

Velg kategorien som passer best for dine matvaner. Kryss av for kun én kategori.

1.  Jeg spiser både kjøtt og fisk.
2.  Jeg er vegetarianer (unngår å spise kjøtt og fisk).
3.  Jeg er veganer (unngår å spise alle produkter fra dyr).
4.  Jeg er pescetarianer (unngår å spise kjøtt, men spiser fisk og sjømat).

Har du svart på dette spørreskjemaet før?

Ja       Nei

Kjøpte du wrap på Break i dag?

Ja       Nei

*Hvis du svarte **nei** på spørsmålet over, kan du se bort fra de neste spørsmålene.  
Hvis du svarte **ja**, vennligst svar på de neste spørsmålene.*

Hvilken wrap spiste du på Break i dag?

- |                                                          |                                                        |
|----------------------------------------------------------|--------------------------------------------------------|
| 1. <input type="checkbox"/> Taco m/kjøtt (kald)          | 6. <input type="checkbox"/> Taco m/kjøtt (varm)        |
| 2. <input type="checkbox"/> BLT (kald)                   | 7. <input type="checkbox"/> Svinekjøtt (varm)          |
| 3. <input type="checkbox"/> Kylling pesto (kald)         | 8. <input type="checkbox"/> Kylling (varm)             |
| 4. <input type="checkbox"/> Kylling curry (kald)         | 9. <input type="checkbox"/> Vegan/mexican style (varm) |
| 5. <input type="checkbox"/> Vegetar/mexican style (kald) | 10. <input type="checkbox"/> Tunfisk                   |

**Hvor ofte spiser du wrap på Break?**

1.  Aldri (dette er første gang jeg spiser wrap her)
2.  Sjelden (1 gang i måneden eller sjeldnere)
3.  Av og til (2-3 ganger i måneden)
4.  Ofte (1-4 ganger i uka)
5.  Alltid (5 ganger i uka)

**Hvis du har spist wrap på Break før: Hvor ofte pleier du å spise den typen du spiste i dag?**

1.  Aldri (det er første gang jeg spiser denne typen)
2.  Sjelden
3.  Noen ganger
4.  Ofte
5.  Alltid (jeg spiser denne typen hver gang jeg er her)

**Hvor godt likte du wrapen du spiste i dag?**

1.  Svært godt
2.  Godt
3.  Helt OK
4.  Dårlig
5.  Svært dårlig

Dersom du har kommentarer eller presiseringer til noen av spørsmålene, skriv dem gjerne på baksiden av dette arket.

## Appendix C

**Factor Analysis of the Nature Relatedness Scale**

All wrap buyers were included in the factor analysis ( $N = 344$ ). The scale items were normally distributed. Bartlett's test of sphericity was significant:  $\chi^2(190) = 1876.00, p = .000$  and the KMO value was satisfactory (KMO = .86). However, the correlation matrices displayed several correlations below .3. This was especially the case for the items within the subscale Perspective.

An initial exploratory maximum likelihood factor analysis supported a five-factor solution (eigenvalues 5.45, 1.91, 1.38, 1.21, and 1.08), accounting for 55.11% of total variance. This solution gave no interpretable result. Furthermore, Nisbet et al. (2009) suggest three factors in the original model, and Catell's scree plot (see Figure C.1) method suggested a three-factor model. Thus, to test the assumed underlying factors NR-Self, NR-Perspective, and NR-Experience, a confirmatory maximum likelihood factor analysis was conducted, requesting three factors. An oblique rotation (direct oblimin) was chosen because the factors were expected to correlate. The three factors (eigenvalues 5.45, 1.91, and 1.38), accounted for 43.69% of the total variance.

An interpretable three-factor structure was obtained (see Table C.1), where a majority of the items were without cross loadings and loaded on one of the three factors. The correlation matrix shows that the items loading on the first factor correspond to the NR-Self concept, representing how people identify with nature. The items loading to the second factor represent people's familiarity with and desire to spend time in nature, the NR-Experience, whereas the items assessing the external, nature-related worldview, the NR-Perspective items, loaded in the third factor.

Two items did not fit the structure proposed by Nisbet et al. (2009). Item NR\_Self\_4 ("I am not separate from nature, but a part of nature") and NR\_Self\_6 ("Even in the middle of the city, I notice nature around me") did not have strong loadings to any factors, but loaded the most strongly to the Experience factor. Item NR\_Self\_8 ("I think a lot about the suffering of animals") had weak loadings, and loaded more strongly to the Perspective scale. Cronbach's alpha analysis was performed to explore the reliability of the scale with or without these items. Cronbach's alpha of the subscale NR\_Self was increased without the items NR\_Self\_4 and NR\_Self\_8, but would decrease without NR\_Self\_6. Taking into consideration the factor analysis and the Cronbach's alpha analysis, items NR\_Self\_4 and NR\_Self\_8 were excluded, but NR\_Self\_6 was retained. Though some items in NR\_Perspective had weak loadings, they

all loaded most strongly to the third factor, and the Cronbach’s alpha of the subscale would decrease if any of the items were removed. Thus, these items were all retained.

The structure proposed by Nisbet et al. (2009) was therefore supported, with two modifications. 18 items were computed into three sums and one total sum, based on the scales developed by Nisbet et al. (2009). The reliability estimated by Cronbach’s alpha was satisfactory for the full scale ( $\alpha = .837$ ), NR-Experience ( $\alpha = .780$ ) and NR-Self ( $\alpha = .808$ ), but not satisfactory for NR-Perspective ( $\alpha = .477$ ). Nisbet et al. (2009) likewise found the NR-Perspective factor to have the lowest reliability in the scale ( $\alpha = .66$ ). Even though NR is a multidimensional concept, Nisbet et al. (2009) considered a one-factor structure more promising, because several items are loading on multiple factors, and the subscales are strongly inter-correlated. The authors suggest that the items require changes to achieve an optimal multi-factorial solution. Nevertheless, because there seemed to be a clear three-factorial structure, I chose to proceed with both the three subscales and a total scale, keeping in mind that the subscale NR-Perspective had poor internal reliability.

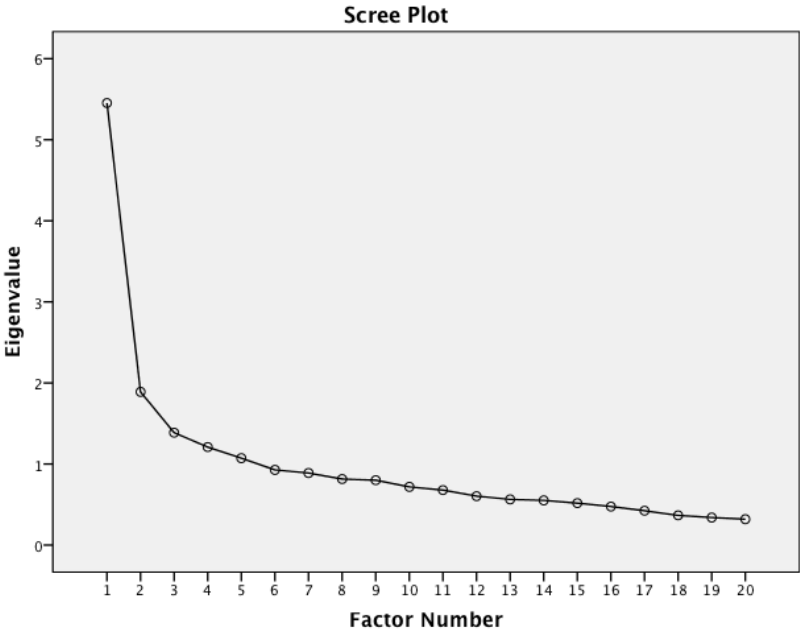


Figure C.1. Scree Plot of the 20 Nature Relatedness Items.

# EFFECTS OF NUDGING ON SUSTAINABLE FOOD CONSUMPTION

Table C.1

*Factor Loadings for Confirmatory Factor Analysis with Oblique Rotation of Nature Relatedness Scale.*

Items	Factor 1 (Self)	Factor 2 (Experience)	Factor 3 (Perspective)
<b>NR-Experience</b>			
E1	<b>.70</b>	-.03	-.18
E2	<b>.67</b>	-.04	.09
E3	<b>.62</b>	.08	-.00
E4	<b>.35</b>	.29	.09
E5	<b>.52</b>	.10	.02
E6	<b>.60</b>	-.07	.06
<b>NR-Self</b>			
S1	-.09	<b>.70</b>	.04
S2	.30	<b>.48</b>	-.08
S3	-.07	<b>.67</b>	.10
S4	.19	.17	.12
S5	<b>.32</b>	<b>.46</b>	.03
S6	.27	.24	.02
S7	<b>.45</b>	<b>.49</b>	-.04
S8	.01	.28	.36
S9	.29	<b>.52</b>	.06
<b>NR-Perspective</b>			
P1	.06	-.11	<b>.41</b>
P2	-.03	.10	<b>.46</b>
P3	.17	-.04	.20
P4	-.13	.07	<b>.62</b>
P5	-.02	.13	.18

Note. Factor loadings > .32 are in boldface.

Appendix D

**Descriptive Statistics: Participants' Café and Wrap Habits**

Customers' frequency of visiting the café and of purchasing the same wrap as they bought on the experiment day can be found in Figure D.1 and D.2. A majority of the participants (85%) had been to the café at least once before, and almost half (44%) reported to visit the café at least 2-3 times à month ("Sometimes" in the questionnaire). 14% of those who answered reported to buy the same wrap as they bought today, every time, and more than half (56%) reported to buy the same wrap sometimes, often or every time they visit the café. For 3 out of 10, it was the first time they bought the wrap they had chosen today.

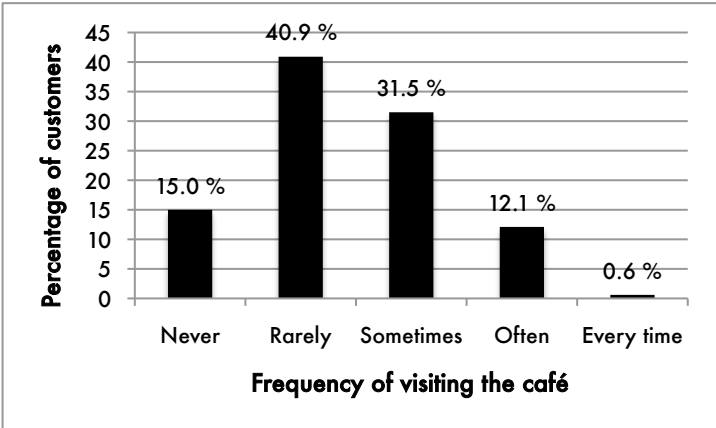


Figure D.1. Frequency of Visiting the Café. The diagram shows how often the customers visit the café, in percent. N = 340.

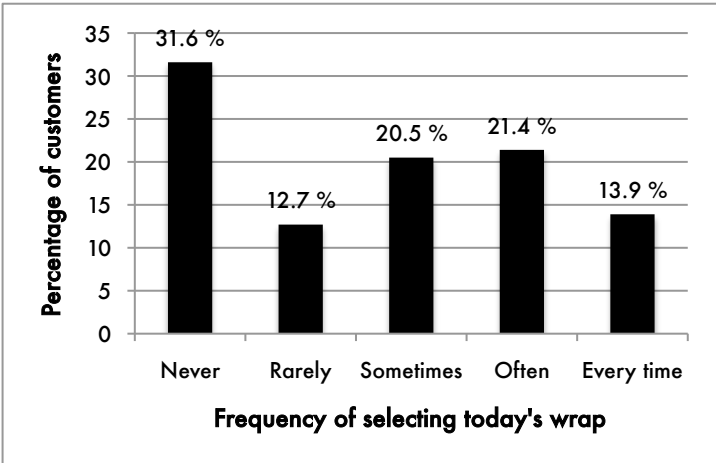


Figure D.2. Frequency of Purchasing this Wrap. The figure shows how often the customers choose the same wrap as today. N = 332.

## Appendix E

**Logistic Regression of Default Frame versus Control with full NR Scale**

Binary logistic regression with DEFAULT+FRAME condition versus CONTROL was run with total Nature Relatedness score as predictor (see table E.1). The full model was significant,  $\chi^2(4, n = 159) = 55.47, p < .001$ . However, the model containing the three NR subscales was reported, for several reasons. First of all, the factor analysis yielded a multidimensional structure of NR. Secondly, the logistic regression model with the subscales revealed that one subscale explained variance, whereas the two others did not. The difference between the subscales was considered relevant to present. Thirdly, the model with three scales had stronger classification accuracy rate (86.8%) than the model with one scale (84.3%), and explained more variance (Cox and Snell  $R^2$ : 33.4%, Nagelkerke  $R^2$ : 50.2%) than the model where the total NR scale was predictor (between 26.6 and 38.9%).

Three cases were tried excluded because of high standardized residuals, which lead to stronger classification accuracy rate (87.7%), but inflated odd ratio values (Vegetarianism, OR = 4.333E+10). Taken together, reporting the model with three subscales was considered more promising. However, the logistic regression model for NR total can be found below. only the models with the three subscales were reported for FRAMING and DEFAULT.

Table E.1

Binary Logistic Regression of Vegetarian Wrap Selection in Control versus Default Frame Condition.  
 $n = 159$

	B	SE (B)	Wald	df	p	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Constant	-2.05	.40	26.23	1	.000	.13	-2.05	.40
Default Frame nudge	.64	.50	1.63	1	.202	1.90	.71	5.08
NR	1.60	.74	4.67	1	.031	4.96	1.16	21.16
Vegetarianism	4.40	1.08	16.72	1	.000	81.43	9.89	670.60
NR x Default Frame	-2.17	.92	5.58	1	.018	.11	-2.17	.92

Note:  $R^2 = .60$  (Hosmer & Lemeshow),  $.27$  (Cox and Snell),  $.39$  (Nagelkerke). Model  $\chi^2(3) = 49.25, p < .001$ .

## Appendix F

**Logistic Regression of Default versus Control**

Binary logistic regression was conducted with DEFAULT nudge, NR subscales and vegetarianism as predictors in Block 1, interaction terms between subscales and nudge in Block 2 (see table F.1). The full model was significant,  $\chi^2(3, n = 165) = 81.615, p < .001$ , but had poor goodness of fit according to the Hosmer-Lemeshow test ( $p = .022$ ). When three outliers were excluded based on high standardized residuals, the Hosmer-Lemeshow test was no longer significant, indicating good fit ( $p = .568$ ), and classification accuracy rate increased from 89.7% to 92.9%. However, the revised model gave very large odds ratios (NR Perspective, OR = 1228.12 and Vegetarianism, OR = 1.435E+12), which could be due to too few participants in some cells. Thus, the original model with all cases is reported, but its poor goodness of fit should not be considered.

Table F.1

Binary Logistic Regression of Vegetarian Wrap Selection in Control versus Default Condition.  $n = 165$

	B	SE (B)	Wald	df	p	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Default nudge	.55	.62	.78	1	.378	1.73	.51	5.84
NR Perspective	2.59	.80	10.37	1	.001	13.33	2.76	64.46
NR Experience	.24	.61	.16	1	.689	1.28	.39	4.21
NR Self	.36	.72	.25	1	.620	1.43	.35	5.83
Vegetarianism	5.07	1.21	17.58	1	.000	159.38	14.89	1706.37
NR Perspective x Default	-1.73	.97	3.17	1	.075	.18	.03	1.19
NR Experience x Default	-.36	.86	.18	1	.672	.67	.13	3.75
NR Self x Default	.07	.98	.01	1	.940	1.08	.16	7.32
Constant	-2.49	.51	24.25	1	.000	.08		

Note:  $R^2 = .02$  (Hosmer & Lemeshow),  $.39$  (Cox and Snell),  $.58$  (Nagelkerke). Model  $\chi^2(8) = 82.63, p < .001$ .