



# Interested, indifferent or active information avoiders of carbon labels: Cognitive dissonance and ascription of responsibility as motivating factors

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## ABSTRACT

Active avoidance of information is gaining attention in the behavioural sciences. We explore motivations for active avoidance of carbon emissions information. In the first stage of a stated preference survey, respondents indicated whether they wished to access carbon emissions information (*info-takers*) or not (*info-decliners*) when selecting a protein source. In the second stage, all respondents were provided with carbon emissions information. The info-takers reduced emissions from their food choices by 32%, while the info-decliners also reduced their emissions (by 12%). This indicates active information avoidance among at least some info-decliners. We explore how cognitive dissonance, responsibility feelings and personal norms affect a person's actions when information is imposed upon them, and their role as motivators for actively avoiding carbon emissions information on meat products. Individuals who experience climate-related cognitive dissonance and/or responsibility feelings change behaviour more following climate information, and it also increases choice task uncertainty mostly among these. These findings point to the potential of increasing impact from information by simultaneously increasing personal responsibility feelings and activating social norms.

## 1. Introduction

The global food system is a significant contributor to climate change, generating approximately 25–30% of total greenhouse gas emissions (Mbow and Rosenzweig, 2019). Of all food products, meat has the highest environmental impact (Tukker et al., 2006). Present meat consumption patterns contribute to increasing emission levels, and therefore constitute a growing concern with respect to climate impact (Hedenus et al., 2014; Wellesley et al., 2015). Consumers can reduce carbon emissions by adapting their food purchases towards products that have a lower climate impact (de Boer and Aiking, 2011). Labels with Carbon dioxide (CO<sub>2</sub>) information and other means of climate labelling can aid consumers in their purchase decisions. Another means of altering consumer choices could be to use taxes that internalise the negative externalities of the CO<sub>2</sub> emissions (CO<sub>2</sub>e) (Bonnet and Bouamra-Mechemache, 2018; Brännlund and Nordström, 2004).

There are currently few established labels that inform about the CO<sub>2</sub>e from each product in grocery stores, although label initiatives have been initiated in various supermarket chains and countries (Liu et al., 2016).

Experimental studies have explored consumers' willingness to pay more for lower-impact variants of a product (Canavari and Coderoni, 2020; Elofsson et al., 2016; Grunert et al., 2015; Lombardi et al., 2017; Thøgersen and Nielsen, 2016; Van Loo et al., 2014). Yet, to obtain insights into the behavioural impacts that climate labels are likely to have, it is important to understand the wish to access and the expected behaviour if provided such information.

In general, consumers have little knowledge about the climate impact of various food products (Hartmann and Siegrist, 2017). This highlights the potential of providing more information in order to direct consumers towards more sustainable food choices. While providing information as a way of changing consumer behaviour is a relatively easy and cheap instrument to use, its effects rely on consumers being willing to access and process the information, and ultimately, to incorporate it into their purchase decisions. Typically, information is assumed to be processed and incorporated into the decision process when it is found useful, but is otherwise ignored (Stigler, 1961). There are, however, occasions when individuals actively avoid information, and this may be attributed to motivations that are rational to the individual. Examples

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include a desire to avoid unwanted information (e.g., disease condition), or a desire to be surprised (Golman et al., 2017; Hertwig and Engel, 2016). Active avoidance of information has gained increased attention in other fields (Sharot and Sunstein, 2020), and the relevance from an economic theory perspective is discussed in e.g. Golman, Hagmann and Loewenstein (2017), Thunström, Nordström, Shogren, Ehmke and vant Veld (2016), and Nordström et al., (2020). This study explores the mechanism and policy implications of such active information-avoidance<sup>1</sup> behaviour in the context of food purchase behaviour and sustainability information.

In the area of food choices, two studies find evidence of consumers actively avoiding food product information related to animal welfare (Bell et al., 2017; Onwezen and van der Weele, 2016). Both studies are based on the individuals' self-indicated avoidance ('If I buy cheap chicken/meat, I'd rather not think about the possibility that it is a fast-growing chicken/has used an antibiotic' and 'So long as pork is safe, healthy, and delicious, I would rather NOT know how the pig/hog was raised'). Importantly, such direct questioning may be associated with concerns of social desirability bias. Moreover, these studies do not explore individual behaviour following the imposition of information among those who state that they prefer to avoid such information. Three recent studies target these concerns with experimental approaches to explore active information avoidance regarding country of origin and calories. They find that a fairly large proportion of participants decline access information about calories – 60% (Thunström et al., 2016), 46% (Nordström et al., 2020) – and country of origin ~20% (Beiermann et al., 2017). Hence, there is some evidence of individuals actively avoiding certain types of information when making food choices. However, the motivation for such behaviour is sparsely explored, an exception being Nordström et al. (2020), who find that active information avoidance is motivated by optimal expectations, i.e., individuals chose not to know the calorie content so that they can downplay the probability that their preferred meal is high in calories. In a related area, Thunström et al. (2014) show that social norms may affect the share of individuals that decline CO<sub>2</sub>e information on overseas flights, and similarly, Adda et al., (2018) find that moral obligation increases avoidance of information about the environmental impact from air condition when the cost of acting on the information is high (on hot days).

In this article, we investigate whether consumers actively avoid information about the climate impact of food products, and we explore motivations for such active avoidance. We test whether conflicting cognitions and responsibility feelings in the domain of climate change affects food choices when exposed to CO<sub>2</sub>e information. This can provide insights that are of interest to policy makers regarding how different types of consumers are affected by such labels. We identify consumers who wish to avoid climate impact information, but when such information is imposed upon them, change their purchase behaviour towards lower emissions products. Moreover, we explore how conflicting cognitions and responsibility feelings affect choice behaviour and choice uncertainty when climate impact information is provided, and if this motivates active information avoidance. We expect these insights to be of value in the development of measures to influence consumers towards more climate-friendly food choices.

## 2. Theoretical framework

We follow the definition of *active information avoidance* by Golman, Hagmann, and Loewenstein (2017), who state that an individual has to be aware that the information in question exists, yet chooses not to access the information, even if it is available without cost or even costly to avoid. We here refer to costs as defined in a neoclassical framework,

<sup>1</sup> Also referred to as strategic ignorance, willful information avoidance, or as willful ignorance.

including monetary and search costs. There are many motivations for active avoidance of information, and individuals may use different methods to avoid readily available information. Importantly, actively avoiding information need not be irrational; e.g., an individual may expect that the information will cause discomfort of some kind. Two broad motivational categories of active information avoidance relevant to food choices and climate impact information can be defined<sup>2</sup>:

- (1) Dissonance avoidance occurring as a result of the *cognitive dissonance* (discomfort) from being exposed to information that conflicts with one's prior beliefs (Golman et al., 2017), or that cause unpleasant emotions or diminish pleasant ones (Sweeny et al., 2010). This is also termed *emotion regulation* in the field of psychology (Hertwig and Engel, 2016).
- (2) Strategically motivated avoidance. This is an intrapersonal<sup>3</sup> strategic device for eschewing responsibility (Hertwig and Engel, 2016) that arises when information is expected to cause a person to feel an unwelcome responsibility to change his or her behaviour (Sweeny et al., 2010). An example would be individuals who like to consider themselves altruistic and therefore avoid information to generate 'moral wiggle room', where they can allow themselves to act selfishly (Dana et al., 2007).

### 2.1. Dissonance avoidance

The theory of cognitive dissonance (Festinger, 1957) provides a basis for understanding *dissonance avoidance* as an emotion regulation device. Cognitive dissonance arousal related to food consumption and climate impact can be caused by (a) cognitive discrepancy (conflicting cognitions), and (b) dissonance (psychological tension as a result of such cognitive discrepancy) (Ong et al., 2017). Cognitive discrepancy can, in turn, be either in the same domain (intra-attitudinal), e.g., 'red meat is nutritious and good for me' vs 'red meat may cause cancer', or in different domains (inter-attitudinal); 'consuming red meat is an important part of my culture' vs 'red meat is bad for the climate'.

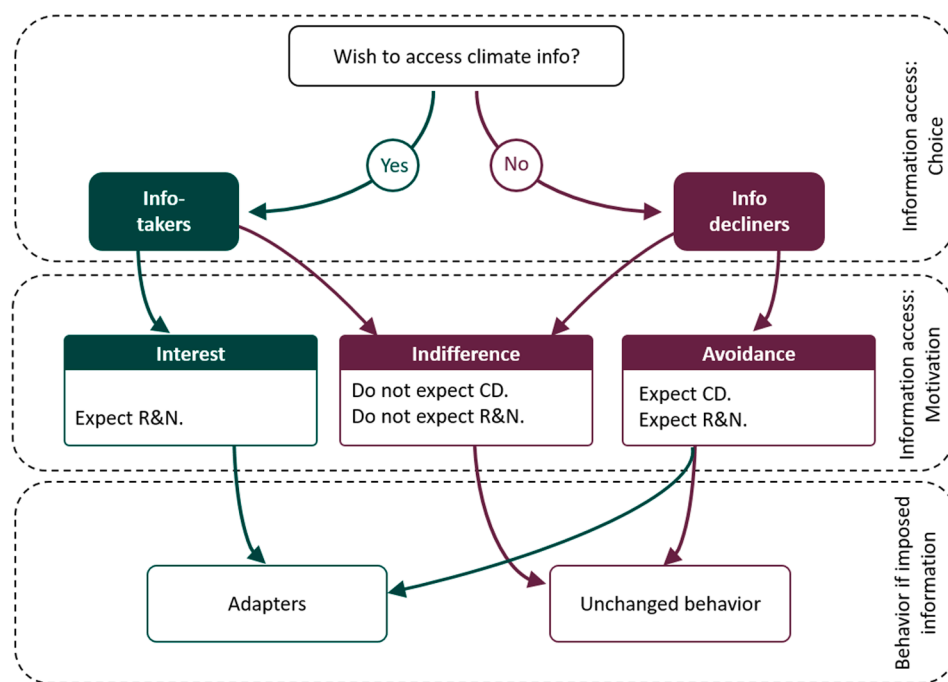
### 2.2. Strategically motivated avoidance

The Norm Activation Model (NAM) (Schwartz, 1977) provides a theoretical basis for *strategically motivated avoidance* of climate impact information. The NAM proposes a sequential model; problem awareness → ascription of responsibility → personal norm → pro-social intention/behaviour (Han, 2014). A person who attributes responsibility for taking action to themselves and who has personal moral norms that suggest action may want to access information that increases the problem awareness. However, for some, it is also possible that they want to avoid being exposed to information about the first stage (problem awareness), as an internal strategic device to eschew responsibility.

Note that there may be other possible motivations for avoiding information, and Golman et al provide a comprehensive overview.

<sup>2</sup> There are several other motivations and methods for actively avoiding information that have been explored in experiments in other contexts (Golman et al., 2017; Grossman and van der Weele, 2017). We argue that cognitive dissonance avoidance and responsibility feelings are of relevance in the context of credence attributes of food (in our case, climate impact information).

<sup>3</sup> *Intrapersonal* strategic information avoidance is a device to disable one's own ability to make certain decisions (e.g., altruistic choices). *Interpersonal* strategic information avoidance is rather a device to eschew knowledge that other individuals/entities rely on one's knowledge in making their own decisions. This is mainly exemplified in bargaining situations (Golman et al., 2017).



**Fig. 1.** Decision schedule for information takers and decliners, expected motivations and behavioural change. Note: CD = cognitive dissonance, R&N = responsibility feelings and norms.

### 2.3. Behaviour following the imposition of climate information

What will be the behavioural implications, in terms of choice complexity, from the introduction of climate information that the consumers chooses to see or are forced to see? A climate label would convey an information cue that is new to the consumer by both informational amount (an additional label adding further depth to the amount of information already provided by other labels) and by the content of the information made available through the new label. The extant literature suggest that attribute importance is characterized by salience, relevance, and determinance (i.e. the importance of the attribute in judgement and choice) (Myers and Alpert, 1968). Therefore, both the addition of new information as well as the further processing of its content may contribute to conflicts of interests, which then may increase the complexity of the choice task, thus with the possibility that individual choices become less consistent (Caussade et al., 2005; Dellaert et al., 2012; DeShazo and Fermo, 2002). For the present study, we expect that individuals who experience conflicting beliefs and/or emotions with regard to climate impact and food consumption will find that climate information increase the choice complexity more than for individuals with less cognitive dissonance. When these individuals' are confronted with climate information, which conflicts with their positive perceptions of the food, their inner conflict is more obvious and pronounced. We also expect that individuals with a high degree of responsibility and personal norms that oblige them to change behaviour will experience lower determinance and hence find the choice tasks more difficult when provided with climate information. Following this, we expect that the introduction of climate impact information will increase choice complexity more for individuals who experience higher cognitive dissonance and/or responsibility feelings and norms that compel them to change their behaviour. The choice complexity takes the form of less consistent choices, as measured by larger error variance in econometric choice models.

### 2.4. Hypothesis: Info-takers and info-decliners

We divide individuals into two groups based on their choice on whether to access free (non-costly) information or not (upper box in

Fig. 1): *info-takers* and *info-decliners*. The middle box in Fig. 1 contains the reason for wishing to access information or not. *Info-takers* can be divided into two sub-groups based on the reason for choosing to access information: those who choose to access information out of *interest*, to increase their awareness, and those who choose to access information out of *indifference* (it is non-costly to access).<sup>4</sup> *Info-decliners* can also be divided into two sub-groups based on the reason for declining information; out of *indifference* and out of active information *avoidance*. We make the following prediction: *H1. There are individuals who decline climate impact information ('Info-decliners')*. We expect that anticipated CD is largest for individuals who find competing attitudes/values to be of importance; i.e., they hold positive perceptions of meat consumption (tasty, nutritious, familiar, part of tradition and identity) and experience negative emotions when presented with information about climate impacts. We expect that individuals who find personal carbon reduction to be important and feel morally obligated to act accordingly, will anticipate that climate impact information will demand that they change their behaviour. Here, moral norms play a central part, as they are grounded in concepts such as the welfare and rights of others, considerations of fairness and justice (Kaiser et al., 1999). We test whether *H2. CD and R&N are motivating factors for the decision to decline climate impact information.*

### 2.5. Hypothesis: Active information avoidance

The lower box in Fig. 1 shows the behavioural implications when climate impact information is imposed upon individuals, and this is divided into those who change their behaviour after receiving the information (*adapters*), and those that do not (*unchanged behaviour*). For the *interest*-group, climate impact information increases their problem awareness (first stage in the NAM) and they will change their behaviour towards lower carbon-emissions products (*adapters*). We note that it is possible that some individuals in this group will not change their

<sup>4</sup> Following expected utility theory, individuals will choose to ignore costly information only if they anticipate that it would not change their behaviour, making them exactly indifferent about learning the information or not.

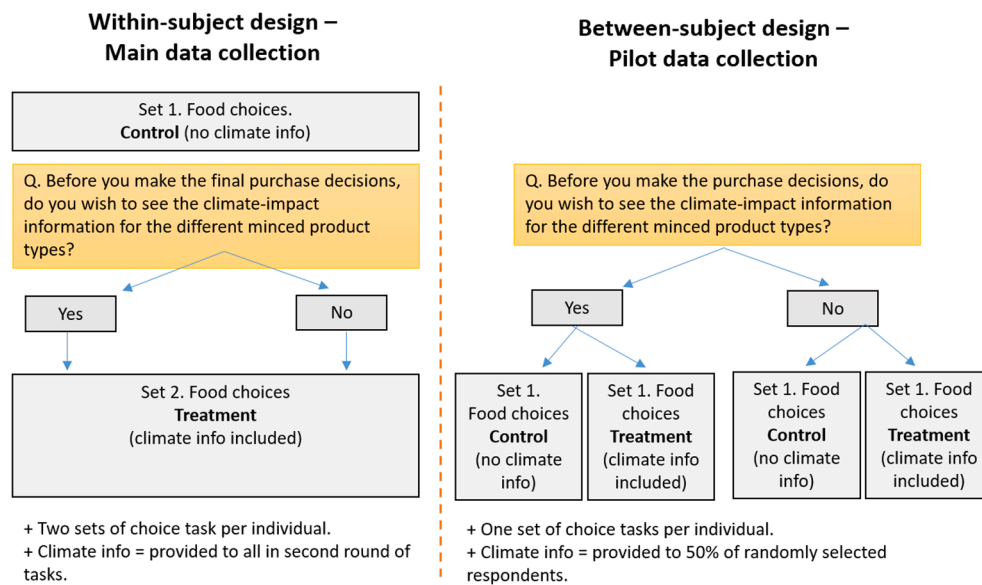


Fig. 2. Experimental design.

behaviour if they already make climate friendly choices. The indifference group do not change their behaviour when imposed with climate impact information (*unchanged behaviour*). Finally, for individuals who avoid information, we do not know *a priori* whether they will change behaviour if they are imposed with climate impact information. This is an empirical question, as it depends on the importance of the cognitive dissonance (CD) and/or the extent of responsibility feelings and norms (R&N) relative to the positive preferences for foods that have high carbon footprints.

When exposed to climate impact information, *avoiders* may change their behaviour to reduce CD or follow their R&N (*Adapters*). It is also possible that *avoiders*, though not changing their behaviour following the information exposure, do experience disutility caused by cognitive dissonance or from the failure to act in accordance with their responsibility feelings. *H3. The behaviour predicted in H1 is explained by active information avoidance (rather than indifference)*. We test this by investigating whether info-decliners change their behaviour when provided with climate impact information. The rationale behind this approach is that, if individuals are indeed indifferent to the information offered, it is not rational to react to the information when provided with it. We will test whether info-decliners change their behaviour in the form of altered preferences for product types after receiving information.

### 2.6. Hypothesis: The role of CD and R&N on choice behaviour

We predict that CD is a motivation for changing behaviour: *H4a. Individuals who experience high CD are more likely to change their choice behaviour after receiving climate impact information compared to individuals with little or no CD*. And similarly, we test whether: *H4b: Individuals with high levels of R&N are more likely to change their choice behaviour after receiving climate impact information than individuals with lower R&N*.

We further hypothesise that the introduction of climate impact information makes the choice task more difficult for respondents who experience CD compared to those who do not experience CD. We predict that: *H5a: CD increases choice uncertainty (error variance) when exposed to climate impact information*. Moreover, we predict that individuals who feel responsible to change their behaviour will find choice task complexity higher when exposed to climate impact information: *H5b: R&N that oblige action increase choice uncertainty (error variance) when exposed to climate impact information*.

### 2.7. The role of CD and R&N on active information avoidance

Finally, focusing on the info-decliners, we explore if CD is a motivation for avoiding information. We test if info-decliners who experience high CD are more likely to change their choice behaviour after receiving climate impact information compared to info-decliners with little or no CD. Moreover, following NAM, we will explore strategic reasons for declining to access climate impact information. We test if info-decliners with high levels of R&N are more likely to change their choice behaviour after receiving climate impact information than info-decliners with lower R&N. These analysis are explored similar to H4a and H4b respectively, while only including info-decliners.

## 3. Method

We conducted a stated preference choice experiment. The objective of analysing motivations for actively avoiding information requires detailed responses to a number of scales at the individual level. A further advantage with the conducted survey method is that it enabled us to have a large sample of responses from a representative sample of the population, and it provided us the freedom to design products that are not yet on the market. An online survey was distributed by a research panel firm in Sweden, resulting in 803 responses. The survey included initial screening questions on sociodemographic characteristics, which were used to ensure a representative sample of the population with respect to gender, age and region. Next, there were questions regarding food-related habits and general food attitudes, followed by the choice tasks. A final section included questions regarding attitudes and beliefs, for measuring CD and R&N, detailed further below.

The choice experiment used meat products, since this is a category where significant differences in CO<sub>2</sub>e levels exist, and where the level of CO<sub>2</sub>e is relatively high for some products. Following discussions in two focus group sessions and an analysis of retail sales data, minced meat was selected as the most suitable product. A hybrid meat product, combining meat with vegetable protein, was included as a viable option for less-involved consumers (de Boer and Aiking, 2017). Relevant product attributes and levels were also selected in this process (Table A1 in the appendix). Price levels were selected based on current market prices. The levels of CO<sub>2</sub> equivalent for each of the meat types were based on recent LCA reviews (Blonk et al., 2008; Clune et al., 2017). Given the common unfamiliarity with CO<sub>2</sub> equivalents, a short explanation was provided before the first task containing such information

(survey available in the supplementary material).

The experimental design was generated using a d-efficiency criterion for evaluation, and Bayesian priors were included from the pilot study ( $n = 400$ ). The final main effects design included 12 choice tasks, and these were blocked in three to reduce the burden on respondents. Each choice task included four unlabelled alternatives, described by the attributes, and the option to purchase none of the products. The order of the choice tasks and the position of the alternatives were randomised.

### 3.1. Design of information experiment

While we decided on a within-subject design for this study, we tested a between-subject design in a large pilot study ( $N = 400$ ). Fig. 2 illustrates our design for the experiment used for the main data collection as well as the pilot data collection. While participants in the main survey made choices, first without, and then with, climate impact information, the pilot study participants were randomly assigned to either receive (treatment group) or to not receive (control) climate impact information. The results from the main study corroborate our findings from the pilot study.<sup>5</sup> We are therefore confident that the effects of repeating decisions are not driving the findings in the results from the main data collection.

More specifically, in the within-subject design each respondent was initially presented with four choice tasks, where the product type was presented (control), without information about the products' climate impact. Following this, respondents were asked if they wished to see an additional label displaying the CO<sub>2</sub>e levels for the product (info-takers) or not (info-decliners). They were unable to proceed until responding either 'yes' or 'no'; the effort was thereby equal for the two options. We note that respondents may have opted for 'no information' if they wished to limit their cognitive burden, and would therefore avoid any additional labelling information. While this could be solved by providing some 'nonsense information' to those declining the climate impact information, we decided against it, as there would be a risk of confusing the respondents.

Following the information question, all respondents were provided with the final four choice tasks where the CO<sub>2</sub>e information was included on all products as an additional label. We recognise that this approach may annoy participants who were provided information against their will. For this reason, we included an explanation for these participants that the choice tasks were decided as part of an experimental design, and they were therefore provided with the information. When examining active information avoidance, there are two possible approaches: 1) the average-effect approach and 2) the imposed-information approach. With the average-effect approach, a portion of participants are given the information without being asked whether they wish to receive it or not (control), while the remaining participants are given the choice whether or not to access the information. Comparing the average behaviour in these groups makes it possible to identify whether there are any active information avoiders. This approach has been applied in a number of studies on information avoidance (Beiermann et al., 2017; Thunström et al., 2016, 2014). However, the objective of this study – to explore motivations for actively avoiding information and behavioural change – requires information on the individual level, and comparing averages is therefore not sufficient. For this reason, some degree of imposed information provision is needed. This approach has been applied in other studies (Woolley and Risen, 2018).

<sup>5</sup> Showing that information-decliners make significantly different choices in how they treat the information compared with the control. In addition, as we believe that the within-subject design is behaviorally plausible in the context of the study; we measure a reaction to added information, and since food purchases are repeated on a regular basis, and the information is not currently available, this design is reasonable.

Ideally, responses to the question if the respondent wished to see climate information should be incentive compatible, i.e. the response should affect the likelihood of actually seeing such climate information. We used alternative measures during survey testing (focus groups), where the likelihood of receiving climate impact information was affected by the answer given to the question if they wished to see climate information. These efforts were not understood by the participants. More details are provided in Section A1 of the appendix. The final four choice tasks (Treatment) were based on the same experimental design as the first four (Control).

### 3.2. Measures of expected cognitive dissonance from climate impact information

Cognitive dissonance is a latent construct, which can be measured using beliefs and values as proxies. The CD measure was designed to capture the conflict between conceptualisations of eating meat on the one hand and meat-related climate anxiety on the other. The conceptualisations of eating meat included five statements relating to enjoying the taste, being part of one's identity, eating meat being natural, meat having a central role in meals, and its nutritional importance on a Likert scale with anchors (1 = disagree–5 = agree) ( $M = 3.8$  and  $S.d. = 0.95$ ). The climate-anxiety scale was generated from a short version of the positive and negative affect scale (PANAS) (Watson et al., 1988) that included only the negative part of the scale. Respondents indicated their feelings when exposed to information about climate impacts from food, including *afraid*, *nervous*, *upset*, *distressed* and *guilty*<sup>6</sup> on a scale from 1 to 5 (never–always) ( $\alpha = 0.90$   $M = 2.2$   $S.d. = 1.0$ ). The CD scale was constructed by reversing the absolute value of the difference between the two sub-scales, such that  $CD = 0$  implies low CD, and 4 implies high CD.

### 3.3. Measures of responsibility and personal norms

A composite measure for R&N was constructed based on feelings of personal responsibility and personal norms that oblige climate reducing action ( $\alpha = 0.84$   $M = 3.8$   $S.d. = 0.9$ ). Personal responsibility feelings were measured by two items, modified from Kaiser et al., (1999): *Because my personal contribution is very small I do not feel responsible for climate change* (reverse coded) and *I feel co-responsible for climate change because I contribute with carbon emissions through my consumption*. Personal norms were measured by two items, building on Han, (2014); Onwezen et al., (2013): *I feel a moral obligation to reduce my contribution to climate change* and *I do not have a responsibility to reduce my contribution to climate change if other consumers do not* (reverse coded).

### 3.4. Other control measures

A measure of attitudes towards the relation between humans and nature was developed using four selected questions from the New Ecological Paradigm (NEP) questionnaire, modified to describe the context of climate change (Dunlap et al., 2000) ( $\alpha = 0.73$   $M = 3.6$   $S.d. = 0.75$ ). We included a measure of case-specific problem awareness, where individuals indicated to what extent they agree with the statement *Red meat has a large negative climate impact*. To obtain insights about the motivation for declining information, a question was included following the choice tasks where individuals could indicate which statement(s) they agreed with. Finally, we asked respondents to indicate their recent consumption behaviour in five different domains of relevance for climate impact: flying, traveling by car, overall consumption, consumption of meat and energy usage. They selected from a scale of *have reduced*, *plan to reduce*, *no change*, *plan to increase* and *have increased*.

<sup>6</sup> The short version is tested in Mackinnon et al., (1999), although here, *scared* was altered to *guilty* following focus group discussions.

### 3.5. Econometric methods

Data from the choice experiment is analysed taking departure in random utility theory (McFadden, 1974). For individual  $i$ , the utility of choosing alternative  $k = 1, \dots, K$  on choice situation  $t = 1, \dots, T$  is:

$$U_{ikt} = \beta' x_{ikt} + \varepsilon_{ikt} \tag{1}$$

where  $x_{ikt}$  is a vector of the observable variables related to alternative  $k$  and the person,  $\beta$  is a vector of parameters to be estimated and  $\varepsilon$  is a random term with mean zero that denotes the unobserved part of utility.  $\varepsilon$  is iid extreme value type 1 distributed with variance  $\pi^2/6\lambda^2$ , where  $\lambda$  is a scale parameter. In our case,  $T = 8$ , four choice situations without climate labelling (control) and four with climate labelling (treatment), and  $K = 5$ . To allow for heterogeneity in preferences between the respondents, we estimate mixed logit (ML) models, where all product attributes are described by a density function  $f(\beta)$ , which takes the form:

$$\beta_i = b + \sigma v_i \tag{2}$$

with the population mean  $b$ , parameter standard deviation  $\sigma$ , and random error term  $v_i \sim \text{i.i.d. } N(0,1)$  capturing the individual specific heterogeneity (Train, 2009). The unconditional probability can then be written as:

$$P_{ik} = \int \left( \prod_{t=1}^T \left[ \frac{\exp(\lambda(\beta_i' x_{ikt}))}{\sum_{k=1}^K \exp(\lambda(\beta_i' x_{ikt}))} \right] \right) f(\beta|b, \sigma) d\beta \tag{3}$$

where  $\beta_i$  is the individual specific parameter vector. The ML models are estimated in R (R Core Team, 2018), using the Apollo package (Hess and Palma, 2019). Estimates were stable at 1,000 Halton draws, and at different starting values. All estimates were specified with a normal distribution except price, for which a negative lognormal distribution was modelled, since it is expected to be negative for all respondents.

To test H3-H4, we examine whether preferences for meat types and for opting out are different after carbon information is provided (Treatment), and whether such changes depend on the degree of CD and/or the extent of R&N. We include interaction terms, and in the ML specifications, these are included in the form of shifters in the mean. For H3, this takes the form:

$$b = b_1 + b_2 \text{treatment} \tag{4}$$

i.e. we test whether the mean differs between Control and Treatment. The variable *treatment* takes the value one for the treatment group (the four last choice tasks for the respondents) and zero otherwise. For H4a and H4b, we also include interactions with CD and R&N respectively. Finally, to test H5a, we allow the error variance to depend on the degree of CD. More specifically, we specify  $\lambda$  as:

$$\lambda = \exp(\gamma_1 \text{treatment} + \gamma_2 CD + \gamma_3 CD * \text{treatment}) \tag{5}$$

where  $\gamma_3$  is the main parameter of interest, enabling us to test if the scale (and thereby error variance) is affected differently by the information treatment, depending on the level of cognitive dissonance. A corresponding function is specified in the model with R&N to test H5b. These specifications also allow for scale differences between the control group and treatment group.

Given that the hypothetical products likely share a different error structure compared to not purchasing any (opt out), we specify an error component for the product alternatives with mean 0, and a normal distribution (Brownstone et al., 2000). Thereby, the variance of the opt-out option and the hypothetical alternatives are allowed to differ. The off-diagonal elements in the covariance matrix is set to zero.

## 4. Results

### 4.1. Information takers vs decliners

One third (33%) of respondents indicate that they do not wish to

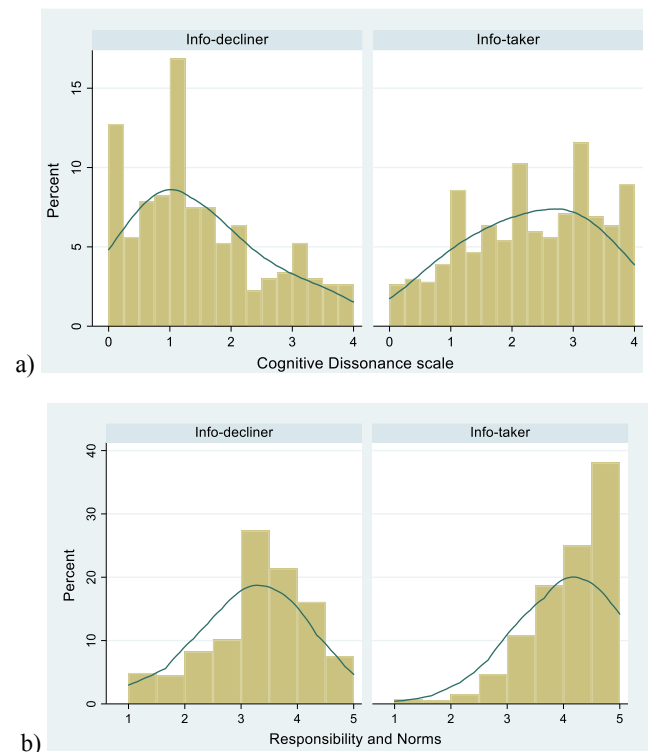


Fig. 3. Histogram by info-decliners and info-takers. Note: a) depicts Cognitive Dissonance scale b) depicts scale for Responsibility and Norms.

Table 1

Estimates from logit model on choice of information access.

	Coef.	z	dy/dx	z
Cognitive dissonance (CD)	0.29	3.02	0.05	3.08
Responsibility feelings & personal norms (R&N)	0.78	5.87	0.13	6.34
NEP	0.22	1.42	0.04	1.42
Problem Awareness	0.39	4.33	0.06	4.51
Meat consumption (reference level $\leq 1/$ week)				
2-3/week	0.06	0.24	0.01	0.24
$\geq 4/$ week	-0.13	-0.50	-0.02	-0.50
N	803			
LL	399.01			
Pseudo R <sup>2</sup>	0.22			

Note: Dependent variable: 1 = info-taker, 0 = info-decliner. Model includes variables for gender, region and age, and intercept.

access climate impact information for the products, supporting the first hypothesis of info-decliners. Based on two sample t-tests for differences in means and variance ratio tests, we find that there is a statistically significant difference in the average CD between the info-takers and info-decliners ( $p < 0.001$ ), while there is no statistical difference in the distribution ( $p = 0.891$ ) (Fig. 3a). Info-takers have a higher degree of agreement with the responsibility and personal norms statements ( $p < 0.001$  for each of the four statements) (Fig. 3b). High values represent a high degree of perceived personal obligation to act in a climate-friendly way. There is higher agreement among the info-takers ( $M_{\text{decliners}} = 3.2$   $M_{\text{takers}} = 4.0$   $p < 0.001$ ), while there is larger heterogeneity among the info-decliners (S.d.<sub>decliners</sub> = 0.91 S.d.<sub>takers</sub> = 0.80  $p = 0.009$ ).

To further explore differences between info-takers and info-decliners, we estimate a logit model with the indicated wish to access climate impact information or not as the dependent variable (Table 1). We note that sociodemographic characteristics are poor predictors of

**Table 2**  
Mixed logit models with treatment-shifters.

Variable	Info-decliners				Info-takers			
	Coef.	t-ratio	S.d.	t-ratio	Coef.	t-ratio	S.d.	t-ratio
Status quo	-3.13	-6.72			-3.83	-12.07		
Beef	3.34	9.00	3.07	9.25	2.62	14.15	2.13	11.23
Beef & pork	2.10	8.74	1.76	7.47	1.71	9.90	1.56	9.16
Pork	0.00				0.00			
Chicken	-1.46	-4.17	2.76	10.60	0.09	0.42	2.61	12.83
Beef & beans	-0.34	-1.54	2.36	8.18	1.19	7.44	2.32	13.20
Meat substitute	-9.72	-3.21	6.76	3.44	-4.23	-4.33	10.59	8.96
Organic	0.01	0.13	0.80	5.51	0.48	6.04	0.88	6.89
Log (Price) <sup>a</sup>	-3.33	-23.45	0.83	9.27	-3.33	-33.87	0.85	-17.67
Mean price/S.d price	-0.05		0.06		-0.05		0.06	
S.d for err. comp.			3.38	7.69			3.45	11.59
<i>Shifters for Treatment<sup>b</sup></i>								
Status quo	-0.03	-0.14			-0.06	-0.35		
Beef	-0.91	-3.30			-2.36	-12.46		
Beef & pork	-0.54	-2.29			-1.65	-9.30		
Chicken	0.79	2.97			0.26	1.51		
Beef & beans	-0.87	-3.89			-2.25	-12.04		
Meat substitute	0.24	0.38			1.28	3.94		
# individuals	267				536			
# observations	2132				4285			
LL	-2310.3				-5023.0			
BIC	4789.2				10229.9			

<sup>a</sup>  $mean_{price} = \exp(\beta_{price} + (s^2_{price}/2))$  and  $S.d_{price} = mean_{price} * (\exp(s^2_{price}) - 1)^{1/2}$ .

<sup>b</sup> Specified in Eq. (4).

**Table 3**  
MNL model with Treatment (Tr.) and CD or R&N interactions [PRINT IN COLOR].

	Cognitive Dissonance				Responsibility and Norms (R&N)			
	Main	Tr.	CD	Tr.*CD	Main	Tr.	R&N	Tr.*R&N
Product type								
Beef	2.07*	-0.21	-0.18*	-0.42*	2.27*	0.67	-0.15	-0.44*
Beef & pork	1.59*	-0.54*	-0.26*	-0.08	1.88*	0.29	-0.21*	-0.27*
Chicken	-0.32	0.06	0.22*	0.05	-0.64	0.08	0.21*	0.02
Beef & beans	-0.13	-0.59*	0.33*	-0.20*	-1.26*	0.20	0.47*	-0.32*
Meat substitute	-1.39*	-0.12	0.67*	0.10	-4.45*	0.66	1.14*	-0.13
Other attributes								
Opt out	-1.12*				-1.13*			
Organic	0.13*				0.14*			
Price	-0.02*				-0.02*			
# Choices/Indiv.	32 085	803			32085	803		
LL	-9321.4				-9341.7			

Note: \*indicates a significance level of 1%. For statistically significant variables related to the hypothesis tests (H4a and H4b), green indicates a positive effect and red a negative effect.

Utility function:  $V_j = \sum_{k=1}^K \beta_k^{Main} Producttype_k + \sum_{k=1}^K \beta_k^{Tr} Producttype_k * Tr + \sum_{k=1}^K \beta_k^{CD} Producttype_k * CD / R\&N + \sum_{k=1}^K \beta_k^{Tr*CD} Producttype_k * Tr * CD / R\&N + \beta_{org} Org + \beta_{price} price + \beta_{opt-out} Opt - out$  (individual subscripts are omitted).

desire to access information, as the parameters for most characteristics are insignificant (not reported). The most important predictor of choice of information access are the R&N, problem awareness (belief that red meat affects the climate negatively) and CD, supporting our second hypothesis. The measure based on selected questions from the NEP scale is insignificant, implying that after controlling for the other aspects, the attitude towards nature and the role of humans in it does not explain information demand. When excluding the case-specific problem awareness variable, the NEP becomes statistically significant (Table A2 in the appendix), suggesting that these measures to some extent measure

the same construct (general and case specific problem awareness). Regressing the R&N measure on sociodemographic characteristics does not provide significant parameters (with the exception of gender) (Table A3 in appendix). However, regressing CD and Problem Awareness respectively on sociodemographic characteristics reveals that older individuals experience less CD with respect to meat consumption and agree less with the large negative impact of meat.

Following the choice tasks, respondents indicated which statements they agreed with concerning a set of motivations for wanting or not wanting to access CO<sub>2</sub>e information. The most notable differences

**Table 4**  
Mixed logit models with scale shifters.

	Cognitive Dissonance (CD)				Responsibility and Norms (R&N)			
	Coef.	t-ratio	Std.dev	t-ratio	Coef.	t-ratio	Std.dev	t-ratio
Status quo	-1.42	-9.61			-1.04	-5.41		
Beef	2.16	11.11	2.28	11.14	1.63	6.27	1.72	6.51
Beef & pork	1.19	8.17	1.78	11.69	0.89	5.38	1.32	6.45
Pork	0				0			
Chicken	-0.57	-3.62	2.20	10.97	-0.41	-3.23	1.61	5.99
Beef & beans	0.30	2.55	2.11	11.19	0.23	2.57	1.55	6.35
Meat substitute	-3.79	-5.99	5.33	7.19	-2.66	-4.38	3.76	4.88
Organic	0.16	3.41			0.13	3.21		
Price	-0.03	-9.53			-0.02	-5.52		
<i>Shifters for Treatment</i>								
Beef	-1.62	-11.16			-1.24	-6.51		
Beef & pork	-1.07	-8.60			-0.80	-5.67		
Pork	0				0			
Chicken	0.37	3.26			0.27	3.09		
Beef & beans	-1.46	-10.64			-1.10	-6.28		
Meat substitute	0.98	4.25			0.69	3.64		
<i>Scale shifters (<math>\lambda</math>)<sup>a</sup></i>								
Treatment	0.55	4.81			0.96	4.08		
CD	-0.01	-0.31						
CD*Treatment	-0.14	2.82						
RN					0.07	1.86		
RN*Treatment					-0.18	-3.14		
# individuals	803				803			
# observations	6417				6417			
LL	-8023.2				-8026.9			
BIC	16230.5				16237.9			

<sup>a</sup> Specified in Eq. (5).

between info-decliners and info-takers is their distrust in climate impact information (48% vs 27%, Pearson  $\chi^2$  test:  $p < 0.001$ ). Moreover, more info-decliners agree that climate change is not caused by humans (8.6% vs 2.1%, Pearson  $\chi^2$  test:  $p < 0.001$ ). A low agreement with *I want to use climate impact information when I purchase food* among the info-decliners (7.1%) is consistent with their previous decision to decline access information in the experiment. The corresponding rate among info-takers was 55%. This relatively low agreement among info-takers signals that some individuals indicated that they wish to see climate impact information out of indifference (the cost of saying yes and no was very similar) (see Table A4 in the appendix).

We also explore whether info-decliners were uninterested in the climate impact information on meat but had planned or already made changes towards more climate-friendly behaviour in other domains. Across all five domains (flying, traveling by car, overall consumption, consumption of meat, energy usage) the info-takers had higher scores.

#### 4.2. Choice behaviour of info-decliners after receiving climate impact information

To test the third hypothesis – whether info-decliners are avoiders (rather than indifferent) – we analyse the effect that climate impact information has on choice behaviour in the experiment. ML models for info-decliners and info-takers are estimated separately, where the product type and opt-out parameters are interacted with the treatment period (Table 2).<sup>7</sup>

Interaction parameters between treatment and *organic* and *price* are not included, as they were insignificant in both models. Info-takers change preferences significantly after receiving carbon information on the products; *beef*, *beef & pork* and *beef & beans* become less preferred in favour of the *meat substitute*. Interestingly, info-decliners also shift

<sup>7</sup> We investigate whether info-decliners and info-takers have different preferences for the products in the experiment. The results for the control tasks (without climate impact information) are presented in Section A2 in Appendix.

preferences following the provision of information. This provides support for the third hypothesis of active information avoidance: there are individuals who incorporate the climate impact information into their decisions even though they declined to access such information.

#### 4.3. The role of cognitive dissonance and responsibility & norms on choice behaviour

We test H4a and H4b by interacting the level of CD and R&N respectively with the product-type parameters and treatment. These model specifications include a large number of interactions, and the number of observations does not allow for random preference heterogeneity, wherefore we estimate MNL models. We present the parameters in focus for the hypothesis in Table 3, while the full results are available in Tables A5a and A5b in the appendix.

In the CD-model, individuals with higher levels of CD are more likely to choose lower carbon-emissions product types (CD-column in Table 3). Moreover, as predicted in H4a, climate impact information affects individuals with higher CD more than individuals who have less or no CD ( $Tr*CD$ -column). LR-test for joint significance:  $p < 0.001$ .

Individuals with high levels of R&N that obliged them to act in a climate-friendly way are more likely to choose the lower carbon-emissions product types before the information treatment. Moreover, the treatment effect varies significantly with R&N ( $Tr*R&N$  column). LR-test for joint significance:  $p < 0.001$ . Individuals with high R&N are less likely to choose *beef*, *beef & pork* and *beef & beans* after they receive the CO<sub>2</sub>e information compared to individuals with low R&N levels. These product types are also the highest emitters of carbon. There is, therefore, support for H4b.

We further test whether the introduction of climate impact information makes the choice task more complex for respondents who experience CD (H5a) and R&N (H5b), by including these measures in the scale term and interactions with the treatment (eq. (3)). Results are presented for CD in the first model in Table 4, and R&N in the second. The models become more computationally burdensome compared to the ML-models presented in Table 2, and for this reason only the product



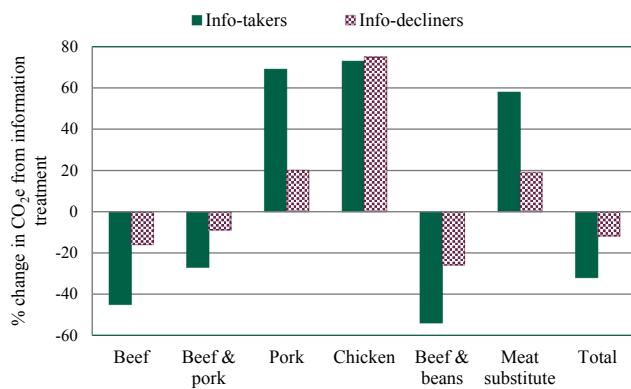


Fig. 4. Effect on carbon emissions from information treatment in percent.

types are specified with distributions. The scale parameter is obtained from  $\exp(\lambda)$ , where the normalisation is one. Therefore, the  $\lambda$  parameters should be tested against zero. In both models, the treatment  $\lambda$  parameter is positive, implying an increased choice uncertainty after the introduction of climate impact information. The scale does not vary with the level of CD, as revealed by the statistically insignificant  $\lambda_{CD}$  parameter. However, individuals with higher levels of CD show larger choice inconsistencies in the choice tasks with climate impact information ( $CD \cdot Tr$ ). This is in line with prior expectations, providing support for H5a.

The second model in Table 4 reveals that, similarly to the CD model, the level of R&N does not affect the scale significantly, but after the information treatment, the level of R&N is associated with a lower scale ( $\lambda = 0.83 = \exp(-0.18)$  following eq. (5)) and thereby a higher error variance. These findings support H5b; individuals with a high degree of R&N concerning meat consumption become less certain in their choices after the provision of climate impact information.

#### 4.4. The role of CD and R&N on active information avoidance

Finally, we focus on the info-decliners, to explore if CD and/or R&N is a motivation for avoiding information. We repeat the model specifications from Table 3, but include info-decliners only, to explore if CD and R&N motivates active information avoidance. To save space, results are presented in Table A6a and 6b. While the likelihood of purchasing the different product types changes with the level of CD, this is not affected by the information treatment. LR-test for joint significance of  $CD \cdot Tr$  variables:  $p = 0.642$ . Hence, there is not support for CD motivating active information avoidance. There is weak support for R&N motivating information avoidance. LR-test for joint significance of the  $R\&N \cdot Tr$  variables:  $p = 0.036$ . This lends some support for the idea that info-decliners with strategic motivations for avoiding information react more strongly to climate impact information when provided with it. We acknowledge that the lower number of info-decliners (267 vs 536) may contribute to the weak results for R&N and the insignificant results for CD.

#### 4.5. Changes in CO<sub>2</sub> emissions after receiving climate impact information

Finally, we explore the effect on carbon emissions from the CO<sub>2</sub>e information, and we compare the effect on those who have climate impact information imposed on them (info-decliners) with those who received it voluntarily (info-takers). We summarise the total amount of CO<sub>2</sub> equivalents from the chosen products in the control tasks and compare it with the total amount in the treatment tasks. The percentage of change in total CO<sub>2</sub> equivalents constitutes the effect on emissions from the imposed information. Since the experimental design is the same for the control tasks and the treatment tasks, the total CO<sub>2</sub> equivalents

can be compared<sup>8</sup>. For the whole sample, the provision of climate impact information reduced the total amount of CO<sub>2</sub> equivalent emissions from the chosen products by 25% (Fig. 4). Although the reduction is larger among the info-takers (32%), a reduction (12%) can still be seen among individuals who indicated that they prefer not to access climate impact information. As expected, the total CO<sub>2</sub> equivalent emissions from the low-emissions product types (e.g. pork, chicken, and meat substitute) increase as a result of their being used as substitutes for the high-emissions product types.

## 5. Discussion

One possible measure for reducing the climate impact of food consumption is to include carbon emissions (CO<sub>2</sub>e) labels on food products. However, in order such labelling programmes to be effective, consumers must consider the information and change their consumption patterns accordingly. There is evidence from other domains that some consumers actively avoid certain types of information in order to eschew uncomfortable feelings (Onwezen and van der Weele, 2016; Thunström et al., 2016). This article explores whether consumers desire to learn about their climate impact when making food purchases, and how their behaviour is affected when such information is imposed upon them. Data was collected in an online questionnaire, which included a stated preference experiment. One third of the respondents did not wish to access CO<sub>2</sub>e information when choosing minced meat products (info-decliners). Interestingly, when CO<sub>2</sub>e information about the products was imposed upon the info-decliners, their likelihood of purchasing products with high CO<sub>2</sub>e declined. This suggests some degree of active information avoidance.

We identify three types of individuals: (1) Those who are *interested* in climate impact information (they wish to access such information, and they alter their behaviour when it is provided and the information deviates from their expectations). (2) Those who are *indifferent* (they may or may not wish to access information, but are not affected by it). (3) *Avoiders*, who decline information when given the choice, but at least some of them are affected sufficiently to change their behaviour when information is imposed upon them. Our results reveal that some individuals avoid carbon information where possible, yet alter their behaviour if information is imposed upon them. While info-takers reduced their CO<sub>2</sub>e emissions by 32% after receiving climate impact information, the info-decliners also reduced theirs by 12%.

We investigate two motivations that we hypothesize affect the behaviour if imposed information; conflicting beliefs or emotions – cognitive dissonance (CD) and responsibility feelings and personal norms (R&N). We find that both motivations affect how a person reacts to information. Individuals with higher levels of CD and/or R&N are more likely to change their purchase behaviour towards lower carbon-emissions products when provided with climate impact information. Moreover, a higher degree of CD related to meat consumption is associated with higher uncertainty when making purchases due to the imposition of climate impact information. Similarly, stronger R&N that oblige an individual to act in a climate-friendly way are associated with higher levels of uncertainty when making the decision after CO<sub>2</sub>e information is included on the products.

We further hypothesize that the anticipated discomfort due to conflicting beliefs or emotions (CD) motivates avoidance of information, and that R&N that oblige a person to take action they would rather avoid motivate information avoidance. However, among info-decliners, we only find weak support for this effect from R&N, and no effect from CD. A possible reason for this is that the info-decliners who are avoiders (as

<sup>8</sup> While the distribution between the blocks is close to being evenly distributed, some minor differences occur, wherefore we weigh the blocks equally when calculating the CO<sub>2</sub> equivalents before and after the information treatment.

opposed to indifferent) are relatively few and that such effects are therefore not possible to measure in our experimental setup. Another reason could be that a high share of the avoiders do not change behaviour, but experience disutility from the information. In this study we are not able to measure the disutility among the info-decliners who do not change behaviour. While challenging to measure, it would be informative to include the degree of disutility experienced due to imposition of information in future studies on active information avoidance.

### 5.1. Limitations and future research directions

There is no established CD scale, but various methods are used in the literature. There are many possible variants of questions that could be asked, and their appropriateness is also likely to vary with the context. While the approach in this study has been instructive, we suggest that more work is needed on the measurement of CD and the development of short scales that can be included in questionnaires.

We use a heterogeneous definition of a product category, where minced protein includes both types of red meat, as well as chicken and meat substitutes. The inclusion of low carbon-emissions product types in the same choice context as red meat products makes such alternatives more feasible and increases awareness. The market share for minced meat substitutes, minced chicken and minced beef combined with minced beans are currently very low, while the market share in this experiment is significant; and for chicken and meat substitutes, it increases following the inclusion of climate impact information. The introduction of specific CO<sub>2</sub>e labels on all products is a complicated task that requires policy and/or groceries to demand such information from producers. A more feasible measure, which can be implemented by groceries, is the use of simple nudges (Panzone et al., 2018). Making changes in the choice presentation has proven to be effective in restaurant settings (Kurz, 2018). In the grocery setting, a possible nudge could be to place meat substitutes and chicken products on the same shelf as red meat products, together with some kind of simple CO<sub>2</sub> label on the products, such as red, yellow and green, to help the consumer identify low-emissions product groups.

### 5.2. Conclusions and policy implications

The results from this study highlight the potential that climate impact information has as a measure for transitioning towards food consumption that results in lower carbon emissions. The study also reveals that some individuals avoid carbon information where possible, yet alter their behaviour if information is imposed upon them. We distinguish between individuals that are *interested* in information, indifferent to information and those who rather avoid the information.

## Appendix A

See [Tables A1](#)

**Table A1**  
Attributes and levels for grounded meat product in choice experiment.

Attribute	Levels	Treatment information (CO <sub>2</sub> e)
Product type (Grounded meat)	Beef	27
	Beef & pork 50/50	16
	Beef & beans 70/30	19
	Pork	6
	Chicken	4
	Meat substitute	3
Production method	Conventional, Organic	
Price	25,33,41,49,57,65	

The implication from our findings is that while *interested* individuals can be expected to more actively seek out climate impact information (e.g., turn the package, read a complex label), *avoiders* will only be affected by the label if it is imposed upon them. Hence, while CO<sub>2</sub>e can be reduced by providing consumers with labels on their products, such initiatives will likely need to be mandatory, because high-emissions producers are unlikely to voluntarily provide such information on a product level. Importantly, the impact of a mandatory CO<sub>2</sub>e label will be affected by the way it is presented (label complexity and position). The results from this study highlight the potential that climate impact information has as a measure for transitioning towards food consumption that results in lower carbon emissions, and emphasize that if a label is difficult to avoid, the effects are likely to be considerably larger.

This study contributes with insight into motivations behind the avoidance of climate impact information and how these motivations affect a person's actions when information is provided. The study demonstrates that, when positive beliefs and preferences towards carbon-heavy consumption are combined with climate concerns, carbon emissions information results in greater uncertainty in choice behaviour. Similarly, responsibility feelings and norms that move a person to transition to climate-friendly consumption result in increased choice uncertainty when exposed to climate impact information. Our findings imply that the impact from climate information hinges on consumers underlying motivations. For greater behavioural changes from information measures such as labels, it is promising to focus on activating moral obligations and responsibility feelings. An interesting way forward would be to explore interventions that, in combination with information provision, evoke responsibility feelings, possibly through evoking pride or guilt (Vermeir et al., 2020). In addition, increased cognitive dissonance has the potential to increase behavioural change, possibly by emphasizing the discrepancy between the problem (large climate impact from certain food products) and one's personal actions.

### CRedit authorship contribution statement

**Anna Kristina Edenbrandt:** Conceptualization, Formal analysis, Investigation, Writing - original draft, Funding acquisition. **Carl Johan Lagerkvist:** Conceptualization, Methodology, Writing - review & editing. **Jonas Nordström:** Conceptualization, Methodology, Writing - review & editing.

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## Section A1. Design for increased incentive compatibility

We tested the following design: the probability of receiving information was lower if respondents declined access to the information. We explained that, for 50% of participants, the information would be presented only if they had requested it, and for the other 50%, there was a lottery that decided if they received climate information or not. This design is indeed more incentive-compatible, but we are concerned with the quality of such data. We tested such an incentive-compatible design in focus groups (explained in page 10 of the manuscript), but participants found such probability descriptions difficult to understand, and even after more comprehensive explanation was provided, the incentive-compatibility mechanism was largely misunderstood. We concluded that having such a feature in the survey instrument would likely provide misleading results, and for this reason, we decided on a more simple design. Similar design has been used in other research on information avoidance (Woolley and Risen, 2018) (see Tables A2-A4).

**Table A2**  
Logit-model where Problem awareness is excluded.

	Coef.	z
Male	<b>0.39</b>	2.04
Age category (reference level: 35–49)		
<24	0.09	0.19
25–34	–0.26	–0.95
50–74	–0.37	–1.72
75–	–0.40	–0.97
Region (reference level: Middle region)		
Northern region	–0.36	–1.51
Southern region	0.26	1.33
CD	<b>0.38</b>	4.19
R&N	<b>0.86</b>	6.57
NEP	<b>0.34</b>	2.27
Meat eating frequency		
<1 time/week		
2–3/week	–0.04	–0.18
4 or more/week	–0.28	–1.08
Problem Awareness		
Constant	<b>–4.28</b>	–6.93
N	803	
LL	–408.48	
Pseudo R2	0.20	

Note: CD = cognitive dissonance, R&N = responsibility feelings and norms.

**Table A3**

	CD		R&N		Problem Awareness	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Male	–0.40	–5.02	–0.47	–7.14	–0.39	–4.60
Age category						
<24	0.12	0.59	–0.13	–0.74	0.96	4.43
25–34	0.17	1.49	–0.09	–0.95	0.23	1.89
35–49 reference level	0		0		0	
50–74	–0.24	–2.56	–0.13	–1.71	–0.29	–2.92
75–	–0.45	–2.47	0.04	0.24	–0.41	–2.15
Region						
Middle region (ref.)	0		0		0	
Northern region	–0.03	–0.27	0.11	1.26	0.06	0.48
Southern region	0.05	0.60	–0.01	–0.12	0.05	0.57
Constant	2.29	23.19	4.05	49.58	3.54	33.95
R <sup>2</sup> adjusted	0.07		0.06		0.10	
F-statistic	9.52		8.83		13.68	
N	803		803		803	

Note: CD = cognitive dissonance, R&N = responsibility feelings and norms.

Estimated all of these with educ too, where educ was insign for all.

**Table A4**

	Info-demanders	Info-decliners	Difference
Don't trust that the climate information is correct	27.2	48.3	**
Not caused by humans	2.1	8.6	**
Reducing climate impact not my personal responsibility	7.5	16.9	**
Climate info makes me feel bad	13.3	10.9	–
I already know much about climate impact from food	24.6	21.4	–
I do not know how to interpret the climate info	26.1	26.2	–
I want to use climate info	55.6	7.1	**

\*\* p-value < 0,001.

Section A2. Differences in preferences between info-decliners and info-takers

We investigate whether info-decliners and info-takers have different preferences for the products in the experiment. The results for the control tasks (without climate impact information) are presented in Table 2, where the relative size of the standard deviation to the mean reveals the degree of heterogeneity in preferences. As a point of reference, a main effects model with all respondents is presented. All else equal, participants on average prefer organic products over conventional, and they are more likely to choose lower-priced products. The negative opt-out parameter implies that respondents prefer to choose a product over not selecting any. The statistically significant standard deviation for the error component implies that the error variance, and hence the decision process, differs between experimentally generated products compared to the opt-out alternative, something that has been found in previous studies (Scarpa et al., 2013).

Mixed logit models for control sample

Variable	All respondents				All respondents info-demander effects			
	Coef.	t-ratio	S.d	t-ratio	Coef.	t-ratio	S.d	t-ratio
Status quo	-3.36	-11.48			-3.44	-9.05		
Beef	2.62	16.51	1.68	8.42	3.29	11.53	1.70	8.38
Beef & pork	1.74	13.39	0.84	3.51	2.10	10.06	0.82	3.40
Pork	0.00				0.00			
Chicken	-0.48	-2.26	2.43	11.06	-1.22	-3.82	2.44	10.18
Beef & beans	0.48	3.67	2.03	12.73	-0.35	-1.66	1.94	12.38
Meat substitute	-12.11	-3.52	13.63	5.15	-23.54	-3.78	14.77	4.13
Organic	0.36	4.80	0.74	5.51	0.24	1.97	0.79	6.55
Log (Price) <sup>a</sup>	-3.30	-35.16	0.76	6.62	-3.20	-23.42	0.70	9.02
Mean price/S.d price	-0.05		0.04		-0.04		0.04	
S.d for err. comp.			2.97	8.44			3.02	9.78
Shifters for info-takers								
Beef					-0.98	-3.01		
Beef & pork					-0.52	-2.09		
Pork					0.00			
Chicken					1.05	3.10		
Beef & beans					1.27	5.24		
Meat substitute					13.50	4.01		
Status quo					0.02	0.06		
Organic					0.14	0.93		
Price					0.01	0.89		
# individuals	803				803			
# observations	3212				3212			
LL	-4124.4				-4055.9			
BIC	8378.0				8305.6			

<sup>a</sup> Price takes a negative lognormal distribution. The estimated parameter is  $\log(\beta_{price})$ . The  $mean_{price} = \exp(\beta_{price} + (s^2_{price}/2))$  and  $S.d_{price} = mean_{price} * (\exp(s^2_{price}) - 1)^{1/2}$

There are relatively homogenous preferences for *beef* and *beef & pork* compared to *pork*. In contrast, preferences for *chicken*, *beef & beans* and *meat substitute* are heterogeneous. For example, while the mean estimate for *chicken* compared to *pork* is negative, the large standard deviation relative to the mean implies that 42% of respondents prefer chicken over pork. In the second model, all mean coefficients are interacted with the wish to access climate impact information (info-takers). This reveals that only the estimates associated with the meat types are statistically significantly different between the info-takers and info-decliners (see Tables A5a-A6b).

Table A5a  
MNL model with Treatment- and CD interactions.

	Coef.	t-ratio	Treatment effect		CD-effect		Treatment* CD-effect	
			Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
<b>Product type</b>								
Beef	2.07	15.41	-0.21	-1.16	-0.18	-3.31	-0.42	-5.11
Beef & pork	1.59	12.17	-0.54	-3.06	-0.26	-4.49	-0.08	-1.02
Pork	0		0		0		0	
Chicken	-0.32	-2.04	0.06	0.30	0.22	3.44	0.05	0.64
Beef & beans	-0.13	-1.11	-0.59	-3.30	0.33	6.62	-0.20	-2.61
Meat substitute	-1.39	-6.12	-0.12	-0.42	0.67	8.20	0.10	0.94
<b>Opt-out</b>								
Opt-out	-1.12	-19.91						
<b>Product attributes</b>								
Organic	0.13	3.24						
Price	-0.02	-15.16						
# Observations	32 085							
# Individuals	803							
LL	-9321.4							

**Table A5b**

MNL model with Treatment- and Responsibility &amp; Norms (RN) interactions.

	Coef.	t-ratio	Treatment effect		RN-effect		Treatment* RN-effect	
			Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
<b>Product type</b>								
Beef	2.27	8.69	0.67	1.83	-0.15	-2.21	-0.44	-4.56
Beef & pork	1.88	7.56	0.29	0.84	-0.21	-3.26	-0.27	-2.91
Pork								
Chicken	-0.64	-2.12	0.08	0.20	0.21	2.69	0.02	0.25
Beef & beans	-1.26	-5.01	0.20	0.52	0.47	7.50	-0.32	-3.30
Meat substitute	-4.45	-8.46	0.66	0.98	1.14	9.36	-0.13	-0.82
<b>Opt-out</b>								
Opt-out	-1.13	-20.05						
<b>Product attributes</b>								
Organic	0.14	3.32						
Price	-0.02	-15.35						
# Observations	32,085							
# Individuals	803							
LL	-9341.7							

**Table A6a**

MNL model with Treatment- and CD interactions, Info-decliners.

	Coef.	t-ratio	Treatment effect		CD-effect		Treatment* CD-effect	
			Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
<b>Product type</b>								
Beef	2.30	11.19	-0.32	-1.23	-0.02	-8.57	-0.11	-0.79
Beef & pork	1.79	9.52	-0.45	-1.82	-0.23	-2.34	0.09	0.64
Pork	0		0		0		0	
Chicken	-0.51	-2.05	0.23	0.73	-0.38	-3.91	0.14	0.88
Beef & beans	-0.13	-0.72	-0.57	-2.12	0.02	0.14	0.07	0.52
Meat substitute	-3.18	-4.70	-0.67	-0.69	0.07	0.72	0.32	0.89
<b>Opt-out</b>								
Opt-out	-1.16	-12.01						
<b>Product attributes</b>								
Organic	-0.05	-0.78						
Price	-0.02	-8.57						
# Observations	10,660							
# Individuals	267							
LL	-2817.8							

**Table A6b**

MNL model with Treatment- and Responsibility &amp; Norms (RN) interactions, Info-decliners.

	Coef.	t-ratio	Treatment effect		RN-effect		Treatment* RN-effect	
			Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
<b>Product type</b>								
Beef	1.42	3.58	0.24	0.45	0.17	1.43	-0.23	-1.38
Beef & pork	1.07	3.03	0.12	0.23	0.05	0.48	-0.14	-0.94
Pork								
Chicken	-0.35	-0.74	-1.05	-1.64	-0.04	-0.29	0.46	2.39
Beef & beans	-0.98	-2.54	-1.02	-1.72	0.30	2.60	0.17	0.97
Meat substitute	-4.16	-3.14	0.07	0.04	0.70	1.96	0.01	0.03
<b>Opt-out</b>								
Opt-out	-1.16	-12.05						
<b>Product attributes</b>								
Organic	-0.05	-0.71						
Price	-0.02	-8.64						
# Observations	10,660							
# Individuals	267							
LL	-2837.3							

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