



A question of taste: Recognising the role of latent preferences and attitudes in analysing food choices



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ABSTRACT

There has long been substantial interest in understanding consumer food choices, where a key complexity in this context is the potentially large amount of heterogeneity in tastes across individual consumers, as well as the role of underlying attitudes towards food and cooking. The present paper underlines that both tastes and attitudes are unobserved, and makes the case for a latent variable treatment of these components. Using empirical data collected in Northern Ireland as part of a wider study to elicit intra-household trade-offs between home-cooked meal options, we show how these latent sensitivities and attitudes drive both the choice behaviour as well as the answers to supplementary questions. We find significant heterogeneity across respondents in these underlying factors and show how incorporating them in our models leads to important insights into preferences.

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1. Introduction

There has long been interest in better understanding consumers' food choices, with a focus on people's motivations, preferences and habits. Recently, particular emphasis has been put on eating habits within an obesity risk context.

Food choices are complex as well as frequent. In a recent study, Wansink and Sobal (2007) estimated that a person can make over 200 food and beverage related decisions every day. Asp (1999) in turn discusses in detail some of the factors which affect consumers when they are deciding what to eat, particularly cultural, psychological and lifestyle factors as well as food trends to name but a few. Work by Lennernäs et al. (1997) has highlighted the role of quality/freshness, price, taste, as well as family preferences and trying to eat healthily, while Drewnowski and Darmon (2005) consider the effects of taste, convenience and economic constraints on food choices. Lennernäs et al. (1997) also found that respondents in different socio-economic categories select different factors as contributing a large portion of influence on their food choices. The extent of heterogeneity in preferences is also highlighted in other work. For example, Logue and Smith (1986) indicate that women have higher preferences for low-calorie foods than men and Rappoport, Peters, Downey, McCann, and Huff-Corzine (1993) found that insofar as the health value of food was concerned, men had a much simpler

cognitive structure than women. Consumer information and market research companies are continually developing classification systems which aim to identify different consumer segments and consequently try to predict consumer behaviour (Asp, 1999). These systems make use of important lifestyle factors to describe how consumers make food decisions. With the exception of examples such as above, most food studies focus on a limited socio-geographic based population (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998; Jaeger & Meiselman, 2004; Marshall & Bell, 2004).

A large body of work has looked at respondent reported measures of importance of key attributes. For example, Glanz et al. (1998) examine the self-reported importance of taste, nutrition, cost, convenience, and weight control on personal dietary choices and whether these factors vary across demographic groups, are associated with lifestyle choices related to health, and actually predict eating behaviour. They found that the importance placed on taste, nutrition, cost, convenience, and weight control helped predict types of food consumed. A share of studies which have investigated adult preferences for a variety of foods have involved the respondent rating individual food items on either a nine, five or four point scale, wherein the studies reported the mean rating for each food item (see, for example Bell & Marshall, 2003; Drewnowski & Hann, 1999; Jaeger & Meiselman, 2004; Rappoport et al., 1993).

Whilst simple rating methods can provide rich information about specific food preferences, they do not examine food preference patterns which would help elicit more general food preferences. For example, a person's preference for one type of food

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could be a predictive indicator of that person's preference for another type of food (Logue & Smith, 1986). Across a number of fields, mathematical structures belonging to the family of random utility models have established themselves as the preferred method for the study of choice behaviour at the disaggregate level (Train, 2009). These models quantify the relative importance of the different attributes describing each alternative and are used across fields as diverse as transport, marketing and health economics. This study adds to a growing literature that has used these models to examine food choices and preferences for food attributes (see, for example Campbell & Doherty, 2013; Carlsson, Frykblom, & Lagerkvist, 2007; Hu, Hünemeyer, Veeman, Adamowicz, & Srivastava, 2004; Jaeger & Rose, 2008; Jaeger, Jørgensen, Aaslyng, & Bredie, 2008; Lusk & Briggeman, 2009; Ortega, Wang, Wu, & Olynk, 2011; Rigby, Balcombe, & Burton, 2009). More specifically, this paper contributes to the literature where these models have been used to investigate the link between food choice, diet and health (e.g., Balcombe, Fraser, & Di Falco, 2010; Gracia, Loureiro, & Nayga, 2009; Mueller Loose, Peschel, & Grebitus, 2013).

The present paper illustrates how advanced choice models can be used to obtain a better understanding of consumer food choices. In particular, we recognise, in line with previous work, that there exist significant differences in preferences across individual consumers. We hypothesise that while some of these differences can be linked to socio-demographic characteristics, others cannot. The standard modelling approach for such "unexplained" differences would be a model allowing for random taste heterogeneity. Any information about sensitivities¹ and differences in sensitivities would be inferred solely on the basis of the choices made by respondents. We use a more refined approach that allows us to make use of the supplementary information provided by respondents in ranking questions and attitudinal questions within a hybrid choice model making use of latent variables (e.g., Ben-Akiva et al., 2002; Ben-Akiva et al., 2002; Bolduc, Ben-Akiva, Walker, & Michaud, 2005). This gives us a better understanding of what drives food choices, and the differences in these drivers across the population.

The remainder of this paper is organised as follows. Section 2 presents an overview of the empirical data and methods used in this study. This is followed in Section 3 by a discussion of the results for both the base models and the latent variable models. Finally, a concluding discussion is presented in Section 4.

2. Material and methods

2.1. Survey work

Data were collected as part of a wider study to elicit intra-household trade-offs between home-cooked meal options. The respondents used for the survey formed a random sample of Northern Ireland households, and face-to-face interviews were used for preference elicitation.

Table 1 shows the socio-demographic characteristics of the respondents. Just over a third of the respondents were aged between 35 and 50, with the rest split evenly above and below these ages. The average income per week was £211, with 48% of the respondents in full-time employment. 10% had at least a degree level education.

2.1.1. Stated choice component

In the stated choice component of the survey, respondents were presented with the choice between three different meal options representing a typical evening meal that they would share with

their partner at home. After a qualitative stage, including consultation with experts and assisted interviews with respondents, we conducted a pilot study. Following this, we were able to select the following attributes to describe the meal options: calories, cooking time, food type and cost. Taste was not included as a direct variable in the choice tasks as it would be subject to *interpretation* by the respondent. Instead, "food type" was used as a proxy for taste. Three levels were used for each attribute, where the specific combinations presented in a given choice scenario were obtained from a D-efficient experimental design with Bayesian priors (Bliemer & Rose, 2010; Rose & Bliemer, 2009), produced using NGene (ChoiceMetrics, 2012). A D-efficient design was chosen so as to minimise the asymptotic variance covariance matrix. The final design contained 24 rows which were divided into 3 blocks of 8 choices, where each respondent was asked to complete 8 choice tasks. To ensure that any heterogeneity retrieved in both the parameter estimates as well as the variances of the error terms is not simply an artefact of the design of choice set scenarios (Arentze, Borgers, Timmermans, & DelMistro, 2003), we used orthogonal blocking, and randomly assigned people to blocks.

Table 2 shows the three levels used for the different attributes, where "Cost" represented the total cost for all of the ingredients needed to produce a typical evening meal, which would feed both the respondent and his or her partner. To allow respondents to better relate to the attribute levels for calories, cooking time and food type, they were provided with illustrative reference cards that showed what type of meal could be expected for given attribute combinations. We chose cost levels of £5, £10 and £15 pounds after conducting a pilot study; the large cost differences were found to be needed as respondents were reacting very strongly to the different levels of the other attributes, causing the cost attribute to become insignificant when smaller price differences were used.

In each choice task, respondents were asked to choose their most preferred option for a typical evening meal that they would share together with their partner at home, and which would be cooked at home. An example choice scenario is shown in Fig. 1. We decided against explicitly including a "no choice" option, but if a respondent could not decide, then this was recorded as a "Don't know" by the interviewer.² For the present study, we made use of responses from 584 individuals, giving 4672 observations in total.

2.1.2. Supplementary questions

In addition to completing the choice tasks, respondents were also asked to state their most preferred and least preferred level of each of the three non-cost attributes. A summary of the information obtained in this manner is shown in Fig. 2, where the first two columns in each subfigure show the responses to the questions eliciting the respondent's *most* preferred options, for females and males respectively, and the last two columns in each subfigure show the responses to the questions eliciting the respondent's *least* preferred options, for females and males respectively.

The results from this exercise are in line with expectations and the prior literature. We can see that for calories, 49% of the interviewed women prefer the medium calories range, with a total of 80% preferring fewer than 600 calories in their meal. Whilst this preference pattern is also shown by male respondents, the level of uncertainty ("Don't know") is increased, especially for the least preferred calorie level. With regards to cooking time, medium

² We acknowledge this potential limitation within the data (Olsen & Swait, 1997), but this approach was taken as the sample size was quite small and we did not want to reduce the data further by encouraging "Don't know" responses. However, although respondents were not told upfront that they could state "Don't know", if they did so, it was recorded. Further, if the respondent stated "Don't know" at any point in the questionnaire and it was recorded down then they would know that it was safe to say "Don't know", meaning that only the first instance of "Don't know" could be subject to any bias.

¹ We have chosen to use the term 'sensitivities' here, as we felt it more appropriate in this specific context, as the more commonly used term 'preferences' can be seen to relate to alternatives, not just attributes.

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