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Disentangling the influence of knowledge on attribute non-attendance

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ABSTRACT

We seek to disentangle the effect of knowledge about an environmental good on respondents' propensity to ignore one or more attributes on the choice cards in a discrete choice experiment eliciting people's preferences for increased protection of cold-water corals in Norway. We hypothesize that a respondent's level of knowledge influences the degree to which she ignores attributes. Respondents participated in a quiz on cold-water coral prior to the valuation task and we use the result of the quiz as an *ex-ante* measure of their knowledge. Our results suggests that a high level of knowledge, measured by a high quiz score, is associated with higher probabilities of attendance to the three non-cost attributes, although this effect is only significant for one of them. A higher quiz score is also associated with a significantly lower probability of attending to the cost attribute. Furthermore, although being told your score has mixed directional effects on attribute non-attendance, it does not significantly affect the probability of attending to any of the attributes. Finally, allowing for attribute non-attendance leads to substantially lower conditional willingness-to-pay estimates. This highlights the importance of measuring how much people know about the goods over which they are choosing, and underlines that more research is needed to understand how information influences the degree to which respondents ignore attributes.

1. Introduction

In environmental economics, it is common to use stated preference methods to elicit people's preferences for environmental goods. For some such goods, scientific knowledge is limited and public awareness is low. This lack of familiarity poses a problem for the use of stated preference in cost-benefit analysis of public policy choice, since it implies making policy recommendation based on the preferences of "uninformed" respondents. For goods such as biodiversity conservation, it is therefore necessary to provide information about the relevant aspects of the environmental good prior to the valuation task, and do so in a manner that is meaningful to respondents (Álvarez-Farizo and Hanley, 2006; Macmillan et al., 2006). In the following, we make a distinction between exogenous information leading to objective knowledge, e.g. provided by the survey instrument, and endogenous information leading to subjective knowledge, e.g. gained through experience (Cameron and Englin, 1997). Information from both sources determines a respondent's knowledge about the environmental good.

We use data from a discrete choice experiment eliciting people's preferences for increased protection of cold-water coral off the coast of Norway (Aanesen et al., 2015). Most cold-water corals are found between 200 and 400 m below the surface, and are

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considered biodiversity hot spots in the deep sea and unique habitats for a number of species (Hovland and Mortensen, 1999; Husebø et al., 2002; Freiwald et al., 2004). Although research on the ecosystem functions of cold-water corals is still limited, some research suggests that they may have important nursery and refuge functions for some species of groundfish (Stone, 2006; Edinger et al., 2007). However, despite their apparent beneficial ecosystem services, their condition worldwide is threatened by deep sea trawling, oil and gas exploration, and deep water mining (Fosså et al., 2002; Freiwald et al., 2004). As cold water corals are unfamiliar to most people and direct experience with them is unlikely (since they are found below the depths which people normally dive to), we consider a respondent's knowledge about this environmental good is mainly acquired through exogenous information provided in the course of the stated preference survey. Unfamiliarity with cold water corals is also the reason why the data used here was gathered in a series of valuation workshops (Alvarez-Farizo et al., 2007; Macmillan et al., 2002; Aanesen et al., 2015). In each workshop, the respondents received an initial presentation about cold-water coral immediately followed by a quiz over the material covered. We explore the link between the answers respondents gave to the quiz, yielding a measure of their knowledge, and their likelihood of ignoring one or more attributes on the choice cards. As such, we investigate the connection between three important strands of the choice modeling literature.

The first concerns the effects of information and experience on stated preferences, an issue that has been of interest to practitioners since the first applications of contingent valuation to environmental goods. Early contributions to this literature are summarized in Munro and Hanley (2001). For example, Cameron and Englin (1997) found that experience with fishing significantly increased willingness-to-pay (WTP) for a doubling of the trout abundance in the North East United States. Carlsson and Martinsson (2006) found that respondents who were directly affected by a power-outage following a hurricane in Sweden were significantly more likely to state a positive WTP, but they found no difference in WTP between affected and non-affected respondents conditional on stating a positive WTP. Recent studies have connected information and experience to how deterministic the choice process appears from an econometrician's perspective. For example, Czajkowski et al. (2014a) find, in a stated preference study on biodiversity conservation management of Red Grouse in the UK uplands, that respondents receiving more complete and positive information have a more deterministic choice process, as seen from a practitioner's perspective, but they observe only minor differences in WTP. In another study on the willingness-to-pay for beach water quality improvement among recreational beach users, Czajkowski et al. (2014b) find that as experience increase, preferences become more deterministic from a practitioners point of view, where experience is measured as number of days visiting the beach per year.

The second relevant strand of literature concerns the way in which respondents make choices under complexity, and the extent to which they fall back on heuristics. The more cognitive effort that is required on part of the respondent to complete a discrete choice experiment, the more likely it is that he or she will use a simplifying strategy or heuristic. The effort required by a respondent is increasing in choice task complexity, as measured for example by the number of attributes, levels, alternatives, or tasks (Caussade et al., 2005; Blamey et al., 2002). The focus of this paper is on one specific heuristic, which consists of simply ignoring one or more of the attributes when choosing between alternatives in the choice task, a behavior known as attribute non-attendance (see e.g. Alemu et al., 2013; Campbell et al., 2011; Carlsson et al., 2010; Scarpa et al., 2009; Hensher et al., 2005). For example, Hensher (2006) finds evidence suggesting that the processing strategy adopted by a respondent is dependent on the nature of the information provided (its relevancy) and not strictly its quantity, where the amount of information is measured as the number of attributes associated with each choice set (p. 820). Kosenius (2013), in a discrete choice experiment on water quality in Finland, finds that geographic proximity to the water body, a rather inexact proxy for familiarity/knowledge of water quality issues, is related to lower levels of stated attribute non-attendance. Hoehn et al. (2010) shows that presenting alternatives and attributes as text makes comparison of alternatives more difficult compared to a tabular presentation, and that the former leads to larger variance estimates and greater use of heuristics, in particular attribute elimination.

A related stream of research highlights the role of experience on being predisposed to different cognitive biases. For example, more experienced traders in a market for sports memorabilia were less prone to the endowment effect and likely to engage in more trades relative to inexperienced traders (List, 2003, 2011). Similarly, Feng and Seasholes (2005) found that experienced stock traders are less likely to suffer from the disposition effect, which is a reluctance to realize losses and an eagerness to realize gains. In other words, keeping a losing stock too long and selling a winning one too quickly. Trader experience significantly reduced loss sensitivity, but had limited effect on gains. A study of NY cab drivers show that experienced drivers work more on days where the earning potential is higher and less on days when it is worse, suggesting that these drivers are less prone to the bias of fixed working hours (Camerer et al., 1997).

The third relevant strand of the literature is that concerned with the nature of the utility function and whether people are indeed willing to make trade-offs between all attributes which are used to describe their choices (Colombo et al., 2013). Several papers within the stated preference literature have considered the implications of lexicographic preferences, where individual refuse to accept any increase in one desirable attribute to compensate for a decrease in a second desirable attribute (Rekola, 2003). Or, individuals may only be willing to make trade-offs between a pair of desirable attributes within certain ranges of values for these attributes – the cut-offs model (Bush et al., 2009). If the individual is unwilling to accept trade-offs (if they have “non-compensatory” preferences), then this may manifest as an unwillingness to pay attention to these attributes.

To test our hypothesis that knowledge of the good is linked to attribute non-attendance, we implement a discrete and continuous mixture model. We classify respondents into low- and high-knowledge groups based on whether they scored below/above the mean quiz score, and include this variable in the probability functions of attending to the different attributes, i.e. as a covariate to explain membership to different latent classes. We also test for the effects of receiving an external signal about the extent of one's knowledge about the environmental good. Respondents were randomly assigned into a treatment group, where they were told their quiz score prior to filling in the choice cards, or a control group that was not told their score (La Riviere et al., 2014). The external signal