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1 **Desire, moral evaluation or sense of duty: the modal framing of stated**
2 **preference elicitation**

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8 **ABSTRACT**

9 Contingent valuation surveys generally elicit stated preferences by asking how much a
10 respondent would be willing to pay for an environmental improvement. By drawing on linguistic
11 theory, we propose that the modal phrasing of this question establishes a particular type of
12 commitment towards a hypothetical payment, namely a subjective want or desire. Based on
13 the idea that beyond subjective desires, considerations about what is morally adequate may
14 guide expressed values and that elicitation of these can be linguistically facilitated, we employ
15 an experimental framework to investigate the effects of different modals (*willing*, *should*, and
16 *appropriate*) in the elicitation question on stated preferences. We find that elicited amounts
17 with *appropriate* are higher than those elicited with *willing* and *should* for environmental
18 improvements more associated with *use* values, while differences are non-significant for
19 environmental improvements more associated with *non-use* values. We discuss the
20 implications of our findings for stated preference studies, as well as the potential broader
21 theoretical implications that our study entails regarding linguistic representations of the moral
22 entrenchment of environmental values.

23

24 **KEYWORDS**

25 Environmental economic valuation, contingent valuation, deontic values, linguistic modality,
26 language

27

28 **1 INTRODUCTION**

29 Economic environmental valuation is generally performed in order to produce values that
30 can be used for environmental policy-making, and, ideally, to improve environmental
31 protection (Hansjürgens et al., 2017). However, the topic is contentious, notably due to the
32 questionable capacity of economic valuation methods to capture the multitude of value
33 dimensions inherent to nature besides instrumental values, such as intrinsic, shared and
34 social values (Kallis et al., 2013; Vatn, 2000).

35 Classical contingent valuation method (CVM) studies represent the most widely used stated
36 preference methods for estimating economic values of non-market goods, such as
37 environmental goods and services (Carson, 2000; Hanemann, 1994). In these surveys
38 participants typically read a description of a good or service and a proposed intervention and
39 are then asked how much they would be willing to pay for an environmental improvement
40 (willingness-to-pay, WTP) or how much they would ask in compensation for an environmental
41 degradation (willingness-to-accept, WTA). The stated amounts are taken as proxies for
42 individual economic preferences that can be aggregated to obtain the total public valuation for
43 a given good or service. The underlying definition of economic preferences is in the
44 neoclassical tradition, i.e. preferences are seen as choices that maximise the satisfaction of
45 subjective wants and desires (von Neumann and Morgenstern, 1944).

46 Stated preference studies constitute value articulating institutions (VAI) (Farrell, 2007;
47 Jacobs, 1994; Vatn, 2005). VAI define a set of rules concerning the valuation process, which
48 do not only reveal, but also heavily influence the results of a valuation process, through the
49 types of values that are elicited (monetary values, preference rankings or weights,...), and the

50 content and form of the information given about the environmental issue at stake. Restricting
51 environmental VAI to wants and desires expressed in WTP may not be reflective of the
52 multitude of values associated with environmental public goods and services, which include
53 broader moral and society-oriented considerations (Gómez-Baggethun and Ruiz-Pérez, 2011;
54 Sen, 1995; Vatn and Bromley, 1994).

55 The different understandings of economic value articulations have been analysed in
56 the context of the WTP/WTA gap (Kahneman et al., 1990), a phenomenon in which WTA
57 structurally exceeds WTP for the same goods or services, even when income effects are
58 compensated for. Kahneman et al. (1990) attributed the WTP/WTA gap to the endowment
59 effect, referring to the observation that people value things more once they own them, which
60 in turn is based on loss aversion. In their experimental investigation, the endowment effect
61 was instantaneously detectable for consumption goods that were handed out and described
62 as belonging to participants, but not for tokens with merely induced financial value, a finding
63 which highlights the importance of both the goods' properties and the structural context of
64 valuation for preference construction.

65 This interpretation was supplemented by Hart and Latacz-Lohmann (2001) with regard
66 to economic environmental valuation, who argued that the WTP/WTA gap may be indicative
67 of a feeling of moral responsibility towards a valued entity and towards others who value it.

68 Sagoff (1988; 1998) underlined the distinction between consumer and citizen
69 preferences: Consumer preferences refer to what the individual thinks is good for them in
70 terms of the satisfaction of personal, individual-level desires. This notion of preferences thus
71 corresponds to the mainstream idea of economic preferences, which is derived from a
72 utilitarian conception of rational choice. Citizen preferences, on the other hand, pertain to
73 considerations about fairness and justice, about people's own predicaments and those of
74 others – both now and in the future (Sen, 1995). The notion of citizen preferences is derived

75 from a deontological understanding of rational choice and thereby conceptually diverges from
76 the mainstream definition of economic preferences.

77 Massenberg et al. (2023) proposed a conceptual framework of how social values enter
78 economic environmental valuation, which consists of three spheres: social, natural and
79 contextual. The social sphere, in their understanding, comprises social factors that influence
80 the valuing individual(s) independently of the concrete valuation exercise, such as
81 transcendental values, beliefs, dispositions, and cultural aspects. The natural sphere relates
82 to the valued ecosystem and its intrinsic value, defined as a weak anthropocentric intrinsic
83 value, meaning valuing an entity for itself, in a non-instrumental way, albeit inevitably from a
84 human perspective. The social and natural spheres are linked by human-nature relationships
85 and a sense of connectedness, which are all highly heterogeneous among different groups
86 and individuals. The contextual sphere, finally, contains the valuation context which defines a
87 set of rules based on specific ontology and epistemology. Notably, the valuation context leads
88 from abstract values to concrete (economic) value articulations. Massenberg et al. (2023)
89 highlighted the role of information for the likelihood of considering specific aspects of the
90 natural and social spheres, alluding to the possibility that tweaks in the descriptions of
91 environmental goods and services can give indications as to which value dimensions are
92 deemed relevant in a given valuation context.

93 The idea of linguistic correspondents of preferences regarding different value
94 dimensions was introduced by Sagoff (1998, p. 214-215), who contended that "[w]hile the
95 words 'I want' are likely to introduce a consumer preference, a statement that begins with
96 'society should...' is likely to express a citizen preference". Influences of linguistic features on
97 consumer behaviour have also been examined in the field of marketing research, where
98 structural features of language as well as lexical-semantic features have been shown to affect
99 preferences (Zhang et al., 2003; Zhang and Schmitt, 1998). We take Sagoff's proposed link
100 between linguistic representations of different preference orderings and the empirical findings

101 from marketing research as a conceptual basis, which we aim to refine by focusing on specific
102 modal structures to assess economic environmental values.

103 The notion of linguistically accessed preferences is highly pertinent in the context of
104 stated preference methods, as they strongly rely on the verbal construction of counterfactual
105 markets: To account for the hypothetical nature of the payment, it is necessary to make use
106 of linguistic terms that prompt participants to take a specific stance towards it.

107 The most common elicitation question in CVM studies roughly has the following
108 structure: *What is the maximum amount you would be willing to pay (for the proposed*
109 *intervention)?* The specific stance that the participant is asked to take towards the payment is
110 here indicated by the phrase *would be willing*. This phrase is what linguists call a modal
111 (Kratzer 1981, Portner 2009, Giannakidou and Mari 2021), because it refers to a hypothetical
112 situation. In this case, the modal expresses a want or desire, as indicated by *willing*.

113 In this study, we experimentally investigate the effect of different linguistic modals on
114 stated preferences. In particular, we ask not only what people would be *willing* to pay, but also
115 what they think they *should* pay and what they think is *appropriate* to pay for environmental
116 interventions. This allows us to isolate the influence of different types of modals on stated
117 preferences, which, to our knowledge, has not yet been done. Our aim is to contribute to the
118 debate on the expression of concepts underlying economic environmental valuation that has
119 been ongoing for many years. Arias-Arévalo et al. (2018) linked metaphors used for describing
120 human-nature relationships to different value dimensions. The expression “gaining from
121 nature” is taken to relate to the view that human welfare and economic productivity depend on
122 the benefits derived from ecosystems, and therefore to the instrumental value domain.
123 Conversely, the metaphor “living for nature” is associated with the intrinsic value domain, here
124 defined as the value that ecosystems have in and of themselves. “Living in nature”, finally, is
125 linked to two value domains: fundamental and eudaimonistic values. The fundamental value
126 domain encompasses all systems of relations and processes that are necessary to sustain life

127 in general. Eudaimonistic values relate to entities and processes that are conditions for “a
128 good human life”, yet not driven by merely self-interested preferences, but extend to notions
129 of what is considered meaningful, including altruism and environmental justice. How people
130 think and talk about nature is thus indicative of the values ascribed to it. Instead of employing
131 different metaphors or using different kinds of information to describe environmental goods
132 and services, our experimental investigation is focused only on the elicitation question of a
133 stated preference study. This is a highly restricted approach to accessing the plurality of
134 environmental values, as we remain in a stated preference framework eliciting individual
135 monetary values, and do not present different kinds of information or different metaphors to
136 describe the scenarios. This differentiates our approach from a number of studies in which
137 alternatives to WTP have already been applied, notably in the domain of what has become
138 known as "deliberative monetary valuation" (DMV) (Spash, 2007). This methodology emerged
139 following the conceptualization of environmental preferences as more inclusive than the
140 traditional consumer view and as a response to calls for the democratisation of valuation
141 processes (Kenter, et al., 2016a; Niemeyer and Spash, 2001; Pelletier et al., 1999; Sagoff,
142 1998). In contrast to traditional stated preference methods, these studies feature deliberative
143 activities. Group discussions and learning sessions are often part of these activities (Álvarez-
144 Farizo et al., 2009; Lienhoop and Völker, 2016). To account for the community-based nature
145 of the economic values they aim to elicit, some DMV studies employ alternatives to the
146 standard WTP elicitation question. For example, they ask for a "fair price" to pay for an
147 environmental good or service (Szabó, 2011; Kenter, 2016). However, the alternative
148 elicitation questions are implemented along with deliberative activities, and so their effects are
149 likely confounded with the effects of deliberation. The relationship between WTP and *fair*
150 *prices* is not unequivocal. Szabó (2011) observed higher elicited amounts for group-
151 deliberated fair prices than for individual WTP, in contrast to Kenter (2016) and Kenter et al.
152 (2016b), who measured lower deliberated fair prices than non-deliberated individual WTP.
153 Concepts like *fair price*, how much one should pay and what would be appropriate to pay tend
154 to be used interchangeably in these studies. For example, Szabó (2011) asked the participants

155 in his study which amount they would find "acceptable/approvable", and later referred to their
156 answers as "fair price", or "how much society [should] pay".

157 By contrast, in this study we concentrate on the effect of the subtle differences between
158 linguistic modals on stated preferences, which constitutes a focused way to access different
159 moral conceptions and evaluative tendencies underlying stated preferences. The study might
160 then bear potential broader implications and help understand how deontic and other morally-
161 based values are entertained by the participants during CVM experiments depending on the
162 linguistic format of the elicitation format they face. By contrasting linguistic, and in particular
163 modal formats of the elicitation mechanism, we take a very minimalistic approach, which could
164 be seen as a "lower bound" for the expression of different values related to the environment,
165 i.e. values that may not correspond (only) to the definition of consumer preferences, but that
166 can also be based on deontological ethics, considerations of justice and norms. Those kinds
167 of value motivations have been recognized as being integral to environmental values, as
168 discussed above (Arias-Arévalo et al., 2018; Hart and Latacz-Lohmann, 2001; Massenberg et
169 al., 2023; Sagoff, 1988; 1998). We assume that if a small change in linguistic modals used in
170 establishing practical commitments (as defined below) can lead to differentiated stated
171 preferences, even when measured only on a monetary scale, then this is indicative of the
172 richness of environmental values, which too linguistically rigid experimental standards in
173 traditional CVM studies may conceal or flatten out. The paper thus contributes to advancing
174 the understanding of how values, manifested in linguistic expressions, are articulated with
175 preferences and how preferences vary according to the nature of the value that the linguistic
176 expression conveys.

177 The rest of this paper is organised as follows: In section 2 we review literature on the
178 concepts relevant for our study, based on which we formulate our hypotheses in section 3.
179 Section 4 lays out our experimental design and the results. We discuss the results and their
180 practical and, especially, theoretical implications, as well as the limits imposed by our
181 experimental design, and conclude in section 5.

182 **2** **CONCEPTS**

183 2.1 *Preferences, attitudes and practical commitments*

184 CVM was developed to measure economic preferences, meaning how much people would
185 actually pay to "buy" the environmental good or service in question. This classical view was
186 termed by Kahneman et al. (1993) the "purchase model"; CVM respondents are assumed to
187 be able to perform an evaluation of their utility levels in a state of the world where the good is
188 provided, as well as in a state of the world where it is not provided and assign a monetary
189 value to the difference in utility. This view has been challenged for a long time and the analysis
190 of stated preferences has notably been enriched with insights from psychology and philosophy
191 (Gregory, Lichtenstein, and Slovic, 1993; Sagoff, 1988; Sen, 1995). It is clear today that stated
192 preferences are not unidimensional, and that they have the potential to be influenced by many
193 factors, such as the level of information that is provided, the valuation context and social
194 interactions. What stated preferences truly represent is still not without controversy. In the
195 *Review on the economics of biodiversity* (Dasgupta, 2021), CVM estimates were referred to
196 as "opinions", a notion which is not further defined. However, it seems to be interpreted as an
197 epistemic concept, since Dasgupta (2021) went on to argue that opinions which are not
198 sufficiently informed about the valuation object should not be used for valuation.

199 The much-voiced criticism of CVM that stated preferences often rest on an insufficient
200 information base has been one of the driving forces behind the recent development of
201 deliberative monetary valuation (DMV) (Bunse et al., 2015; Spash, 2007; Zografos and
202 Howarth, 2008). Studies that apply this methodology include elements of discussion and
203 deliberation among participants and often allow for exchange between participants and
204 experts on the topic. Deliberation is supposed to fulfil two main functions: First, to allow for
205 preferences to be constructed, since they might not be pre-existing (especially for unfamiliar
206 goods and services) and second, to prompt participants to adopt a less self-centred
207 perspective through the exchange with others. In some of these studies, the latter is reinforced

208 by using alternative economic value elicitation questions, such as "What do you think is the
209 maximum increase in the price [...] that is acceptable?" (Szabó, 2011, p. 40), labelling this a
210 fair price, or how much an average individual should pay for the good. In a study by Kenter
211 (2016) a group-based fair price is elicited in addition to individual WTP in order to shift the
212 conceptualization of payments from a purchase model to a public policy model, based on the
213 considerations of the linguistic correspondents of citizen preferences (Sagoff, 1998). Kenter
214 (2016) highlighted, however, that a firm theoretical and empirical basis is still missing for the
215 fair price concept. By employing an approach anchored in linguistic theory, we hope to
216 facilitate understanding of language independently of deliberative processes, i.e. to identify
217 the capacity of different modals to access values that may transcend consumer preferences.
218 By doing so, our goal is not to propose an alternative way to formulate those questions, but to
219 demonstrate that we may reveal underlying moral stances indicative of the heterogeneity of
220 environmental values. Our driving assumption, then, is that a linguistic format for a preference
221 elicitation mechanism actually reveals a moral attitude, assimilable to a practical commitment
222 which can eventually expressed through a hypothetical payment or other environmental value
223 indicators. Below we outline the ongoing debate on how stated preferences should be
224 interpreted, and notably how they relate to attitudes. We then go on to explain the
225 understanding of attitudes that underlies the design of our study.

226 A branch of literature that investigates the motives for stated WTP of laypeople was
227 established by Kahneman et al. (1993); Kahneman and Ritov (1994) and Kahneman et al.
228 (1999). They proposed that stated WTP estimates are better understood as an expression of
229 attitudes than as economic preferences, with attitudes being defined as "an evaluative
230 tendency, which can be favourable or unfavourable" based on Eagly and Chaiken (1993). This
231 was justified by the observation that WTP measures were strongly correlated with elicited
232 attitudes towards briefly described environmental and public health interventions (Kahneman
233 and Ritov, 1994). One group of participants to the study was asked to state their WTP and
234 another group was asked to state their attitudes, measured on Likert scales in three domains,

235 with one question respectively: support for government intervention, satisfaction derived from
236 contribution, and an importance rating of the issue. The strong correlations between monetary
237 amounts and attitude measures were taken as an indication that WTP is actually an
238 expression of attitudes that is forced onto a monetary scale.

239 Ryan and Spash (2011) extended this idea in a WTP study for environmental
240 interventions. In their study, attitudes were defined in line with Kahneman and Ritov (1994). In
241 contrast, they were not measured with a single item, but with psychometric scales featuring
242 several items. Attitude items included for example how good or bad the proposed intervention
243 was perceived to be and how effective it was. In addition to attitudes, Ryan and Spash (2011)
244 included measures for subjective norms and perceived behavioural control in the framework
245 of the theory of planned behaviour. These were also measured on multi-item psychometric
246 scales. The authors found that all of the psychometric scales, attitudinal and non-attitudinal
247 ones, predicted whether participants stated a positive WTP amount. From this, they postulate
248 that what underlies WTP is a complex process of psychological apprehension which is not
249 only, but also driven by attitudes.

250 In the present study we also pursue an attitudinal approach to stated preferences, but
251 we define attitudes more narrowly as propositional attitudes (Schwitzgebel, 2019), referring to
252 the mental state of having some stance, take or opinion about a proposition or about the
253 potential state of affairs in which that proposition is true. The following sentence can be taken
254 as an example of this understanding of attitudes:

255 (1) Ahmed (the subject) hopes (the attitude) that Alpha Centauri hosts
256 intelligent life (the proposition).

257 This focused approach allows us to have more control over the attitudes we are testing than
258 do Kahneman and Ritov (1994) and Ryan and Spash (2011). While they investigated the
259 correlation between attitudes and stated WTP, we focus on the effect of different propositional
260 attitudes (*willing, should, appropriate*) on hypothetical payments (HP), based on the idea of

261 the survey as a value articulating institution which mediates the form of the elicited values
262 through its own structure (Farrell, 2007).

263 We will use the expression *hypothetical payment* rather than *willingness to pay* to be able to
264 refer to all of the elicited economic values. This reflects our approach of situating WTP in a
265 wider realm of modals and associated stances. To avoid confusion with different
266 understandings of attitudes and to underline the associated behavioural implications, we will
267 favour the term *practical commitment*, based on Bratman et al. (1987) and Bratman (2012), to
268 refer to the specific attitudes that we look at. Bratman suggests that people's practical
269 commitments are elements of stable plans of action which are usually grounded in practical
270 normative reasons. We will employ the term practical commitment in a slightly different
271 manner, namely as referring to the propositional attitudes, which are conveyed by a certain
272 modal (*should, appropriate and willing*, in our study), and that are related to an associated
273 action. The action to which the practical commitments in our experiment are related is the
274 hypothetical making of a payment. The modal lexically conveys norms and the attitudes or
275 practical commitments that the modals convey are stances towards hypothetical payments
276 grounded in the norms that are linguistically encoded. We manipulate the practical
277 commitments by linguistically manipulating the modals that encode these commitments, to
278 gain insights into how the assigned economic value is construed. In the next section, we will
279 spell out the basic linguistic theories of modality which underlie this approach.

280 2.2 *Linguistic expressions of practical commitments*

281 CVM questionnaires that directly aim to elicit a value (i.e. that are not designed as a
282 referendum) usually include a WTP elicitation question such as *What is the maximum amount*
283 *you would be willing to pay (for the proposed intervention)?*. This question features the
284 linguistic concept of modality. The notional category 'modality' and its linguistic reflex in modal
285 auxiliaries (*must/might/can/should ...*) refers to situations which need not be real (Portner,
286 2009, p. 1), typically in the realm of possibility and necessity. As an example, the sentence

287 (2) John must be sick.

288 is a modal sentence, because it does not imply that John is actually sick, but that based on
289 what the speaker knows about John, for example that he has been sneezing all day, they
290 believe that he is sick. With modals, truth cannot be evaluated objectively, as in *I am typing*
291 *this paper now*. This sentence is either true or false objectively, but, with modals, truth is
292 relative to non-actual or hypothetical possibilities (Portner, 2009, ch. 2).

293 Many different categories of modality have been identified by both logicians and
294 linguists (see Fitting and Mendelson, 1998, for the logic approaches and Portner, 2009, for an
295 overview of the linguistic approaches), but there is an agreement that these can be classified
296 into two main classes: 'non-root' modals for epistemic modals and 'root' modals for the large
297 category encompassing deontics and priority modals¹.

298 Epistemic modals (e.g. *must/might*), convey the speaker's epistemic stance towards
299 truthfulness of the state of affairs described in the modal sentence. In (2) the word *must*
300 conveys that, given the information that the speaker has, John is sick (Giannakidou and Mari
301 2016). Truth is thus relative to a body of information, and, for this reason it has been called
302 subjective (Giannakidou and Mari 2021). When using an epistemic modal, the speaker signals
303 that she only has partial information and that she cannot be fully committed to the truthfulness
304 of the state of affairs that is being described. If one utters 'It must be raining now' and not 'It
305 is raining now', it is because one is not entirely certain that it is raining, given the information
306 available in the context (one might have seen a wet umbrella, and this can only lead to the
307 hypothesis that it is raining but not to full knowledge that it is raining). With a bare assertion 'It
308 is raining', the speaker is fully committed to truth, but with an epistemic modal, it presents the
309 state of affairs in which it is raining as a possibility or a necessity, but not as an established

¹ The class of root modals also comprises ability modals, describing capacities of individuals as in *John can play the piano*.

310 fact (Giannakidou and Mari *ibid.*). In other terms, the state of affairs in which it is raining is
311 presented as non-actual.

312 In this study, we situate the modal expressions in the realm of root modals (e.g.
313 *should/must*), with a specific attention to deontic and priority modals.

314 Root modals (e.g. *must/should/ought*) are used to describe possibilities and
315 necessities that depend on some state of the world and not on the knowledge that an individual
316 has in a given context. Deontic and priority modals are subcategories of root modals. Deontic
317 modals convey notions of permission and obligation (see (3a) and discussion below) and
318 priority modals convey individuals' preferences (3b).

319 (3) a. You must pay the taxes every year.

320 b. I'd rather buy a new pair of shoes.

321 (3a) conveys that, given what the laws state, the taxes must be paid. The state of affairs
322 in which taxes are paid is relativized to a body of laws. Note that non-actuality is also the
323 hallmark of deontic modals. Indeed, the sentence is compatible with the fact that, in the actual
324 world, the one we live in, one might not pay the taxes and be in a situation of financial evasion.

325 In (3b), the modal 'would rather' describes a preference of the speaker, and the buying
326 of the shoes is relativized to the worlds in which the preferences of the speaker are satisfied.
327 Once again, at the time at which the preference is formed, the shoes have not been bought
328 yet, and the sentence describes a potentiality rather than an actuality.

329 If the hallmark of modals is non-actuality, then, the category modal encompasses
330 several grammatical categories beyond modal auxiliaries. It is today commonly accepted in
331 the linguistic literature (see Giannakidou and Mari, 2021, for an overview) that the empirical
332 spectrum of the notional category modal encompasses lexical expressions of propositional

333 attitudes (such as *want*, *believe*) and adjectives (such as *appropriate*) across both the root
334 and the epistemic domains (see Portner, 2009).

335 This extension to other grammatical categories leads to a revisitation of the strict
336 understanding of the notion of modality as pertaining to possibilities and necessities into a
337 broader view that conceives it as attitudes towards a possible state of affairs (as desired,
338 morally (un)suitable, epistemically conceivable, ...), in line with Giannakidou and Mari (2021).

339 In the question generally used in CV studies *What is the maximum amount you would*
340 *be willing to pay?*, modality is grammatically expressed through the use of the conditional
341 mood in *would be willing*, which refers to the hypothetical (non-actual) nature of the market for
342 the good or service in question.² The set of information which serves as the basis of evaluation
343 is called the "modal base" (Kratzer, 1991), and in our case it is the information given about the
344 environmental good and the hypothetical market (the same across our different elicitation
345 questions). In order to define the type of modal we are dealing with, we need another
346 parameter, which Kratzer (*ibid.*) called the "modal ordering source". This describes how the
347 possibility induced by the modal is realised. For example, in our *What is the maximum amount*
348 *you would be willing to pay?*, the modal ordering source is indicated by "willing": It is about a
349 will or desire, what linguists call "bouletics" (Palmer, 2001). The modality expressed by *willing*
350 is therefore deeply anchored in the subject and their individual goals.

351 In our experiment the different modal expressions take the role of practical
352 commitments towards the hypothetical payment with the respondent being the subject. In our
353 framework, the term practical commitment replaces the term "root modals" in a perspective
354 that emphasises the behavioural component of propositional attitudes and conveys that the
355 modal describes an attitude towards a possible action on the part of the speaker.

² The expression "hypothetical" as referring to a payment is ambiguous. Under a strict understanding, the payment is presented as hypothetical by the very fact of being syntactically embedded under the modal (as in *willing to pay*). Under a broader understanding, the payment is hypothetical, as in the experiments, subjects are not actually going to pay.

356 The gist of our study is to modify the modal expression typically used in stated
357 preference elicitation for contingent valuation to confront respondents with different practical
358 commitments towards the hypothetical payment. In addition to the "classical" bouletic, priority
359 modal question *What is the maximum amount you would be willing to pay?*, we therefore also
360 propose the elicitation questions *What is the maximum amount you think you should pay?* and
361 *What is the maximum amount you think is appropriate to pay?*, which possess particular
362 linguistic properties.

363 Since *should* and *appropriate* deal with how the world ought to be, both the questions
364 with *should* and *appropriate* can, *prima facie*, be classified in linguistic works in the realm of
365 deontic modality. However, there are important differences between the two. Traditionally,
366 deontic modality has been associated with permission and obligation (Kratzer, 2001;
367 Verstraete, 2005; Von Wright, 1951). In a redefinition of deontic modality, Nuyts et al. (2010)
368 said that it should cover only cases where the moral desirability of a state of affairs is evaluated
369 and under this definition, deontic modality does not involve granting a permission or imposing
370 an obligation. Examples of deontic modality from Nuyts (2008):

371 (3) a. The way you are behaving is intolerable for a civilised person.

372 b. This fund raising agency is a very laudable initiative.

373 In these examples, no permission is granted, nor is any obligation imposed. Rather, a speaker
374 evaluates the state of affairs against some ideal. For expressions of permission and obligation,
375 on the other hand, Nuyts et al. (2010) proposed the term "directive" meaning, which is
376 associated with a clear action plan.³ Example from Nuyts (2008):

³ A related idea was brought forward by Cariani, Kaufmann, and Kaufmann (2013) in their discussion of "deliberative modality", which they characterize as referring to "the thing to do" (Cariani et al., 2013, p. 225), an action-oriented proposition that depends on the agent's information state. Schroeder (2011) contrasts this deliberative modality that establishes a clear agent-action relationship with what he calls, similarly to Nuyts (2008), "evaluative", meaning a broadly normative claim.

377 (4) You may leave now. (permission)

378 For our question with *should*, both the deontic-evaluative as well as the directive-deliberative
379 reading are possible, depending on whether it is interpreted as being more associated with an
380 individual action plan or, inversely, with a general evaluation of an "ideal" behaviour.

381 With *appropriate*, we explicitly ask participants to perform an evaluation of the appropriateness
382 or normative acceptability of a state of affairs, thus labelling it clearly as an evaluative modal.
383 We do not engage here with whether moral norms pertaining to what is appropriate are
384 absolute or relative, nor are we committed to a set of moral value categories (see Vincent and
385 Koessler, 2019). In our experiments, we intend to investigate what stance speakers adopt with
386 respect to a specific situation of consideration, with reference to the character of which the
387 appropriateness of one or another behaviour is adjudicated.⁴

388 To conclude, based on the linguistic notions introduced above we define three
389 categories of practical commitments: evaluative (refers to our elicitation question with
390 *appropriate*), bouletic (*willing*) and normative (*should*). Note that we allow for ambiguity in the
391 interpretation of *should* as more evaluative or more directive.

392 2.3 Use and non-use value of environmental goods and services

393 With the linguistic base for the choice of the practical commitments in our experiment laid out,
394 we will now turn to our second experimental parameter. It concerns the type of environmental
395 good or service under valuation.

396 We assume that there may be differences between types of goods with regard to their
397 sensitivity towards modal modification of the valuation question. As the bouletic commitment
398 evokes a desire, it is conceivable that it facilitates the elicitation of value components that are
399 associated with the satisfaction of personal wants and needs, since desires are mainly

⁴ We thank an anonymous reviewer who suggested this formulation of what attitude the modal "appropriate" is hypothesized to realize in the participant.

400 associated with personal motivation and "are directly connected only to intentions and mental
401 states in the pre-intention formation phase of decision making" (Perugini and Bagozzi, 2004,
402 p.72), excluding factors such as the social implications of an action.

403 Correspondingly, it is possible that deontic commitments are related more easily to
404 concerns for entities outside of the self, since moral considerations rest on other-involving
405 norms or rules (Gillett, 1993).

406 In order to refine our understanding of these value components, we will employ the
407 concept of Total Economic Value (TEV) of environmental goods to humans, as first developed
408 by Pearce and Moran (1994). They make the principal distinction between *use* values and
409 *non-use* values. *Use* values are connected to the use of natural resources and comprise for
410 example consumptive values like food or indirect values like climate regulation. *Non-use*
411 values are generated without personal use. In general, they encompass values arising from
412 the knowledge about benefits to nature or to other humans, both in the present and in the
413 future. Notably, existence value, as conceptualised by Krutilla (1967), is understood to be a
414 *non-use* value. It refers to the satisfaction one derives simply from knowing that a natural good
415 (e.g. an ecosystem) exists. These aspects of value tap into different deontic, moral and
416 metaphysical considerations. Importantly, *use* values are anchored in the individual and the
417 satisfaction of their wants or needs, without taking into account implications for other entities.
418 *Non-use* values, on the other hand, are defined as being created without the satisfaction of
419 personal wants or needs, rather they are assumed to be anchored in the individual's
420 perception of the world that surrounds them and the well-being of others.

421 Nyborg (2000) suggested that the type of good or service in question and notably the
422 value components it encompasses will trigger a certain mode of evaluation. One is more likely
423 to adopt a consumer perspective when asked to assess market goods such as coffee mugs.
424 Conversely, when asked about ethically complex issues usually at stake in CVM studies such
425 as biodiversity protection it might be more natural for people to take a citizen point of view.

426 For our experiment we bridge these considerations about the influence of the valuation
427 object on processing mode and about the suitability of modal cues in determining the
428 characteristics of preferences that are expressed. We hypothesise and test in our first
429 experiment that environmental public goods which people cannot directly interact with or
430 derive directly noticeable benefits from, such as the Arctic Ocean and the Amazon rainforest,
431 are subjectively perceived as generating relatively more *non-use* value than environmental
432 public goods which have directly observable benefits, like clean air and pesticide-free produce.

433 In our second experiment, we test whether HP differ according to the stance conveyed
434 by the respective modal expression, which could be due to different modes of processing
435 triggered by certain modal expressions, thus leading to diverging HP. Conversely, it is possible
436 that certain modals facilitate the accessibility of specific types of value, which could lead to
437 differences between HP for *use* and *non-use* value goods in their susceptibility to modal
438 modification. As a concrete manifestation of the former mechanism, we could imagine, in
439 applying Sagoff's (1998) theory of language correspondents of preference orderings, that
440 deontic modals are more likely to trigger a citizen processing mode, while bouletic modals are
441 more likely to activate a consumer processing mode. The latter mechanism would imply that
442 certain value dimensions are more or less easily accessible, depending on the use of specific
443 modals. Deontic modals could be assumed to facilitate the expression of *non-use* values, while
444 bouletic modals could facilitate the expression of *use* values. Our design does not allow us to
445 differentiate precisely between the two mechanisms⁵, and they need not be exclusive.
446 However, we may expect that if there is a difference between the environmental goods more
447 associated with *use* values and those more associated with *non-use* values in terms of how
448 sensitive the elicited values are to different modals, then a specific modal might help to access
449 *non-use* values in particular.

⁵ In order to do this, we would need to collect qualitative data and develop a definition of the ways consumer and citizen processing are expressed (including both economic and non-economic measures) and in what ways those value expression might be different from facilitation of the mental accessibility of certain value dimensions (Kenter et al., 2016c).

450 In our explorative approach, we simply take differentiated elicited values as an
451 indication for underlying preferences that do not correspond to the standard consumer model,
452 but are instead more multifaceted.

453 3 HYPOTHESES

454 We assume that the two scenarios which describe directly noticeable benefits to participants,
455 i.e. the air pollution and the pesticides scenarios are perceived as having (relatively) more
456 *use* value components than the two scenarios which do not describe directly noticeable
457 benefits, but instead focus on benefits to other people and species. Our first hypothesis is
458 thus:

459 H1: The protection of the Arctic Ocean and the Amazon rainforest are perceived as
460 generating relatively more *non-use* value than the provision of clean air and the abolishment
461 of harmful pesticides in the UK.

462 Further, i) *appropriate*, as a deontic-evaluative modal, evokes a mental state towards what is
463 represented as counting as a moral ideal, whereas the bouletic *willing* evokes a subjective
464 desire. It seems reasonable that what one is willing to pay is equal to or less than the perceived
465 moral ideal. ii) *Appropriate* has an evaluative anchoring, which may prompt the consideration
466 of a wider range of interests (analogously to the concept of citizen preferences) than *willing*,
467 which is anchored in the individual (and would therefore correspond more to consumer
468 preferences). As outlined above, *should* could be interpreted as a deontic-evaluative or as a
469 deontic-directive modal. We assume that its effect on stated preferences depends on this
470 interpretation. If *should* is interpreted mainly as deontic-evaluative, it is expected to yield
471 similar amounts of hypothetical payments as *appropriate*. If *should* is interpreted mainly as
472 deontic-directive, but grounded in the individual, it is expected to yield similar amounts of
473 hypothetical payments as *willing*. Consequently, we assume that:

474 H2: Other things being equal, HP elicited with *appropriate* are higher than those elicited
475 with *willing* for any given environmental good or service.

476 H3: If H2 holds, then HP elicited with *should* lie in between those elicited with *appropriate*
477 and those elicited with *willing*.

478 As discussed above, *use* values are defined here to be created based on the satisfaction of
479 the individual's wants and needs. The bouletic modality indicated by *willing* is, similarly,
480 embedded in a highly personal, desire-oriented context. Given the anchoring in the individual
481 that is present in the generation of *use* values and expressed by bouletic modals, we assume
482 that there is a matching process which may facilitate the consideration of *use* values when the
483 elicitation question is asked with *willing*. Conversely, *non-use* values are grounded in the well-
484 being of entities other than the self. Given the deontic-evaluative anchoring of *appropriate*, we
485 expect that there is a match which may facilitate the expression of *non-use* values when
486 elicited with *appropriate*.

487 Since *should* is ambiguous between a deontic-directive interpretation and a deontic-
488 evaluative interpretation, we expect a less unequivocal matching effect.

489 Overall, it is difficult to predict whether there is a difference in the effect of the use of
490 different modals between *use* and *non-use* value goods. In the scenarios that we refer to as
491 *use* value scenarios, value is also generated for entities other than the self – other people as
492 well as other species derive benefits. This *non-use* value aspect of the *use* value goods could
493 be made salient by the use of a deontic-evaluative modal, while it may be more evident from
494 the outset in the case of *non-use* value goods. Conversely, the difference in the perceived
495 associated *non-use* and *use* values may have the opposite effect if the deontic-evaluative
496 modal acts as a reinforcer, rather than a spotlight, on the consideration of *non-use* values. We
497 therefore formulate the following directionless and exploratory hypothesis:

498 H4: If H2 and H3 hold, then there may be a difference in the strength of the effects between
499 *use* and *non-use* value goods.

500

501 **4 EXPERIMENTS**

502 We conducted two separate experiments. The first one was the value perception study,
503 which we included in order to verify that the scenarios that we termed *non-use* value
504 scenarios were indeed perceived as having relatively more *non-use* value components than
505 the scenarios that we termed *use* value scenarios, and vice versa.

506 The second experiment was the main study, in which we elicited HP. We separated
507 the experiment into two studies, because we did not want participants' answers (*use* vs. *non-*
508 *use* value evaluation and HP) to be influenced by the other evaluation, respectively (see for
509 example Schwarz and Strack, 1991).

510 Demographic information in terms of gender, age, income and household size for the
511 participants of the two studies as well as information on sampling and recruitment is in the
512 supplementary material.

513 Since the distribution of demographics do not differ significantly between the two
514 samples, we assume that the main results from the value perception study are generalizable
515 also for the sample of the second experiment. We do not pool the two datasets, but instead
516 simply use the first study to corroborate our interpretation of the air pollution and pesticides
517 as *use* value scenarios and the Arctic Ocean and the Amazon as *non-use* value scenarios.

518 All analyses were conducted in R (v.4.0.4), using R Studio (v.1.1.463).

519 *4.1 Study 1*

520 *4.1.1 Participants*

521 The value perception study was conducted in English among British citizens via the online
522 platform Prolific (N = 101, 74 female, mean age = 37.1).

523 4.1.2 Design

524 This study was designed to categorise environmental goods as *use* or *non-use* value goods,
525 depending on which value components were perceived to be most prevalent in them by
526 participants. In total, four environmental scenarios were considered: i) air quality improvement,
527 ii) toxic pesticide abolition, iii) protection of a part of the Arctic Ocean, iv) protection of a part
528 of the Amazon rainforest. Participants first read a description of the problem and then an
529 intervention to address the problem was proposed. In the description of the former two
530 scenarios, the focus was on adverse public health effects of indoor air pollution and the
531 consumption of especially toxic pesticide residue on produce, respectively. In the description
532 of the other two scenarios, the focus was on the well-being of the respective ecosystems and
533 indigenous groups living in them. The following interventions were proposed: i) the installation
534 of air ventilation and filtration systems to improve indoor air quality, ii) the abolition of
535 particularly toxic pesticides and preferential treatment of pesticide-free crops, iii) the creation
536 of a special marine protected area, an “Arctic sanctuary” zone, that would be off limits to all
537 extractive and destructive uses, iv) the establishment of a special protected zone in the
538 Amazon.

539 Since the former two scenarios entail directly consumable goods – clean air and pesticide-
540 free produce – we assume that they are perceived as having relatively more *use* value
541 components. As for the latter two scenarios, we assume that they are perceived as having
542 relatively more *non-use* value components, precisely because they do not involve such directly
543 consumable goods.

544 After having read a description of the respective problem and the proposed
545 intervention, participants were asked to evaluate the partition of its usefulness for themselves
546 and for the world in general.

547 This evaluation was performed on an 11-point scale, with 0 representing usefulness
548 only for themselves and none for the rest of the world and 10 representing the opposite. This
549 approach unifies the variables "perceived utility for oneself" and "perceived utility for other
550 entities outside of oneself" on the same scale to allow for a straightforward comparison of
551 people's value perceptions. It permitted participants to evaluate the intervention even if they
552 thought it had little to no usefulness, since we did not elicit the absolute levels of usefulness
553 on the two dimensions, but only its perceived partition between *use* and *non-use* components.

554

555 4.1.3 Analysis and results

556 The mean rating for *use* value scenarios was 6.44 and for *non-use* value scenarios 7.67. This
557 difference was significant ($t(96) = -4.11$, $p\text{-value} = 0.00$). There were no significant differences
558 between the ratings for the two *use* value scenarios and the two *non-use* value scenarios,
559 respectively.

560 There were no significant differences between the answers of men and women to study
561 1 (details of the analysis are in the supplementary information).

562 A summary of the results is provided in table 1.

563

Table 1: Value ratings (study 1)

Scenario	Mean (SD)	N
Air pollution	6.09 ^a (1.67)	21
Pesticides	6.70 ^a	27

	(1.27)	
Average use scenarios	6.44	48
	(1.47)	
<hr/>		
Arctic Ocean	7.48 ^b	27
	(1.19)	
Amazon rainforest	7.89 ^b	26
	(1.86)	
Average non-use scenarios	7.67	53
	(1.54)	

565 Values with the same superscript are non-significantly different from each other ($p > 0.05$)

566

567 Both *use* and *non-use* value scenarios were perceived as having relatively more *non-use* than
568 *use* value, but *non-use* value scenarios significantly more so than *use* value scenarios. We
569 retain the expressions *use* and *non-use* value scenarios for simplicity.

570 4.2 Study 2

571 4.2.1 Participants

572 The study was conducted in English among British citizens (N = 756, 533 female, mean age
573 = 35.8), recruited via the online platform Prolific.

574

575 4.2.2 Design

576 We considered the same four environmental scenarios as in study 1. Participants read a
577 description of the environmental issue and a proposed intervention. In order to elicit
578 hypothetical payments, we added financing mechanisms to all interventions.

579 Since coercive payment vehicles (i.e. binding mechanisms such as taxes) have been
580 shown to generally produce more realistic results in CVM studies than non-binding vehicles
581 like donations (Schlöpfer, 2006), we chose coercive payment vehicles for all scenarios for
582 which it was feasible. Payment vehicles in stated preference studies should also be credible
583 in the context of the environmental good or service at stake (Johnston et al., 2017). The choice
584 of a coercive payment vehicle was hence a more straightforward choice for the two *use* than
585 for the two *non-use* value scenarios, as the former were concerned with interventions inside
586 the UK, whereas the latter were related to ecosystem protection outside of the UK. However,
587 we did not want any differences between the effects of language on HP for *use* and *non-use*
588 value scenarios to be attributable solely to different payment vehicles. Therefore, we framed
589 one of the payment vehicles of a *non-use* value scenario as a tax (the "Amazon rainforest
590 tax") and the other one as a voluntary contribution (donation to the "Arctic Ocean sanctuary"),
591 which may be perceived as being more realistic for a good outside of the realm of domestic
592 governance. Since payment vehicles can fundamentally influence people's apprehension of
593 the scenarios and, for instance, trigger protesting behaviour if they disagree with them
594 (Meyerhoff et al., 2014), we analysed potential differences in the perception of the scenarios
595 by focusing on the share of zero bids as well as importance ratings.

596 In a between-subjects design, each participant was presented with one scenario, and
597 HP were elicited with one of three questions:

598 i) *What is the maximum amount you would be willing to pay to support this cause?* ii) *What is*
599 *the maximum amount you think you should pay to support this cause?* iii) *What is the maximum*
600 *amount you think is appropriate to pay to support this cause?*

601 In a statement preceding the elicitation question, it was specified that HP were to be
602 indicated as yearly payments on the household level, for a period of 10 years. HP can be
603 elicited via different question modes, such as open-ended formats, single or multiple-bounded
604 dichotomous choice questions, or payment cards. While close-ended format has been

605 recommended by Arrow et al. (1993), it has been found to be subject to specific biases like
606 yea-saying (Brown et al., 1996). We consider that for our purpose, a payment card style
607 elicitation mechanism, where people choose from a range of possible amounts (see for
608 example OECD, 2018), is adequate. This minimises hypothetical bias induced by yea-saying
609 in dichotomous choice formats which tends to produce inflated results, and we consider that
610 the anchoring that occurs by presenting participants with a range of answers does not corrupt
611 our goal, which is to capture evaluative tendencies, not to produce reliable CVM estimates for
612 policy use.

613 Participants were subsequently asked to indicate how important the respective
614 environmental good or service was to them personally on a 5-point Likert scale ranging from
615 “not important at all” (1) to “very important” (5).

616 Finally, the socio-demographic variables age, gender, household size and annual
617 household income category were elicited.

618

619 4.2.3 Analysis

620 In our study there was a very low ratio of zero bids (under 6% in all scenarios).⁶ Therefore, in
621 the data analysis, we restricted the sample to positive answers (positive HP). We transformed
622 the positive bids using the formula $\log(\text{positiveHP}+1)$ (LNHP) because of the large positive
623 skew of the data, which is typical for CVM estimates. This improved the normality of the data
624 (as can be seen in the estimated Kernel densities in figures 1 and 2 in the supplementary
625 material).

626 To investigate the effect of language on HP for the different goods, we conducted
627 simple and multiple ordinary least squares (OLS) regression analyses for each scenario

⁶ Details on zero bids are in the supplementary information.

628 separately. In the simple regressions, only the modal used in the elicitation question was
 629 included as an explanatory variable. We transformed the language variable into 3 dichotomous
 630 variables and included *appropriate* and *should*, making *willing* the base category. In the
 631 multiple regressions, we added the importance measures as well as the socio-demographic
 632 variables age, gender household size and annual household income category.

633 Finally, we performed Welch independent sample t-tests between the LNHP elicited
 634 with *willing* and with one of the other two elicitation questions, respectively, and reported 95%
 635 confidence intervals (CIs) of the difference between means. This procedure is akin to the
 636 simple regressions, and gives us a more refined idea of the strength of the effects.

637 In order to detect possible differences in protesting behaviour between the scenarios,
 638 we compared the ratio of zero bids by means of Chi-squared tests.

639 *4.2.4 Results*

Table 2: Means of positive HP and LNPH

	Positive HP (SD)	LNHP (SD)
Air pollution		
willing	165.15 (149.98)	4.62 (1.15)
should	156.85 (134.05)	4.65 (1.02)
appropriate	280.27 (269.75)	5.15 (1.06)
Pesticides		

willing	184.10	4.53
	(232.57)	(1.24)
should	146.91	4.51
	(130.31)	(1.17)
appropriate	338.78	5.34
	(329.00)	(1.09)
Arctic Ocean		
willing	123.49	4.07
	(162.67)	(1.30)
should	169.66	4.39
	(234.39)	(1.31)
appropriate	152.22	4.49
	(151.37)	(1.16)
Amazon rainforest		
willing	156.58	4.55
	(151.38)	(1.14)
should	123.32	4.24
	(147.85)	(1.11)
appropriate	230.89	4.59
	(325.48)	(1.37)

640 Table 2 provides a summary of the means of positive HP and LNHP. The results of the
641 regression analyses for the individual scenarios are summarised in the supplementary
642 material. We do not observe a significant effect of *should* on the LNHP, neither in the simple

643 nor in the multiple regressions, meaning that it does not lead to amounts that are significantly
 644 different from those elicited with *willing*.

645 *Appropriate*, on the other hand, has a significant positive effect in the two *use* value
 646 scenarios – HP were higher when they were elicited with *appropriate* than when they were
 647 elicited with *willing*. For the two *non-use* value scenarios, *appropriate* did not have a
 648 significant effect.

649 The importance ratings had a significant positive effect on LNHP in all but the air
 650 pollution scenario.

651 Table 3 summarises the results of Welch independent t-tests between LNHP with *willing* and
 652 the other elicitation questions, respectively. We can see that *should* did not significantly
 653 change the elicited LNHP for any of the environmental goods as compared to *willing*.
 654 *Appropriate* had an unequivocal positive effect for *use* value goods, with similarly wide CIs,
 655 the furthest from zero for the pesticides scenario. It did not have a significant effect for *non-*
 656 *use* value goods.

657

Table 3: LNHP with "willing" as baseline, pairwise comparisons with "should" and "appropriate"

	Use value goods		Non-use value goods	
Practical commitment	Air pollution	Pesticides	Arctic Ocean	Amazon rainforest
Willing	4.62	4.53	4.07	4.55
Should	[-0.39,0.45]	[-0.49,0.45]	[-0.12,0.77]	[-0.71,0.09]
Appropriate	[0.11,0.95]	[0.37,1.24]	[0.00,0.84]	[-0.39,0.48]

First row: means of LNHP with "willing", second and third row: 95% CIs of Welsh independent t-tests between LNHP with "willing" and "should"/"appropriate", respectively. CIs that exclude 0 printed in bold face.

658 There were no significant differences in the ratios of zero bids between the scenarios,
659 Chi-squared = 1.04, df = 3, p-value = 0.79. Therefore, we do not assume that protesting
660 behaviour and differences therein between the scenarios are of particular concern for our
661 study.

662 The means of the importance ratings ranged from 3.42 for the pesticide scenario to
663 4.14 for the Amazon rainforest scenario (measured on a 1-5 scale, 5 corresponding to "very
664 important"). A Kruskal-Wallis test indicated that importance ratings differed between the
665 scenarios $H(3) = 69.53$, p-value = 0.00. Subsequent pairwise comparisons showed that both
666 *non-use* value scenarios were perceived as having significantly more personal importance for
667 the participants in our study than both *use* value scenarios. There were no significant
668 differences in importance ratings between the two *use* and between the two *non-use* value
669 scenarios, respectively (see supplementary information).

670 Pairwise comparisons between men's and women's LNHP revealed only one
671 significant difference: For the Arctic Ocean scenario, when values were elicited with *should*,
672 women's answers were significantly higher than men's, $t(39) = 2.09$, p-value = 0.04. In
673 additional regressions of LNHP on gender, elicitation questions and their interactions, gender
674 did not have a significant effect (see supplementary information).

675 **6 DISCUSSION**

676 6.1 *Sample characteristics*

677 There was an overrepresentation of women in our samples relative to the UK population,
678 which must be considered when making inferences from the results. However, response
679 patterns did not significantly differ between women and men, as indicated by the insignificant

680 effects of gender and gender/language interactions in all specified models (see supplementary
681 information).

682 In our sample, the percentages of positive HP were very high (over 94% in all
683 scenarios), as compared to the studies conducted by Kahneman and Ritov (1994), where
684 positive bids ranged from 24% to 79%, and Ryan and Spash (2011), where positive bids
685 accounted for 42%. We assume that this is due to our sample which we recruited using an
686 online recruitment tool. Participants recruited via such platforms tend to be more experienced
687 in study participation (Palan & Schitter, 2018) and might therefore be less sceptical towards
688 the idea of a hypothetical payment for natural goods and services.

689 6.2 Discussion of results

690 In light of our results, we find support for the hypothesis that the scenarios we termed “*non-*
691 *use value goods*” are perceived as generating relatively more *non-use* value than those that
692 we termed “*use value goods*” (H1). However, all of the scenarios were perceived as generating
693 more *non-use* than *use* value, so the value perception was generally skewed towards *non-*
694 *use* values, albeit with significantly different shares for the two types of scenarios.

695 With regard to H2, we find evidence that, other things being equal, HP elicited with *appropriate*
696 are higher than those elicited with *willing*, but the difference was significant only for *use* value,
697 and not for *non-use* value goods.

698 H3 concerned the elicitation question with *should* - we expected that, conditionally on
699 H1 holding, HP elicited with *should* would lie in between those elicited with *willing* and those
700 elicited with *appropriate*. This hypothesis was not corroborated by the results – values elicited
701 with *should* did not differ significantly from those elicited with *willing* for any of the scenarios.

702 Linguistic theory proved to be a valuable source of information for the characterization
703 of the value articulating institutions represented by the scenarios. The bouletic practical
704 commitment established with *willing* led to lower elicited HP than the deontic-evaluative

705 *appropriate*. We assumed that *willing* prompts a narrower practical commitment, focused on
706 individual desires, while *appropriate* demands a comparison of a state of affairs against what
707 is considered by the speakers as a moral standard. *Should*, as a deontic modal that is
708 associated with some degree of ambiguity between a directive and an evaluative
709 interpretation, produced HP that were not significantly different from those elicited with *willing*,
710 hinting at an interpretation of *should* that is more directive than evaluative.

711 In H4, we considered the possibility that a modal that is explicitly not grounded in the
712 self, i.e. *appropriate*, could act as a spotlight, making *non-use* value components more salient
713 in contexts where they may be less obvious upon first glance. *Appropriate* would then be
714 expected to highlight *non-use* values in *use* value scenarios, thereby increasing elicited
715 values. In the *non-use* value scenarios, the overall focus is already on *non-use* values, so the
716 spotlight effect of *appropriate* may be attenuated. Another possibility is that *appropriate* acts
717 as a reinforcer for *non-use* values. In that case, the relatively higher prevalence of *non-use*
718 values would be expected to lead to a stronger effect of *appropriate* on elicited values for *non-*
719 *use* value scenarios, and a weaker effect for *use* value scenarios. Our results hint at an
720 interpretation of the modal as a spotlight, since we observed a significant effect of *appropriate*
721 on elicited values only for *use*, but not for *non-use* value goods.

722 Both *non-use* value scenarios were rated as having more personal importance for
723 participants than the two *use* value scenarios and for *non-use* value scenarios importance had
724 a significant effect on HP in the regression analyses, which suggests that moral considerations
725 likely played a crucial role in the valuation process.

726 We want to underline the possibility that confounding factors related to study limitations
727 may have played a role in producing the differentiated results for *use* and *non-use* value
728 goods. In particular, the two *non-use* value scenarios in our experiment were set outside of
729 the UK's national jurisdiction, while the *use* value scenarios were set inside. Participants may
730 have moral considerations about environmental issues in their own country that reflect

731 differently in economic valuation as compared to things that are further away. A possible
732 reason for this could be a lack of perceived behavioural control for *non-use* value scenarios
733 as compared to *use* value scenarios, associated with geographical and psychological
734 distance. Future research could look at how perceived behavioural control, which was shown
735 by Ryan and Spash (2011) to correlate with WTP measures, relates to different practical
736 commitments in environmental values.

737 Another possibility is that *appropriate*, contrarily to our expectations, actually matches
738 less with considerations about ideals than with considerations about individual well-being. This
739 seems somewhat counter-intuitive, but a related effect has been observed by Kenter et al.
740 (2016b). They compared individual WTP for marine ecosystems elicited through a survey to
741 deliberated group-based "fair prices" and found that the latter were significantly better
742 explained by measures of subjective well-being associated with the good in question than the
743 former. Thus, it seems possible that personal utility or well-being is the main concern of
744 respondents when the question concerns fairness or appropriateness.

745 Elicitation questions that syntactically differ from the ones we tested, such as "fair
746 prices" to pay for society, may entail other effects on HP. In the current study, we focused on
747 syntactically similar questions that only differ in the type of modal, to be able to trace back
748 observed effects to one linguistic phenomenon. Future research could test a larger variety of
749 questions and notably include linguistic indicators of society-level aggregation, to account for
750 the type of questions that are typically used in innovative stated preferences studies.

751 **6.3 Conclusions**

752 Our study contributes to a better understanding on how values grounding preference are
753 articulated and reflected in their linguistic implementations.

754 We presented the idea that the question *How much would you be willing to pay?* that is
755 standardly used in CVM studies implies an important implicit presupposition, namely that

756 underlying economic preferences can best be accessed by linguistically establishing a bouletic
757 or desire-oriented practical commitment towards a hypothetical payment. We suggested that
758 the choice of elicitation question wording may give rise to different moral stances, thereby
759 influencing directly the elicited values.

760 We found that hypothetical payments elicited with the question *What is the maximum*
761 *amount you think is appropriate to pay?* were higher than those elicited with *What is the*
762 *maximum amount you would be willing to pay?* for environmental goods more associated with
763 *use* values, while there was no significant effect for environmental goods more associated with
764 *non-use* values. We did not find significant differences between the amounts elicited with
765 *willing* and those elicited with *What is the maximum amount you think you should pay?*.

766 *Willing* prompts a narrow practical commitment, concerned with individual wants, while
767 *appropriate* is associated with a deontic-evaluative practical commitment, implying a general
768 moral standard. *Should* is ambiguous regarding its reading as deontic-directive (i.e. referring
769 to an individual action plan) or deontic-evaluative (i.e. referring to a more general evaluation
770 of a moral ideal). We take our results as an indication of an interpretation of *should* in the given
771 context as more deontic-directive and therefore anchored in the individual. With regard to the
772 contrasted results for *use* and *non-use* value goods we noted that the deontic-evaluative
773 *appropriate* may have acted as a spotlight, making *non-use* value components more salient
774 and decisive in the *use* value scenarios, while in the *non-use* value scenarios they are more
775 likely to be of primary concern regardless of the elicitation modal. We discussed possible
776 confounding factors that differentiate *use* and *non-use* value scenarios besides the *use* and
777 *non-use* value composition.

778 A practical conclusion that can be drawn from our findings is the importance of
779 language sensitivity in environmental valuation. Especially now that researchers are starting
780 to employ alternative elicitation formats which target values that go beyond individual WTP
781 (Szabó, 2011; Kenter, 2016; Kenter, et al., 2016), it is important to have a good understanding

782 of what these represent, and insights from the semantic analysis of modality are a promising
783 starting point. In taking into account the informational basis for evaluation, or the modal base,
784 as well as the modal ordering source, i.e. how the individual relates to the payment, we are
785 able to understand nuanced differences, for example between seemingly similar deontic
786 modals such as the questions with *appropriate* and *should*, which in our experiment have been
787 shown to produce differentiated results.

788 Our study demonstrates that it is (relatively) easy to highlight the variety and also the
789 variability of moral stances and of their associated practical commitments that can emerge
790 through preference elicitation mechanisms in their role as value articulating institutions. By
791 that we do not mean to say that purely monetary environmental valuation suffices to capture
792 the variety and variability of environmental values (which is the subject of animated debates
793 in the field, see for example Gómez-Baggethun and Ruiz-Pérez, 2011; Farley, 2012, Vatn and
794 Bromley, 1994), but rather that even with purely monetary valuation, we can detect indications
795 for differentiation created by such practical commitments.

796 Without a conception of the connection between the linguistic substrate of
797 environmental valuation based on hypothetical scenarios and the axiological dimensions that
798 depend on it, one could be misled in the interpretation of the elicited values. We would like to
799 conclude this article by insisting on two broad implications of our study with respect to our
800 understanding of the nature of environmental valuation.

801 The first one is that values elicited with stated preference methods may not be stable
802 and final and, thus, different from individual preferences as they are defined in mainstream
803 economics (Carson, 2012). This is the case not only because they are morally dependent, but
804 also because they are dependent on the contextual actualisation of a particular moral stance
805 at the moment of the valuation procedure, a value articulating institution. In that way,
806 preferences, as revealed through a hypothetical monetary scale, are rather to be conceived
807 of as indirect measures of the extent to which the respondent engages in a certain practical

808 commitment. This hints at a substantial difference from traditional stated preference studies,
809 where valuation is forced onto a monetary scale, which constrains respondents to a default
810 practical commitment. The applicability of the conventional logic of the economic sphere of
811 reasoning is therefore put into question for environmental goods and services (see also:
812 Farrell, 2007; Light, 2002; O'Connor, 2006).

813 Second, we note that our study allowed us to question the degree of adequacy, through the
814 stated preference procedures, between the practical commitment solicited from the
815 participants and the presumed nature of the environmental change described in the scenario.
816 Our results point to differences in how different environmental goods and services are valued
817 in terms of the responsiveness to linguistically activated practical commitments. It could also
818 be the case that asking to evaluate an environmental scenario, from the angle of a particular
819 evaluative term or phrase, does not simply correlate with an objective feature (*use or non-use*
820 aspects) of the considered environmental entity but influences its perception. Language
821 encodes and shapes the construction and expression of values. This has deep implications
822 on the scope of stated preferences methods, revealing, in particular, their sensitivity to
823 linguistic framing. Our present study, although standardly eliciting monetary stated
824 preferences, sheds light on the issue of the sensitivity of expressed values to the linguistic
825 framing of the elicitation methods. This raises the question of how, if at all, it is possible to
826 elicit supposedly underlying values in an undistorted way.

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831

832 **REFERENCES**

833

834 Álvarez-Farizo, B., Gil, J. M., & Howard, B. (2009). Impacts from restoration strategies:
835 Assessment through valuation workshops. *Ecological Economics*, 68 (3), 787– 797.
836 <https://doi.org/10.1016/j.ecolecon.2008.06.012>

837 Arias-Arévalo, P., Gómez-Baggethun, E., Martín-López, B., & Pérez-Rincón, M. (2018).
838 Widening the evaluative space for ecosystem services: A taxonomy of plural values
839 and valuation methods. *Environmental values*, 27(1), 29-53.
840 <https://doi.org/10.3197/096327118X15144698637513>

841 Arrow, K., Solow, R., Portney, P. R., Leamer, E. E., Radner, R., Schuman, H., et al. (1993).
842 Report of the NOAA panel on contingent valuation. *Federal register*, 58 (10), 4601–
843 4614.

844 Bratman, M. (2012). Time, rationality, and self-governance. *Philosophical Issues*, 22, 73–
845 88. <https://doi.org/10.1111/j.1533-6077.2012.00219.x>

846 Bratman, M., et al. (1987). *Intention, plans, and practical reason* (Vol. 10). Cambridge, MA:
847 Harvard University Press.

848 Brown, T. C., Champ, P. A., Bishop, R. C., & McCollum, D. W. (1996). Which response
849 format reveals the truth about donations to a public good? *Land Economics*, 72 (2),
850 152–166. <https://doi.org/10.2307/3146963>

851 Bunse, L., Rendon, O., & Luque, S. (2015). What can deliberative approaches bring to
852 the monetary valuation of ecosystem services? A literature review. *Ecosystem*
853 *Services*, 14, 88-97. <https://doi.org/10.1016/j.ecoser.2015.05.004>

- 854 Cariani, F., Kaufmann, M., & Kaufmann, S. (2013). Deliberative modality under epistemic
855 uncertainty. *Linguistics and Philosophy*, 36 (3), 225–259.
856 <https://doi.org/10.1007/s10988-013-9134-4>
- 857 Carson, R. T. (2000). Contingent valuation: a user's guide. *Environmental Science and*
858 *Technology*, 34 (8), 1413–1418.
- 859 Carson, R. T. (2012). Contingent valuation: A practical alternative when prices aren't
860 available. *Journal of economic perspectives*, 26(4), 27-42.
861 <https://doi.org/10.1257/jep.26.4.27>
- 862 Dasgupta, P. (2021). *The economics of biodiversity: The Dasgupta review*. HM Treasury,
863 London.
- 864 Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt brace
865 Jovanovich college publishers.
- 866 Farrell, K. N. (2007). Living with living systems: the co-evolution of values and valuation.
867 *The International Journal of Sustainable Development & World Ecology*, 14(1), 14-
868 26. <https://doi.org/10.1080/13504500709469704>
- 869 Fitting, M., and Mendelsohn, R. L. (1998). *First-order modal logic*. Vol. 277. Springer
870 Science & Business Media.
- 871 Gillett, G. (1993). 'ought' and well-being. *Inquiry*, 36 (3), 287–306.
872 <https://doi.org/10.1080/00201749308602323>
- 873 Giannakidou, A. and Mari, A. (2016). Epistemic Future and Epistemic MUST : Nonveridi-
874 cality, Evidence, and Partial Knowledge. In *Mood, Aspect, Modality Revisited. New*
875 *answers to old questions*, ed. by Blaszack, J. et al., University of Chicago Press,
876 pp. 75-124.

- 877 Giannakidou, A. and Mari, A. (2021). *Truth and Veridicality in Grammar and Thought*. The
878 University of Chicago Press.
- 879 Gómez-Baggethun, E., & Ruiz-Pérez, M. (2011). Economic valuation and the
880 commodification of ecosystem services. *Progress in Physical Geography*, 35 (5),
881 613–628. <https://doi.org/10.1177/0309133311421708>
- 882 Gregory, R., Lichtenstein, S., & Slovic, P. (1993). Valuing environmental resources: a
883 constructive approach. *Journal of Risk and Uncertainty*, 7 (2), 177–197.
884 <https://doi.org/10.1007/bf01065813>
- 885 Hanemann, W. M. (1994). Valuing the environment through contingent valuation. *Journal*
886 *of economic perspectives*, 8 (4), 19–43. <https://doi.org/10.1257/jep.8.4.19>
- 887 Hansjürgens, B., Schröter-Schlaack, C., Berghöfer, A., & Lienhoop, N. (2017). Justifying
888 social values of nature: economic reasoning beyond self-interested preferences.
889 *Ecosystem Services*, 23, 9-17. <https://doi.org/10.1016/j.ecoser.2016.11.003>
- 890 Hart, R., & Latacz-Lohmann, U. (2001). The indifference curve, motivation, and morality in
891 contingent valuation. *Environmental Values*, 10(2), 225-242.
892 <https://doi.org/10.3197/096327101129340813>
- 893 Jacobs, M. (1994). The Limits to Neoclassicism: towards an institutional environmental
894 economics. In: Redcliff M and Benton T (eds), *Social Theory and the Global*
895 *Environment*. London: Routledge, 67–91.
- 896 Johnston, R. J., Boyle, K. J., Adamowicz, W., Bennett, J., Brouwer, R., Cameron, T. A., ...
897 & Vossler, C. A. (2017). Contemporary guidance for stated preference studies.
898 *Journal of the Association of Environmental and Resource Economists*, 4(2), 319-
899 405.

900 Kallis, G., Gómez-Baggethun, E., & Zografos, C. (2013). To value or not to value? That is
901 not the question. *Ecological economics*, 94, 97-105.
902 <https://doi.org/10.1016/j.ecolecon.2013.07.002>

903 Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment
904 effect and the Coase theorem. *Journal of political Economy*, 98(6), 1325-1348.
905 <https://doi.org/10.1086/261737>

906 Kahneman, D., & Ritov, I. (1994). Determinants of stated willingness to pay for public
907 goods: A study in the headline method. *Journal of Risk and Uncertainty*, 9 (1), 5–37.
908 <https://doi.org/10.1007/bf01073401>

909 Kahneman, D., Ritov, I., Jacowitz, K. E., & Grant, P. (1993). Stated willingness to pay for
910 public goods: A psychological perspective. *Psychological science*, 4 (5), 310–
911 315. <https://doi.org/10.1111/j.1467-9280.1993.tb00570.x>

912 Kahneman, D., Ritov, I., Schkade, D., Sherman, S. J., & Varian, H. R. (1999). Economic
913 preferences or attitude expressions?: an analysis of dollar responses to public
914 issues. In: *Elicitation of preferences* (pp. 203–242). Luxemburg: Springer.
915 https://doi.org/10.1007/978-94-017-1406-8_8

916 Kenter, J. O. (2016). Integrating deliberative monetary valuation, systems modelling and
917 participatory mapping to assess shared values of ecosystem services. *Ecosystem*
918 *Services*, 21, 291–307. <https://doi.org/10.1016/j.ecoser.2016.06.010>

919 Kenter, J. O., Bryce, R., Christie, M., Cooper, N., Hockley, N., Irvine, K. N., . . . others
920 (2016a). Shared values and deliberative valuation: Future directions. *Ecosystem*
921 *services*, 21, 358–371. <https://doi.org/10.1016/j.ecoser.2016.10.006>

922 Kenter, J. O., Jobstvogt, N., Watson, V., Irvine, K. N., Christie, M., & Bryce, R. (2016b).
923 The impact of information, value-deliberation and group-based decision-making on

924 values for ecosystem services: integrating deliberative monetary valuation and
925 storytelling. *Ecosystem Services*, 21, 270–290.
926 <https://doi.org/10.1016/j.ecoser.2016.06.006>

927 Kenter, J. O., Reed, M. S., & Fazey, I. (2016c). The deliberative value formation model.
928 *Ecosystem Services*, 21, 194-207. <https://doi.org/10.1016/j.ecoser.2016.09.015>

929 Kratzer, A. (1991). Modality. In *Semantics: An international handbook of contemporary*
930 *research* (p. 639- 650). Berlin: De Gruyter.
931 <https://doi.org/10.1016/j.ecoser.2016.06.006>

932 Kratzer, A. (2001). *Semantik der Rede. Kontexttheorie - Modalwörter - Konditionalsätze*.
933 Königstein/Ts.

934 Krutilla, J. V. (1967). Conservation reconsidered. *The American Economic Review*, 57 (4),
935 777–786.

936 Lienhoop, N., & Völker, M. (2016). Preference refinement in deliberative choice
937 experiments for ecosystem service valuation. *Land Economics*, 92 (3), 555– 577.
938 <https://doi.org/10.3368/le.92.3.555>

939 Light, A. (2002). Contemporary environmental ethics from metaethics to public philosophy.
940 *Metaphilosophy*, 33(4), 426-449. <https://doi.org/10.1111/1467-9973.00238>

941 Massenberg, J. R., Hansjürgens, B., & Lienhoop, N. (2023). Social Values in Economic
942 Environmental Valuation: A Conceptual Framework. *Environmental Values*.
943 <https://doi.org/10.3197/096327123X16702350862728>

944 Meyerhoff, J., Mørkbak, M. R., & Olsen, S. B. (2014). A meta-study investigating the
945 sources of protest behaviour in stated preference surveys. *Environmental and*
946 *Resource Economics*, 58(1), 35-57. <https://doi.org/10.1007/s10640-013-9688-1>

947 Niemeyer, S., & Spash, C. L. (2001). Environmental valuation analysis, public
948 deliberation, and their pragmatic syntheses: a critical appraisal. *Environment and*
949 *planning C: government and policy*, 19 (4), 567–585. <https://doi.org/10.1068/c9s>

950 Nuyts, J. (2008). Qualificational meanings, illocutionary signals, and the cognitive
951 planning of language use. *Annual Review of Cognitive Linguistics*, 6 (1), 185– 207.
952 <https://doi.org/10.1075/arcl.6.09nuy>

953 Nuyts, J., Byloo, P., & Diepeveen, J. (2010). On deontic modality, directivity, and mood:
954 The case of dutch mogen and moeten. *Journal of pragmatics*, 42 (1), 16–34.
955 <https://doi.org/10.1016/j.pragma.2009.05.012>

956 Nyborg, K. (2000). Homo economicus and homo politicus: interpretation and
957 aggregation of environ- mental values. *Journal of Economic Behavior &*
958 *Organization*, 42 (3), 305–322. [https://doi.org/10.1016/s0167-2681\(00\)00091-3](https://doi.org/10.1016/s0167-2681(00)00091-3)

959 OECD. (2018). Cost-benefit analysis and the environment. Retrieved from
960 <https://www.oecd-ilibrary.org/content/publication/9789264085169-en>

961 O'Connor, M. (2006). The “Four Spheres” framework for sustainability. *Ecological*
962 *complexity*, 3(4), 285-292. <https://doi.org/10.1016/j.ecocom.2007.02.002>

963 Palan, S., & Schitter, C. (2018). Prolific. ac — a subject pool for online experiments.
964 *Journal of Behavioral and Experimental Finance*, 17, 22–27.
965 <https://doi.org/10.1016/j.jbef.2017.12.004>

966 Palmer, F. R. (2001). *Mood and modality*. Cambridge, UK: Cambridge university press.

967 Pearce, D. W., & Moran, D. (1994). *The economic value of biodiversity*. London:
968 Routledge.

969 Pelletier, D., Kraak, V., McCullum, C., Uusitalo, U., & Rich, R. (1999). The shaping of
970 collective values through deliberative democracy: An empirical study from New
971 York's north country. *Policy Sciences*, 32 (2), 103–131.
972 <https://doi.org/10.1023/a:1004641300366>

973 Perugini, M., & Bagozzi, R. P. (2004). The distinction between desires and intentions.
974 *European Journal of Social Psychology*, 34 (1), 69–84.
975 <https://doi.org/10.1002/ejsp.186>

976 Portner, P. (2009). *Modality*. Oxford, UK: Oxford University Press.

977 Ryan, A. M., & Spash, C. L. (2011). Is WTP an attitudinal measure? Empirical analysis of
978 the psychological explanation for contingent values. *Journal of Economic
979 Psychology*, 32 (5), 674–687. <https://doi.org/10.1016/j.joep.2011.07.004>

980 Sagoff, M. (1998). Aggregation and deliberation in valuing environmental public goods: A
981 look beyond contingent pricing. *Ecological economics*, 24 (2-3), 213–230.
982 [https://doi.org/10.1016/S0921-8009\(97\)00144-4](https://doi.org/10.1016/S0921-8009(97)00144-4)

983 Sagoff, M. (1988). *The Economy of the Earth: Philosophy, Law, and the Environment*.
984 Cambridge: Cambridge University Press.

985 Schläpfer, F. (2006). Survey protocol and income effects in the contingent valuation of
986 public goods: A meta-analysis. *Ecological Economics*, 57 (3), 415–429.
987 <https://doi.org/10.1016/j.ecolecon.2005.04.019>

988 Schroeder, M. (2011). Ought, agents, and actions. *Philosophical Review*, 120 (1), 1– 41.
989 <https://doi.org/10.1215/00318108-2010-017>

990 Schwitzgebel, E. (2019). Belief. In E. N. Zalta (Ed.), *The Stanford encyclopedia of
991 philosophy* (Fall 2019 ed.). Metaphysics Research Lab, Stanford University.
992 <https://plato.stanford.edu/archives/fall2019/entries/belief/>

993 Schwarz, N., & Strack, F. (1991). Context effects in attitude surveys: Applying cognitive
994 theory to social research. *European review of social psychology*, 2(1), 31-50.
995 <https://doi.org/10.1080/14792779143000015>

996 Sen, A. (1995). Environmental evaluation and social choice: contingent valuation and the
997 market analogy. *The Japanese economic review*, 46 (1), 23–37.
998 <https://doi.org/10.1111/j.1468-5876.1995.tb00003.x>

999 Spash, C. L. (2007). Deliberative monetary valuation (DMV): Issues in combining
1000 economic and political processes to value environmental change. *Ecological*
1001 *Economics*, 63 (4), 690–699. <https://doi.org/10.1016/j.ecolecon.2007.02.014>

1002 Szabó, Z. (2011). Reducing protest responses by deliberative monetary valuation:
1003 Improving the validity of biodiversity valuation. *Ecological Economics*, 72, 37– 44.
1004 <https://doi.org/10.1016/j.ecolecon.2011.09.025>

1005 Vatn, A. (2000). The environment as a commodity. *Environmental Values*, 9(4), 493-509.
1006 <https://doi.org/10.3197/096327100129342173>

1007 Vatn, A. (2005). *Institutions and the Environment*. Cheltenham: Edward Elgar.

1008 Vatn, A., & Bromley, D. W. (1994). Choices without prices without apologies. *Journal of*
1009 *environmental economics and management*, 26(2), 129-148.
1010 <https://doi.org/10.1006/jeem.1994.1008>

1011 Verstraete, J.-C. (2005). Scalar quantity implicatures and the interpretation of modality:
1012 Problems in the deontic domain. *Journal of pragmatics*, 37 (9), 1401–1418.
1013 <https://doi.org/10.1016/j.pragma.2005.02.003>

1014 Vincent, M., & Koessler, A. K. (2019). Moral Pluralism in Behavioural Spillovers: Across-
1015 Disciplinary Account of the Multiple Ways in Which We Engage in Moral Valuing.
1016 *Environmental Values*. <http://dx.doi.org/10.2139/ssrn.3354945>

- 1017 Von Neumann, J., & Morgenstern, O. (1944). *Theory of games and economic behavior*.
1018 Princeton, NJ: Princeton University Press.
- 1019 Von Wright, G. H. (1951). Deontic logic. *Mind*, 60 (237), 1–15.
- 1020 Zhang, S., & Schmitt, B. (1998). Language-dependent classification: The mental
1021 representation of classifiers in cognition, memory, and ad evaluations. *Journal of*
1022 *Experimental Psychology: Applied*, 4(4), 375. [https://doi.org/10.1037/1076-](https://doi.org/10.1037/1076-898X.4.4.375)
1023 898X.4.4.375
- 1024 Zhang, S., Schmitt, B. H., & Haley, H. (2003). Language and culture: Linguistic effects on
1025 consumer behavior in international marketing research. In: *Handbook of research*
1026 *in international marketing*, 228.
- 1027 Zografos, C., & Howarth, R. (2008). *Deliberative ecological economics*. Oxford University
1028 Press.
- 1029
- 1030

Table 4: Sample demographics studies 1 and 2

Variable	Study 1	Study 2
Gender	Male: 33	Male: 218
	Female: 66	Female: 533
		Other/NA: 5
Age	Mean: 37.1	Mean: 35.82
	SD: 13.45	SD: 13.78
Income category	<£13,300: 6	<£13,300: 80
	£13,300 - £26,800: 18	£13,300 - £26,800: 170
	£26,801 - £35,700: 24	£26,801 - £35,700: 146
	£35,701 - £54,000: 26	£35,701 - £54,000: 188
	>£54,000: 25	>£54,000: 172
Household size	1: 8	1: 85
	2: 31	2: 240
	3: 27	3: 179
	4: 18	4: 174
	5+: 15	5+: 78

1032 Categorical variables were compared by means of Chi-squared tests, continuous variables by means of Welch
1033 independent sample t-tests. For all comparisons $p > 0.05$.

1034

Table 5: Simple and multiple OLS regressions, DV: LNHP, robust standard errors in parentheses

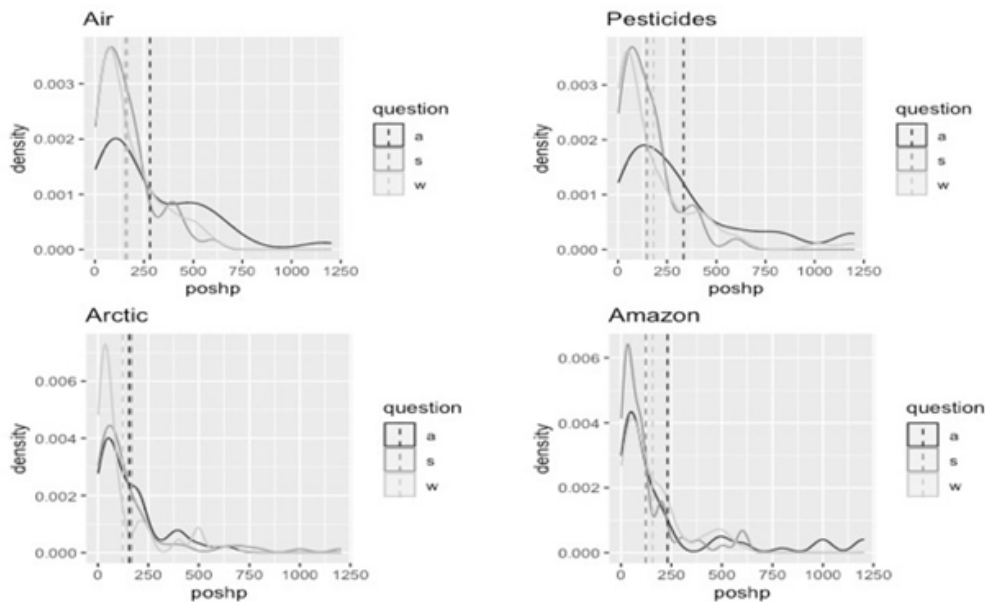
	Air pollution		Pesticides		Arctic Ocean		Amazon rainforest	
	Simple	Multiple	Simple	Multiple	Simple	Multiple	Simple	Multiple
Should	0.03 (0.24)	0.03 (0.22)	-0.02 (0.23)	-0.04 (0.23)	0.33 (0.22)	0.25 (0.21)	-0.31 (0.20)	-0.31 (0.20)
Appropriate	0.53 (0.22) **	0.49 (0.21) **	0.81 (0.21) ***	0.77 (0.22) ***	0.42 (0.22)	0.31 (0.21)	0.05 (0.22)	0.05 (0.23)
Importance		0.03 (0.08)		0.29 (0.07) ***		0.34 (0.09) ***		0.23 (0.08) ***
Age		-0.01 (0.01)		-0.01 (0.01)		-0.02 (0.01) ***		-0.00 (0.01)
Gender: male		-0.08 (0.22)		0.12 (0.19)		-0.31 (0.20)		0.07 (0.20)
Gender: other				-0.14 (0.22)		0.93 (0.32)		0.01 (0.41)
Household size		0.11 (0.08)		0.06 (0.08)		0.09 (0.07)		-0.06 (0.09)

Income category		0.04 (0.06)		-0.04 (0.06)		-0.07 (0.05)		0.02 (0.05)
Constant	4.62 (0.16) ***	4.23 (0.55) ***	4.53 (0.16) ***	3.46 (0.55) ***	4.07 (0.16) ***	3.14 (0.51) ***	4.55 (0.14) ***	3.52 (0.65) ***
N	161	160	160	160	204	204	190	190
R ²	0.05	0.09	0.09	0.19	0.02	0.16	0.02	0.05
Adjusted R ²	0.04	0.04	0.08	0.15	0.01	0.13	0.01	0.01

Note: *p<0.1; **p<0.05; ***p<0.01

1035

1036 Figure 1: Kernel density estimation – positive HP

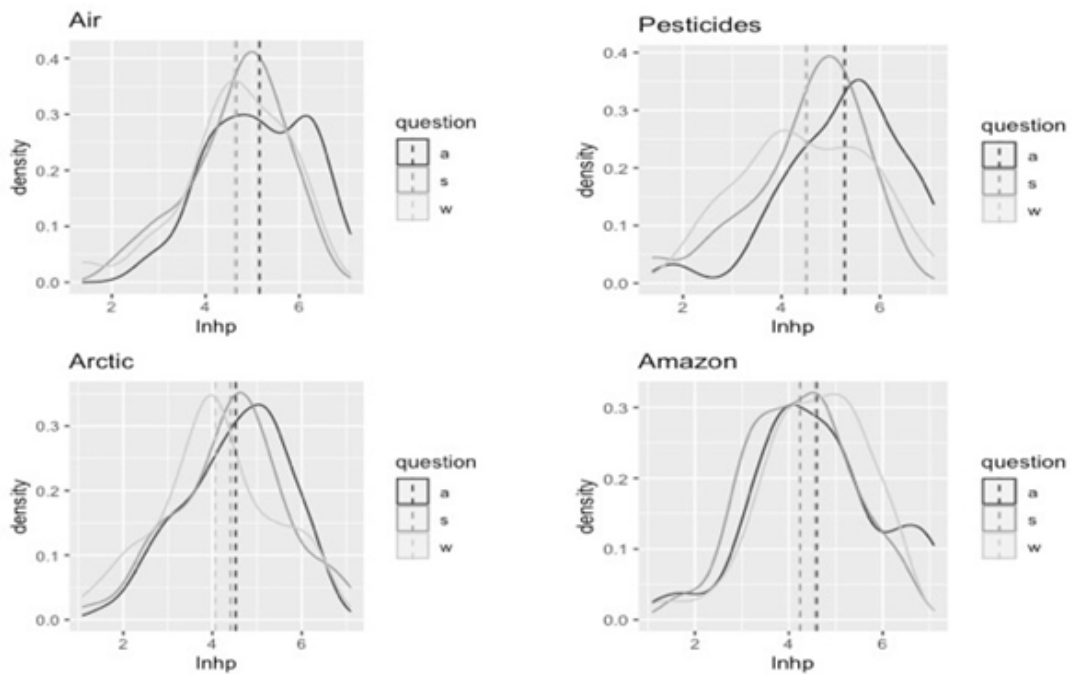


1037

1038

1039

1040 Figure 2: Kernel density estimation – LNHP



1041

1042

1043 Sample study 1

1044 Participants were recruited in 2021 using the online panel Prolific. We posted a task under
1045 the neutral name “household study” that required participants to complete a survey hosted
1046 by Qualtrics. Participants were paid £0.63. The study was open to panelists who were British
1047 citizens and residing in the UK. Participants selected themselves into the study group.

1048 The share of female participants to study 1 was 66%. Compared to the UK
1049 population, there was a higher percentage of women in our sample (percentage of women in
1050 the UK: 51%⁷). The overrepresentation of women needs to be taken into account when
1051 considering the applicability of our results to the general population. In order to gauge
1052 whether men and women responded differently, we compared their answers. Table 1b below
1053 shows averages of use and non-use value ratings for men and women separately.

1054

⁷ <https://www.statista.com/statistics/281240/population-of-the-united-kingdom-uk-by-gender/>

(Access: 16.08.2022)

Table 1b: Value ratings by gender

Scenario	Men		Women	
	Mean (SD)	N	Mean (SD)	N
Air pollution	6.43 ^a (1.90)	7	6.00 ^a (1.56)	15
Pesticides	6.50 ^a (1.24)	12	6.87 ^a (1.30)	15
Average use scenarios	6.47 (1.47)	19	6.43 (1.48)	30
Arctic Ocean	7.50 ^b (1.31)	8	7.53 ^b (1.23)	17
Amazon rainforest	8.67 ^b (1.21)	6	7.63 ^b (1.98)	19
Average non-use scenarios	8.00 (1.36)	14	7.58 (1.65)	36

1055 Values with the same superscript are non-significantly different from each other ($p > 0.05$).

1056 Pairwise t-tests do not detect significant differences between men and women's value
1057 ratings for any of the scenarios with all p-values > 0.05 .

1058

1059 Sample study 2

1060 Participants were recruited in 2021 using the online panel Prolific. We posted a task under
 1061 the neutral name “household study” that required participants to complete a survey hosted
 1062 by Qualtrics. Participants were paid £0.63. The study was open to panelists who were British
 1063 citizens and residing in the UK. Participants selected themselves into the study group.
 1064 Panelists who had participated in study 1 were excluded from participation to study 2.

1065 The share of female participants to study 2 was 71%. Compared to the UK
 1066 population, there was a higher percentage of women in our sample.

1067 We compared answers between men and women by different means(five participants
 1068 who answered “other / prefer not to specify” in the gender question were excluded for these
 1069 analyses):

- 1070 ● We fitted an additional regression model with only the elicitation question, gender
 1071 and their interactions as independent variables
- 1072 ● We conducted pairwise comparisons of men’s and women’s answers

Table 3b: OLS regressions with elicitation question, gender and interactions, DV:
 LNHP, robust standard errors in parentheses

	Air pollution	Pesticides	Arctic Ocean	Amazon rainforest
Should	0.18 (0.23)	-0.01 (0.29)	0.59** (0.26)	-0.30 (0.24)
Appropriate	0.57** (0.24)	0.73*** (0.29)	0.43** (0.24)	0.13 (0.26)
Gender: male	0.24 (0.45)	0.02 (0.33)	0.02 (0.37)	0.11 (0.35)

Should*male	-0.75 (0.60)	-0.05 (0.50)	-0.73 (0.50)	0.09 (0.45)
Appropriate*male	-0.23 (0.56)	0.21 (0.43)	-0.29 (0.54)	-0.23 (0.52)
Constant	4.58*** (0.17)	4.52*** (0.20)	4.02*** (0.19)	4.51*** (0.17)
Observations	159	160	202	190
R ²	0.06	0.10	0.05	0.02
Adjusted R ²	0.03	0.08	0.03	0.00

Note: *p<0.1; **p<0.05; ***p<0.01

1073

1074 Neither the gender coefficients nor the interaction terms between gender and the
1075 elicitation question are significant in this analysis.

1076 Tables 2b below shows the means of positive HP and log-normalized HP for men and
1077 women, respectively.

Table 2b: Means of LNHP, men and women

	Men		Women	
	LNHP (SD)	N	LNHP (SD)	N
<hr/>				

Air pollution				
willing	4.82 (1.37)	10	4.58 (1.11)	44
should	4.25 (1.23)	11	4.76 (0.94)	44
appropriate	5.16 (1.11)	15	5.15 (1.06)	43
Pesticides				
willing	4.54 (1.26)	23	4.52 (1.24)	40
should	4.49 (1.03)	18	4.51 (1.24)	34
appropriate	5.48 (0.77)	19	5.26 (1.26)	35
Arctic Ocean				
willing	4.04 (1.37)	21	4.02 (1.26)	46
should	3.90 (1.40)	24	4.61 (1.23)	51
appropriate	4.28 (1.49)	18	4.55 (1.04)	52
Amazon rainforest				
willing	4.61 (1.26)	21	4.51 (1.11)	47

should	4.40 (0.92)	18	4.20 (1.18)	55
appropriate	4.51 (1.52)	26	4.63 (1.31)	48

1078

1079 We compared men's and women's log-normalized HP by means of Welch independent
1080 sample t-tests and found one significantly different mean:

1081 In the Arctic Ocean scenario, when the elicitation question was "What is the
1082 maximum amount you think you should pay?", log-normalized HP of women were
1083 significantly higher than for men, $t(39) = 2.09$, $p\text{-value} = 0.04$.

1084

1085 Table 5: Means and SD of importance ratings

Scenario	Importance
Air pollution	3.61 ^a (0.89)
Pesticides	3.42 ^a (0.98)
Arctic Ocean	3.99 ^b (0.89)
Amazon rainforest	4.14 ^b (0.83)

1086 Values with the same superscript are non-significantly different from each other ($p > 0.05$).

1087

1088 3. Zero bids

1089 The shares of zero bids for the different scenarios are given in table 6 below.

1090 Table 6: Shares of zero bids

Air pollution	0.036
Pesticides	0.059
Arctic Ocean	0.047
Amazon rainforest	0.046

1091 A Chi-squared test between the four scenarios indicated that there were no significant
1092 differences in terms of the share of zero bids, Chi-squared = 1.04, df = 3, p-value = 0.79.

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