The Influence of Cheap Talk on Willingness-to-Pay Ranges. Some Empirical Evidence

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Abstract: Different instruments have been developed to mitigate the hypothetical bias in contingent valuation surveys. One, labelled "cheap talk", warns participants about the hypothetical bias phenomenon prior to the valuation question. This paper investigates the effect of cheap talk on willingness-to-pay ranges in two case studies. Information on the endpoints of the willingness-to-pay ranges – the maximum amount an individual is sure to pay and the minimum amount above which she is sure to refuse to pay – is obtained by means of a multiple-bounded uncertainty choice and a two-way payment ladder. The main conclusion is that cheap talk has no influence on the width of people's willingness-to-pay range but is effective at lowering the mean willingness-to-pay.

Keywords: Cheap talk; contingent valuation; hypothetical bias; uncertainty; willingness-to-pay range

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1 Introduction

The contingent valuation method is a survey-based technique used to estimate the economic value of non-marketed goods and services. Participants are assumed to answer the valuation question as if they really faced the economic consequences of their statements, which would be to pay the requested amount if the good were provided. However, a well-established tendency for some participants is to state that they will pay for the good, when in reality they would not, or pay less, if placed in an actual purchase situation (for a meta-analysis, see Murphy et al. 2005a).

Among the instruments which aim to mitigate hypothetical bias, "cheap talk" (CT) is probably the most frequently used. It informs participants of the tendency to overestimate the willingness-to-pay (WTP) and asks them to complete the valuation task as if the payment were real (Cummings et al. 1995). This approach has given mixed results. In some studies, CT has been effective at lowering the stated values, while it has been ineffective in others. In order to better understand how CT affects people's decision making, several experiments have been conducted in the past, as explained in the next section.

The contribution of the paper is to test the effects of CT on WTP ranges. A growing number of empirical evidence supports the idea that some people know their WTP within a range (Ariely et al. 2003; Broberg and Brannlund 2008; Hakansson 2008; Ellingson et al. 2009; Hanley et al. 2009), where the range is composed of two endpoints – the maximum amount an individual would definitely pay and the minimum amount above which she would definitely refuse to pay. Whether this range is sensitive to CT is explored in two case studies using the two-way payment ladder and multiple-bounded uncertainty choice formats.

The chapter is organized as follows. Section 2 reviews the literature on CT. Section 3 explains how to explore the determinants of WTP ranges when using the two-way payment ladder and multiple-bounded uncertainty choice formats. Section 4 describes the survey. Section 5 presents the results. Section 6 provides a discussion and section 7 concludes.

2 Cheap Talk

Although the effectiveness of CT at mitigating the hypothetical bias has been extensively tested, results are not conclusive. CT has been effective at lowering the mean WTP in a few studies (Cummings and Taylor 1999; Bulte et al. 2005; List et al. 2006; Landry and List 2007; Mozumder and Berrens 2007; Whitehead and Cherry 2007); however, in others it has been ineffective (Samnaliev et al. 2003; Nayga et al. 2007; Blumenschein et al. 2008; Loureiro et al. 2009), if not counter-productive with the mean WTP increasing rather than decreasing (Aadland and Caplan 2006; Carlsson et al. 2009).

To better understand how CT affects people's decision making, several experiments have been carried out. The effect of CT on protest answers has been tested. Ami et al. (2009) conducted a contingent valuation (CV) survey related to air pollution and used three scenarios, with each participant being assigned one of them. Their results showed that the influence of CT on protest answers depended on the scenario implemented. The effect of CT on internal consistency has also been investigated. In a choice experiment involving sportcards, List et al. (2006) found that the violation of preference consistency was more frequent in the CT treatment than in the hypothetical and actual treatments. People faced with CT were more likely to decline purchase of a card superior to a card they previously consented to purchase.

The combination between the cheap talk and open-ended question format has also been explored. Carlsson et al. (2009) found that CT increases the proportion of zero WTP.

Other studies have explored whether CT is more effective with inexperienced participants than with experienced ones. List (2001) found that unlike inexperienced participants, experienced participants were insensitive to CT in a CV survey dealing with sportcards auctions. Similar results were found by Lusk (2003) in a CV survey dealing with golden rice. Whether CT influences men and women in the same way has also been tested. Ladenburg and Olsen (2009) found that men's stated WTP were not affected by CT contrary to women's stated WTP in a choice experiment survey involving parks. Barrage and Lee (2010) found the same results in a CV survey dealing with pollution. Finally, it has been shown that the length, content or neutrality of the script matters (Cummings et al. 1995; Aadland and Caplan 2003; Aadland and Caplan 2006), and that CT might be less effective when the bid amount assigned in dichotomous choice surveys is low (e.g. Brown et al. 2003; Murphy et al. 2005b).

3 Determinants of WTP Ranges

Similarly to recent studies, it is assumed in this paper that some individuals are unsure about their exact WTP but are able to state a range of values which contains it, where the width of the range reflects the degree of their uncertainty (Flachaire and Hollard 2007a; b; Belyaev et al. 2008; Broberg and Brannlund 2008; Hakansson 2008; Ellingson et al. 2009; Hanley et al. 2009; Belyaev and Kristrom 2010).

To obtain information on the range, a two-way payment ladder (TWPL) (Jones-Lee et al. 1995; Hanley et al. 2009) or a multiple-bounded uncertainty choice (MBUC) format (Ready et al. 1995; Welsh and Poe 1998; Svedsater 2007; Broberg and Brannlund 2008) can be used. In TWPL applications, people are faced with a payment ladder to indicate all the amounts that they would definitely pay, and all the amounts that they would definitely reject to pay. In MBUC applications, they are shown a matrix composed of bids (rows) and degrees of certainty (columns) where the subjects pick a degree of uncertainty to pay for each of the bid amounts. Examples are displayed in Appendices A and B.

With both elicitation formats, the width of the range is known within an interval. If an individual states a definitive "yes" up to 1 euro, a definitive "no" up to 20 euro and states to be uncertain for 10 and 15 euro, the absolute difference between the endpoints of the range lies between 5 (15-10) and 19 (20-1). In the same manner, the relative difference lies between 0.33 ((15-10)/15) and 0.95 ((20-1)/20). When considering several individuals, an interval regression analysis (Cameron 1988; Whitehead and Clifford 2000; O'Garra and Mourato 2007) enables estimation of the mean of the width and exploration of the source of the uncertainty. The interval data regression corresponds to a generalisation of the tobit model, i.e. a model where each interval is censored on both sides.

The exact width can be captured with a follow-up question, as explained in the next section. In this case, a linear regression analysis enables to explore the source of the uncertainty, with the width of the range which takes a value of zero when the two bounds coincide, being regressed against some explanatory variables.

Interval regression also allows for estimation of the mean WTP and the valuation function. With this approach, the WTP of an individual stating a range between 3 and 6 euro, is assumed to lie anywhere between these two amounts. The WTP of an individual stating an exact value, say 4 euro, is assumed to lie within a very tight interval, like between 3.999 and 4.001 euro. A similar approach is sometimes used to compare results from open-ended and close-ended elicitation formats (e.g. Welsh and Poe 1998).

4 Surveys

The influence of CT on WTP ranges is investigated in two surveys taking place in France.

4.1 *Lakes*

The design of the questionnaire was based on a study valuing a decrease of acidity in remote mountain lakes in different countries. The work was a follow-up of the valuation exercise of a European project labelled EMERGE (European Mountain Lake Ecosystems: Regionalisation diagnostics and socio-economic evaluation). For more details, see Bateman et al. (2005).

The structure of the questionnaire was as follows. The first part described the expected increase of acidity in French Pyrenean lakes. Several questions related to respondents' attitudes toward the good were included and a program to avoid the acidity increase was presented. CT was then introduced in half of the questionnaires before the valuation question. The script had a similar length than the one used by Bulte et al. (2005) or Aadland and Caplan (2006), and its content was in line with the one proposed by Cummings and Taylor (1999) –

tendency to overestimate WTP, explanation of hypothetical bias, along with income and substitute reminders. The text was the following:

> "Let me tell you about a problem encountered in similar surveys. People generally state higher amounts when the payment is not actual. Indeed, when we simply express an intention and that the answer does not have actual consequences like here, we tend to forget that our budget is limited and that the money spent for the program will not be available for other purchases. Please consider that the payment is real. For each of the amounts stated, ask yourself whether you would be really willing to pay it."

The central section of the questionnaire was devoted to the valuation exercise. A payment card with 32 bids was presented to the participants who were to complete three successive tasks. The first two tasks – (i) and (ii) – were aimed at getting an interval where the WTP bounds lie, while the last one – (iii) – was aimed at estimating the exact WTP bounds.

(i) First, respondents were to state whether they would definitely pay the lowest bid of the scale. Those saying "yes" were asked the same question for the following bids; this exercise being repeated until they said "no".

(ii) Secondly, respondents were to state whether they would definitely reject the highest bid of the scale. Those saying "yes" were asked the same question for the previous bids; this exercise being repeated until they said "no".

(iii) Finally, they were to state the bound amounts more precisely, i.e. the exact maximum amount they would definitely pay and the exact amount above which they would definitely refuse to pay (instructions are reported in Appendix A).

The last part of the questionnaire contained debriefing and socio-demographic questions related to age, income and educational achievements. Descriptive statistics are displayed in Table 1. In total, 825 citizens of Rouen aged between 18 and 86 were interviewed face-to-face in Fall 2008. The final sample contained 644 participants with 329 participants facing a CT script, after removing protest answers and incomplete questionnaires. The script was well understood as suggested by debriefing questions in focus group and pre-test stages.

Table 1 Descriptive statistics

Variable	Description	Lakes	Elephants
Age	Number of year	38.13 (15.96)	20.34 (1.51)
Income	Expressed in hundred of euro per year (the participant was to pick an interval in which his income lies)	12.82 (8.75)	1.99 (1.15)
Woman	Binary variable (1 if the respondents is a woman, 0 otherwise)	0.55 (0.50)	0.68 (0.47)
Biodiversity	Scale ranging from 1 (“the biodiversity not important at all”) to 5 (“the biodiversity is extremely important”)	-	4.12 (0.86)
-	Scale ranging from 1 (“no knowledge about African elephants”) to 5 (“extremely good knowledge about African elephants”)	-	3.29 (0.91)

Standard deviation is in brackets

4.2 *Elephants*

The questionnaire was based on the one designed by Svedsater (2007) to value the rescue of African elephants through a program led by World Wildlife Fund (WWF); minor changes were made to the core questionnaire, like the currency used (euros instead of pounds) and the position of the socio-economic questions, set at the end. All instructions were written and the same interviewer dealt with all sessions. The first part of the questionnaire described the WWF campaign consisting of creating a protected area in Africa to prevent hunting. Then, the CT script was introduced in half of the questionnaires, the script being like the one used for lakes.

The central section was devoted to the valuation task, which was to pick, for each of the 13 bid amounts, one of the following statements: “I am definitely sure that I will pay”, “I am rather certain that I will pay”, “It is equally likely that I will or will not pay”, “I am rather certain that I will not pay” and “I am definitely sure that I will not pay” (see the Appendix B for an example). No follow-up question was included to capture the exact range like in the survey conducted by Svedsater. However, the bid amounts were presented vertically and not horizontally since people in focus groups encountered this presentation far less difficult.

In the last part, some debriefing and socio-demographic questions were asked. In total, 276 undergraduate students from the University of Rouen aged between 18 and 25 were surveyed at the beginning of their course in Fall 2007. Altogether, 8 sessions took place in the department of science, each class containing between 20 and 40 students. Although students could decline the invitation, very few did so. After removing incomplete questionnaires and

protest answers, 164 usable questionnaires were obtained, with 84 and 80 respectively corresponding to the baseline and CT treatments.

5 Results

The effects of CT on the width of WTP ranges and on the mean WTP are successively considered. Both ordinary least square and interval regressions were computed using STATA 10.0 software.

5.1 *Width of WTP Ranges*

5.1.1 Lakes

The mean of the variable *width* is similar for the two groups as shown by a t-test, regardless of whether the absolute difference between bounds (*width* = *upper bound – lower bound*) or the relative difference (*width* = (*upper bound – lower bound*)/*upper bound*) is considered. In the baseline and CT groups, the mean width is 14.20 and 13.11 respectively when considering the absolute difference ($p_{absolute}$ = 0.527), and 0.46 and 0.47 when considering the relative difference ($p_{relative}$ = 0.919). Furthermore, the median of the variable *width* is similar between the two groups as shown by the non-parametric Mann Whitney test ($p_{absolute}$ = 0.708; $p_{relative}$ = 0.803).

Results of the regression analysis point in the same direction; CT has no influence on the width of the range. The coefficient cheap talk is not statistically significant at 5% level (Table 2). In addition, CT has no influence on the proportion of range responses. The proportion of

participants stating a range is 76.82% in the baseline group and 78.42% in the CT group (p = 0.487).

Table 2 Determinants of width range

	Lakes		Elephants	
	Absolute difference	Relative difference	Absolute difference	Relative difference
Constant	18.461***	0.654***	49.373***	-1.002***
	(3.029)	(0.036)	(9.110)	(0.261)
Age	-0.191***	-0.004***	1.790	-0.007
	(0.070)	0.001	(4.625)	(0.010)
Income	0.067	0.001	-11.786	0.022*
	(0.096)	(0.001)	(9.592)	(0.011)
Woman	4.086***	0.008	15.884	0.012
	(1.595)	(0.023)	(12.152)	(0.032)
Knowledge			-13.580**	0.008
			(5.546)	(0.017)
Biodiversity			5.709	-0.037**
			(5.096)	(0.017)
Cheap talk	-1.760	0.003	-3.041	-0.008
	(1.540)	(0.022)	(11.877)	(0.027)

***, ** and * refer to statistically significant at 1%, 5% and 10% levels, respectively.

Robust standard errors are in brackets

Fig. 1 illustrates the lack of influence of CT on the width of WTP ranges, displaying the empirical survival functions of *width* for the CT and baseline groups. A Kolmogorov-Smirnov test indicates that the functions are similar between the two groups ($p_{absolute}$ = 0.998; $p_{relative}$ = 0.974). The lack of influence of CT on the width can also be illustrated with the mean WTP of the lower and upper bounds (Fig. 2). This type of graph is commonly used in MBUC applications (e.g. Ready et al. 1995; Svedsater 2007). CT provokes a downward shift of similar intensity on both bounds (the mean of the bounds are reported in Table 3).

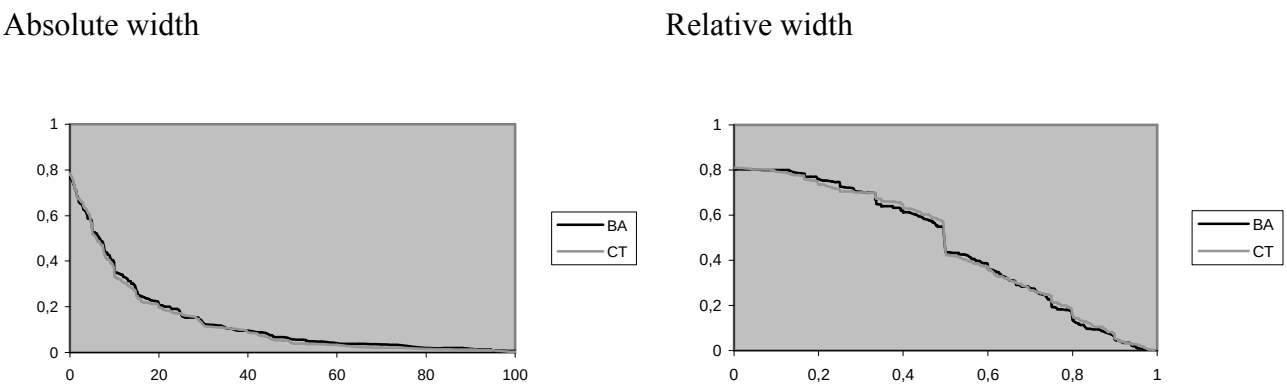

Fig. 1 Empirical survival functions for the range width in the lakes survey

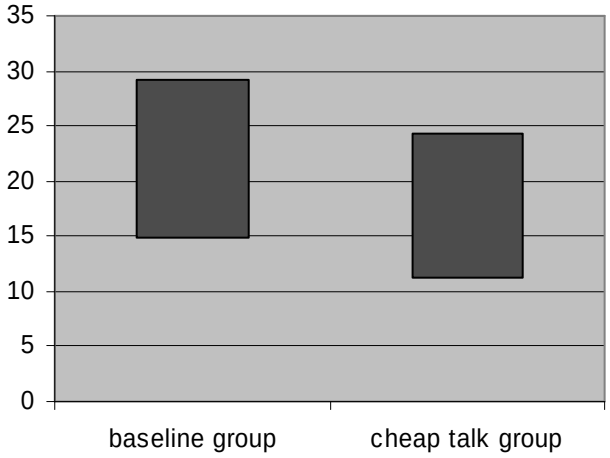

Fig. 2 Willingness-to-pay range in the lakes survey

Table 3 Mean lower and upper bounds

		Baseline group	Cheap talk group
Lakes	Lower bound	14.94	11.20
		(1.60)	(0.89)
		N = 315	N = 329
	Upper bound	29.14	24.31
		(2.21)	(1.70)
		N = 315	N = 329
Elephants	Lower bound	12.26	8.58
		(1.74)	(0.82)
		N = 84	N = 80
	Upper bound	70.52	64.79
		(9.35)	(9.36)
		N = 84	N = 80

Robust standard errors are in brackets

5.1.2 Elephants

Like in the lakes survey, the mean width is not statistically different between the two groups. In the baseline and CT groups, the mean width is 55.90 and 55.75 respectively when considering the absolute difference ($p_{absolute}$ = 0.999), and 0.79 and 0.78 when considering the relative difference ($p_{relative}$ = 0.812). Results of the regression analysis also suggest that CT has no influence on the width of the range (Table 2).

The empirical survival functions for each group are displayed in Fig. 3. The functions can be contrasted with a chi-square test as in Kristrom (1993), since the width is known within an interval. The null hypothesis that the width is generated from the same distribution is rejected ($p_{absolute}$ = 0.752; $p_{relative}$ 0.927). In another graphic, the mean WTP of both the lower and upper WTP bounds is displayed (Fig. 4). Like in the lakes survey, CT simultaneously decreases the lower and upper WTP bounds with similar intensity (the mean values of the bounds are reported in Table 3).

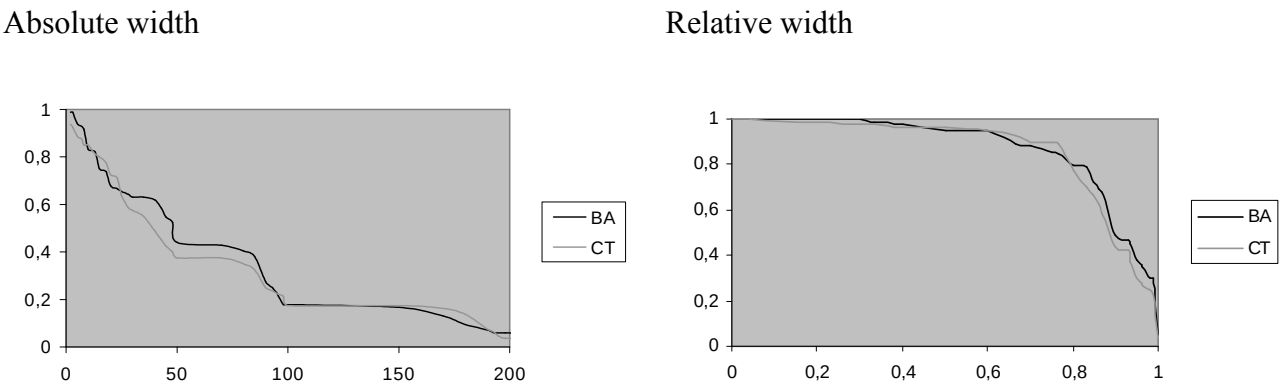

Fig. 3 Empirical survival functions for the range width in the elephants survey

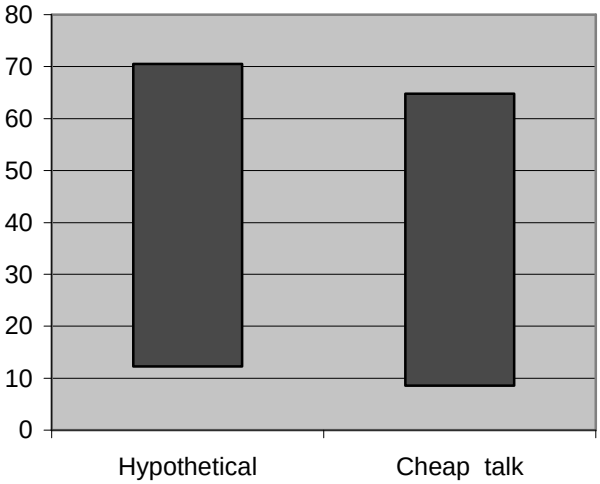

Fig. 4 Willingness-to-pay range in the elephants survey

5.2 *Mean WTP*

5.2.1 Lakes

Table 4 Determinants of willingness-to-pay

	Lakes		Elephants	
	Absolute difference	Relative difference	Absolute difference	Relative difference
Constant	20.141***	20.451***	16.963	10.423
	(3.395)	(3.621)	(23.140)	(10.138)
Age	-0.242***	-0.241***	0.028	0.026
	(0.057)	(0.057)	(0.998)	(0.834)
Income	0.437***	0.439***	-1.185	-1.148
	(0.141)	(0.140)	(1.319)	(1.026)
Woman	7.040***	6.397*	3.962	8.815*
	(2.221)	(3.598)	(3.130)	(4.782)
Knowledge			-2.874*	-2.423
			(1.657)	(1.510)
Biodiversity			4.086**	4.523***
			(1.802)	(1.715)
Cheap talk	-4.209**	-4.758*	-5.006*	1.463
	(2.022)	(2.613)	(2.962)	(4.070)
Cheap talk * Woman		1.246		-9.935*
		(3.969)		(5.981)

***, ** and * refer to statistically significant at 1%, 5% and 10% levels, respectively.

The dependant variable is WTP; Robust standard errors are in brackets

The mean WTP decreases from 20.46 euro in the baseline group to 15.61 euro in the CT group (p = 0.014). This reduction of the mean WTP is not due to a higher proportion of zero WTP (lower bound = upper bound = 0) values in the CT group since the proportion is 4.76% and 3.34% respectively in the baseline and CT groups (p = 0.361). Results from the regression analysis also suggest that CT is effective at reducing the mean WTP (Table 4).

5.2.2 Elephants

Like in the lakes survey, CT is effective at decreasing the mean WTP. It decreases from 25.92 euro in the baseline group to 17.10 euro in the CT group (p = 0.002). Results from the regression analysis also suggest that CT has a negative influence on WTP (Table 4).

6 Discussion

The effects of CT on WTP ranges and on the mean WTP are successively discussed. In addition, other findings related to protest answers, internal consistency and gender are considered.

6.1 *Width of WTP Ranges*

In both case studies, CT has no influence on the width of WTP ranges regardless of whether the absolute or relative difference is considered. To the best of authors' knowledge, the effect of CT on WTP ranges has not been formally tested in the literature, although it has been discussed and there is some indirect evidence as examined below. According to Murphy et al. (2005b, p 332), CT would increase the effort invested in the valuation task and would lead to tighter WTP ranges, although they did not check for it. In the same way, Morrison and Brown

(2009, p 313) argue that CT leads to more accurate responses based on some comments stated in the focus group stage. " (...) some participants indicated that they thought it [CT] helped them to give more accurate responses, as in the following three examples: "Slowed down the decision, made me think a bit longer"; "Made me think how I'd really spend it"; and "I think it is a valid point, I changed my answers… would probably lead to more accurate answers". According to List et al. (2006, p 10), people would commit a higher cognitive effort to retrieve accurate values when faced with CT, although the authors did not formally test it. In the same vein, it is sometimes argued that taking more time and care in answering the valuation question may narrow WTP ranges (Ready et al. 1995, Guzman and Kolstad 2007, Hanley et al. 2009).

At least two reasons could explain why tighter WTP ranges were not obtained with CT. First, people might not increase their effort unless they have some incentives to do so. Guzman and Kolstad (2007) found in a CV survey that people were more inclined to purchase information when their responses were likely to have actual consequences. Secondly, even if the effort invested does increase, factors other than the effort may account for individuals' uncertainty. People may be uncertain about their WTP because they feel uncertain about their future income (Hakansson 2008); also, they may lack practice at answering valuation questions or have little experience with the good valued. Hanley et al. (2009) found, in a TWPL application, that an increase of experience tightens WTP ranges. In their study, the experience was approximated by the number of years an individual had lived in the area, and the number of trips taken to the site.

6.2 *Mean WTP*

The fact that CT reduces the mean WTP in the two studies is encouraging, given the mixed results found in past studies (Cummings and Taylor, 1999; Samnaliev *et al.*, 2003; Aadland and Caplan, 2006; Nayga *et al.*, 2007; Blumenschein *et al.*, 2008). This may indicate that the combination of CT and elicitation formats allowing participants to express their uncertainty range is effective at mitigating the hypothetical bias.

6.3 *Other Findings*

It appears that CT has no significant effect on the proportion of protest answers. The percentage of protest answers is 10.79% and 10.51% respectively in the baseline and CT groups ($p = 0.895$) for the lakes survey, and 6.36% and 8.05% ($p = 0.586$) for the elephants survey.

Likewise, CT has no significant effect on the proportion of response inconsistencies; 7.22% of the participants gave inconsistent responses in the baseline group, and 6.15% in the CT group ($p = 0.561$). Inconsistencies may occur in the lakes survey when people respond to the follow-up question in a way which is in contradiction with their prior answer, such as when an individual declares to be unsure about paying 39 euro, and then stating 39 euro when asked to pick the maximum amount she would definitely pay between 32 euro and 39 euro.

Finally, CT has no significant effect on men's stated WTP in the elephant surveys (Table 4), which has also been observed in two recent studies (Ladenburg and Olsen 2009; Barrage

and Lee 2010). However, CT has a significant effect on both men and women's stated WTP in the lakes survey.

7 Conclusion

The results of two case studies based on different elicitation questions (MBUC and TWPL), goods (lakes and elephants), types of participant (students and citizens) and survey administrations (one-on-one interviews and group interviews) lead to similar conclusions. CT is effective at lowering the mean WTP but has no significant effect on the width of WTP ranges. Additionally, CT has no effect on the proportion of protest answers and on internal consistency.

Acknowledgements

The authors gratefully thank Olivier Beaumais, Olivier Chanel, Soren Boye Olsen and Erik Brockwell for their helpful comments, and Henrik Svedsater for communicating his questionnaire.

Appendix A. Example of Responses in the Lakes Survey

Amounts (per year in euro)
(0.6)
(1.2)
(1.6)
(2)
(2.4)
(2.8)
(3.2)
(4.1)
(4.9)
5.7
(…)
19.4
23
32
39
~~45~~
~~52~~
~~58~~
~~65~~
~~78~~
~~97~~
~~130~~
~~162~~
~~214~~

Would you definitely pay 0.3 euro per year for the program? If "yes", circle the amount and ask the same question with 0.6 euro. Keep going until the respondent says "no"

Would you definitely refuse to pay 214 euro per year for the program? If "yes", cross the amount and ask the same question with 162 euro. Keep going until the respondent says "no"

As you can see, all the possible amounts are not displayed in the table, such as the amounts between 4.9 and 5.7 euro (show in the table), *and between 39 and 45 euro* (show in the table). *With this in mind, please answer the two following questions:*

What is the maximum amount you would definitely pay? *Please pick an amount between 4.9 and 5.7 euro*.

Beyond which amount would you definitely refuse to pay? Please pick an amount between 39 and 45 euro

Appendix B. Example of Responses in the Elephants Survey

Circle one letter for each amount, i.e. one letter per line.

	I am definitely sure that I will pay	I am rather certain that I will pay	It is equally likely that I will or will not pay	I am rather certain that I will not pay	I am definitely sure that I will not pay
2 €	Ⓐ	B	C	D	E
5 €	Ⓐ	B	C	D	E
7 €	Ⓐ	B	C	D	E
10 €	A	Ⓑ	C	D	E
15 €	A	Ⓑ	C	D	E
20 €	A	B	Ⓒ	D	E
30 €	A	B	C	Ⓓ	E
50 €	A	B	C	D	Ⓔ
100 €	A	B	C	D	Ⓔ
200 €	A	B	C	D	Ⓔ
400 €	A	B	C	D	Ⓔ

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