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DYNAMIC PROCESSES IN THE CONTINGENT VALUATION OF AN ENDANGERED MAMMAL SPECIES

ABSTRACT

Reports experimental results involving 204 members of the public who were asked their willingness to pay for the conservation of the mahogany glider *Petaurus gracilis* on three occasions: prior to information being provided to them about the glider and other wildlife species; after such information was provided, and after participants had an opportunity to see live specimens of this endangered species. Variations in the mean willingness to pay are analysed. Concerns arise about whether information provision and experience reveal 'true' contingent valuations of public goods and about the choice of the relevant contingent valuation measure.

Keywords: Contingent valuation, experience, information, reliability, time.

DYNAMIC PROCESSES IN THE CONTINGENT VALUATION OF AN ENDANGERED MAMMAL SPECIES

1. INTRODUCTION AND BACKGROUND

Stated preference methods are widely used in economics to value public goods. Several lists of limitations of these methods have been published (see for example, Carson et al., 2001; Venkatachalam, 2004) but there has been little consideration in the bulk of contingent valuation (CV) studies of variations in individuals' willingness-to-pay arising from dynamic processes (the lapse of time, learning and experience), namely the issue of the *reliability* of a CV measure (Adamowicz 2004, p. 438). This possibly reflects the strong grip of neoclassical modelling on economics which assumes that individuals' preferences are predetermined (compare Green and Tunstall 1999, p. 207).

Few studies separately explored particular aspects of dynamic processes in contingent valuation. Kealy et al. (1988), Loomis (1989) and Teisl et al. (1995) tested the stability of CV values over time, in the absence of specific extra stimulation of the subjects, and found that elicited values remained stable. Characteristic of these studies is the short time-frames involved between tests and re-tests (ranging between two weeks and nine months). Information provision effects have also been studied in the CV literature (Kriström 1999, p. 781). WTP values obtained from CV are known to be sensitive to the quantity and quality of information given about the good being evaluated, especially for less well-known environmental goods (Samples et al., 1986; Bergstrom et al., 1990; Ajzen et al., 1996; Blomquist and Whitehead, 1998; Spash, 2002). However, an important conundrum is whether information provision actually elicits the 'true' WTP value of an environmental good or not, because the amount and nature of the information provided could be influential. The effect of participants' exposure to the actual good being valued (their experience of it) is another influencing factor in the dynamic process of value formation that has been singled out by Reiling et al. (1990) as an area requiring more study. According to Cameron and Englin (1997), information provided to respondents about an environmental good alone "will not be perfectly correlated with the totality of their experience with the good". This is particularly the case with non-use public goods – goods which tend to be amorphous in nature, with which many people may be unfamiliar, and of which people may have no monetary conception (unlike familiar use goods such as grocery items) (see Gregory et al., 1993, p. 181). For these reasons, Kealy et al. (1990, p. 245) argue on the basis of psychology

research (e.g., Snyder and Swann, 1976; Cummings et al., 1986) that the reliability and predictive validity of stated WTP values is limited.

The lack of attention to these dynamics of contingent valuations contrasts with the substantial attention given to the embedding effect (Kahneman and Knetsch, 1992; Blamey et al., 1995, Bennett et al., 1998, Green and Tunstall, 1999), and the standard economic approach to valuation contrasts with that in psychology. According to Green and Tunstall (1999, p. 207), "the psychological model is a process model where the emphasis is upon how beliefs and preferences are formed and learnt, and how information is acquired." Gregory et al. (1993, p. 179) claim that a CV survey should work "to build a defensible expression of value", rather than "uncover" existing value, because some people may not have a prior clear preference for or a monetary conception of certain goods and would only begin to 'construct' these during a CV exercise (Bateman and Mawby, 2004, p. 54). Our approach in this article has much in common with this psychological /behavioural approach because it explores how individuals' contingent valuation of a wildlife species changes with the passage of time through the stages when (i) the environmental good to be valued is first introduced, (ii) information about the good is provided, and (iii) participants experience the environmental good.

This article therefore:

(1) examines how respondents in a sample vary their willingness to pay to conserve the mahogany glider as they are supplied with increased information about it;
(2) examines how their WTP alters depending upon whether they subsequently see the mahogany glider, or not (have this firsthand 'experience' of it);

(3) considers how their WTP may be expected to alter with the efflux of time after they receive information or a stimulus relating to the mahogany glider (such as experience) and then subsequently receive no further stimulus relating to this; and

(4) finally, reviews existing theories on the subject and draws on other that are compatible with the experimental results to explain what was observed.

This research, unlike previous studies, examines these dynamic processes within a single valuation project in a continuous sequence, charts and evaluates the changes in WTP and discusses their implications for contingent valuation.

The species used as a case study here is the mahogany glider *Petaurus gracilis*, a rare and endangered arboreal Australian marsupial (Van Dyck, 1993; IUCN, 2004). It is endemic to a small area in northern Queensland and was thought to be extinct for almost a century until its rediscovery in 1989, an event that received publicity (QPWS, 2001). Its value comprises mainly of non-use value, i.e., existence value (Tisdell et al., 2005). This species was chosen because it is endangered, was not initially well known by participants, can be considered as a public good with mainly non-use value, and it is relevant to the Queensland population sampled. The sample of participants in this study was drawn from the city of Brisbane, Queensland, Australia. The contingent valuation method (Walsh et al., 1984; Cummings et al., 1986; Mitchell and Carson, 1989; Choe et al., 1996) was used to value the glider employing the open-ended single-bid stated preference technique.

2. METHODOLOGY

The open-ended single-bid CV technique used in this study was chosen because it is convenient to answer, does not require an interviewer, does not incur starting point bias (Walsh et al., 1984), and provides a more conservative estimate of WTP than other approaches (Bishop and Heberlein, 1990). Though it is claimed that this technique could induce large non-responses or protest bids (Desvousges et al., 1993; Carson et al., 1996) and may attract strategic bias, it constituted only 15.2%, 7.3% and 11.7% of the responses in each of the three respective stages of our study.

The CV experiment in this study relied on three structured questionnaires called Survey I, Survey II and Survey III. These were designed to elicit information about: (i) the Brisbane public's knowledge of 24 Australian tropical wildlife fauna (which includes the mahogany glider), (ii) their attitude towards these species (how much they liked the species and whether they favoured its survival), and (iii) support for their conservation (how much they are willing to pay/allocate for it).

Potential survey participants were reached using about 1500 letterbox-dropped leaflets distributed in a large and diverse number of suburbs in the Brisbane area. The leaflet stated that the participants were sought for a study to find out about the public's opinions about the

use of Australia's tropical natural resources. It was mentioned in the leaflet that participants will be offered $20 for attendance, a presentation, refreshments and an opportunity to win $200 (all dollar values mentioned in this paper refer to the Australian dollar; AUD1 = USD0.789, as of 16th March 2005). The complete aims of the survey were not revealed to reduce selection bias. From the responding public, a sample of participants, screened to reflect the population demography (age and gender distribution) and their varied socio-economic characteristics, was drawn. It consisted of 204 people.

These participants, invited to attend the survey sessions, were divided into groups of about 40 people. Four groups attended sessions held at the University of Queensland during the working week and weekend, while the fifth group attended a session held in a church hall on a weekend. This was intended to provide adequate flexibility to participants so that attendance can be maximised.

In the first half of the survey sessions, participants were asked to fill out the Survey I form to gather background on the participants and their initial knowledge of the 24 Australian tropical wildlife fauna and information about their degree of support (WTP) to conserve each species. The completed questionnaires were collected and participants were given a tea break. In the second half of the survey sessions, participants attended a presentation by Dr. Steve Van Dyck (the senior Curator of Vertebrates at the Queensland Museum) about the wildlife species they were introduced to in the Survey I, with special focus on the mahogany glider. Afterwards, participants were given coloured booklets containing photographs and brief descriptions of the species, their geographic range, life histories and current status. Participants were asked to take the booklet home along with the Survey II questionnaire and were asked to read their booklet before completing the questionnaire and returning it in the postage pre-paid envelope provided. Survey II contained overlapping questions with Survey I. When compared to Survey I, Survey II would reveal information about variations in the participants' level of knowledge of the mahogany glider, their concern for it relative to the other mammals in the study and how the provision of information (illustrative presentation, booklet of readings) had changed the participants' WTP to conserve the glider.

For Survey III, the participants were invited to visit the David Fleay Wildlife Park on the Gold Coast, Australia (EPA 2003) so that they could see firsthand some of the animals described to them. This stage of the survey occurred four to five months afterwards. Those

who came to the park were given free entry passes. The wildlife park displays threatened Queensland wildlife species that include the mahogany glider. Most, but not all, of the participants who visited the park saw the mahogany glider. After their tour, participants were asked to fill out the third questionnaire, Survey III, which repeated the one-off WTP question for conservation of the mahogany glider posed in Survey I and in Survey II. The purpose of this was to gauge changes in WTP to conserve the mahogany glider after an efflux of time and after firsthand experience of the animal was gained.

3. RESULTS

3.1. Influence of provision of information on WTP of respondents

Consider the influence on all respondents' WTP on average to conserve the mahogany glider of the initial provision of information about it and about all other species in the sample. In doing so, remember that all respondents were provided with much more information about the mahogany glider as a result of a stimulating lecture by Dr. Van Dyck than for other wildlife species. Initially, the stated degree of knowledge that respondents said they had of the glider was low but this rose considerably by the time Survey II was completed. In Survey I, before information provision, only 48% of the 204 survey participants said that they had any knowledge of the mahogany glider, and only 13% of them rated their knowledge of it as very good or good. In Survey II, after the lecture presentation and provision of the booklet of information about all wildlife species being assessed, 95% of the participants said that they know the mahogany glider and the proportion of participants who said that they had very good or good knowledge rose to 74% (Tisdell et al., 2005). Respondents were given a single bid option in Surveys I and II. They were asked:

'If you were asked for a **one-off** donation for a campaign to save the mahogany glider designed to increase public awareness and secure land against clearing, how much would you contribute? Aus$ …….'

The mean WTP of all survey participants in Survey I was $24.99. With the increase in their knowledge, their mean WTP rose to $35.67 (Tisdell et al., 2005), that is by just under 43%. This difference is relatively large and is statistically significant at the 85% confidence level for a two-tailed *t*-test ($t = -1.52$, $p = 0.13$).

Furthermore, another type of WTP question was asked. Respondents were asked to assume that they were given $1000 which they could only use to support the conservation of nine species of Australian mammals. The species in the list were the mahogany glider, tree kangaroo, red kangaroo, koala, northern bettong, northern quoll, dugong, northern hairy-nosed wombat and the eastern pebble-mound mouse. Respondents were asked in Survey I and Survey II to state the percentage of these funds that they would allocate to each of these species. If equally distributed, each species would receive an average allocation of 11.1% of the sum. In Survey I, participants gave the mahogany glider an allocation of 11.8%. In Survey II, they allocated the mahogany glider 18.7% of the sum. Therefore, the proportion of funds allocated to the mahogany glider rose by more than 59% in Survey II, the largest increase in allocation for any species in the set (comparatively, the second largest rise in allocation, for the northern bettong, was only 8%). The increase in allocation for the glider was statistically significant at the 99% confidence level for a two-tailed *t*-test ($t = -7.40$, $p < 0.01$).

3.2. Impact on WTP of those respondents who visited David Fleay Wildlife Park and saw the glider compared to those who visited and did not see the glider

Of the 204 survey participants, 119 visited David Fleay Wildlife Park. Of those who visited, 90 saw the glider and 29 did not. However, only 77 who saw the glider and 22 who did not had responded satisfactorily to all WTP questions in the survey series. Those 99 are the focus of our present analysis.

Figure 1 presents the dynamics of average WTP of those who visited the wildlife park and saw the glider as well as the pattern of those who visited and did not see the glider. We compare the mean WTP of both groups. With information provision, mean WTP of survey participants increased between Survey I and Survey II for both groups (Figure 1). For the group of participants who would later see the glider, mean WTP increased by 19.5% and for the group of participants who would later not see the glider mean WTP increased by 24.1%. These increases are statistically significant based on a paired one-tailed *t*-test, at the 95% and 85% confidence levels respectively ($t = -2.22$, $p = 0.015$; $t = -1.07$, $p = 0.15$).

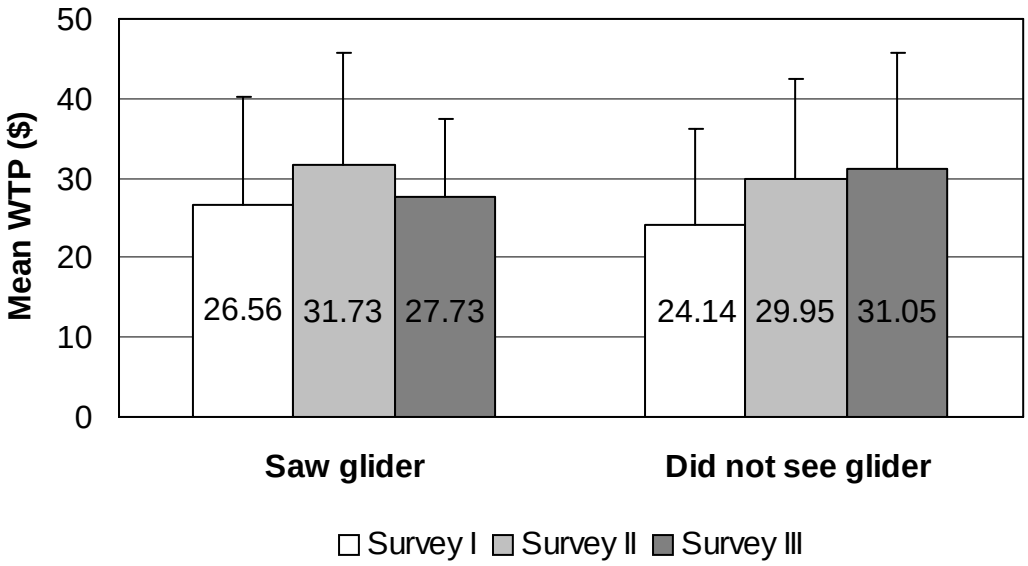

Figure 1: **Comparison of participants' mean WTP for conservation of the glider across all three surveys, divided between those who saw the mahogany glider (*n* = 77) and those who did not see the glider (*n* = 22) at David Fleay Wildlife Park and responded to all WTP questions in survey series. Error bars are at approximately two SE. SD of mean WTP for those who saw glider: Survey I = $60.13, Survey II = $61.89, Survey III = $43.20; for those who did not see glider: Survey I = $27.10, Survey II = $28.40, Survey III = $33.37**

After visiting David Fleay Wildlife Park, the trajectory of the mean WTP of participants (based on Survey III) differed for the two sets of participants. For those who saw the mahogany glider at the wildlife park, their mean WTP fell by 12.6% to $27.73. This change is significant at the 70% confidence level based on a two-tailed *t*-test ($t = 1.13$, $p = 0.26$); mean WTP in Survey II and Survey III can be considered significantly different, but weakly. As for those who did not see the mahogany glider, their mean WTP rose by 3.8% to $31.05, but the change is not statistically significant based on a two-tailed *t*-test ($t = -0.34$, $p = 0.74$); mean WTP in Survey II and Survey III are not significantly different for this group.

3.3. Attributes of respondents who visited the wildlife park compared to those who did not

We found, using a Pearson's chi-square test, that there was a significantly greater proportion (at the 95% confidence level) of participants who stated that they have very good or good

knowledge of the glider in Survey II among those who visited the wildlife park (79.0%) than among those who did not visit the park (64.0%) ($\chi = 5.20$, $p = 0.02$). Participants who stated that they are extremely strong or strong advocates of nature conservation also constitute a significantly larger proportion (at the 90% confidence level) of those who visited the wildlife park (62.2%) than of those who did not visit the park (48.2%) ($\chi = 3.38$, $p = 0.07$). We discovered that a significantly greater proportion (at the 90% confidence level) of participants who are extremely strong or strong advocates of nature conservation among those who said they have very good or good knowledge (60.8%) than among those who said they have poor or no knowledge (44.6%) of the glider ($\chi = 3.69$, $p = 0.05$). In other words, the set of participants who possess very good or good knowledge are more likely than those with poor or no knowledge to be amongst those who are extremely strong or strong advocates of nature conservation. The set of participants with poor or no knowledge, nevertheless, overlaps with the set of participants who are extremely strong or strong advocates of nature conservation, although to a lesser extent than the set of participants with very good or good knowledge. The results accord with the hypothesis inferred from the theories of Ajzen et al. (1996) that personal relevance affects the motivation for knowledge uptake and processing and hence could complicate the problem of information bias in CV (see Turpie, 2003, for a case study).

Given the above results and employing an unpaired one-tailed *t*-test, we tested whether mean WTP stated in Survey I and Survey II would be significantly higher amongst participants who visited the park (Survey I: $26.03; Survey II: $31.34) than amongst those who did not (Survey I: $25.66; Survey II: $33.88). We found no significant difference in mean WTP between both groups ($t_{\text{Survey I}} = 0.04$, $p_{\text{Survey I}} = 0.49$; $t_{\text{Survey II}} = -0.25$, $p_{\text{Survey II}} = 0.40$).

4. DISCUSSION OF RESULTS

Let us now consider possible reasons for the results observed. In turn, let us consider why WTP for conservation of the glider was elevated by the provision of information about it and about other species; the likely normal pattern of decay of such an elevated WTP in the absence of further relevant stimulus; the impact on WTP of viewing the focal animal; and consider whether values in this case pre-exist or are formed by the process of eliciting contingent valuation.

4.1. Elevation of WTP for the conservation of the glider as a result of the provision of information about it

As a result of the experiment performed, there was a statistically significant increase in the WTP for the conservation of the mahogany glider in Survey II compared to Survey I. None of the information supplied about the glider and the other wildlife species was misleading. In our judgement, the information was factual. However, more information was supplied about the glider than other species in the experiment, and this was done in a very interesting and exciting manner by Dr. Van Dyck who is credited with re-discovering the mahogany glider.

As a result of this lecture:

(1) participants' absolute awareness of the glider rose, but more significantly, their awareness of the glider increased significantly relative to the other focal species (for which extra information was also provided);

(2) participants received a greater exposure to concerns for the future of the mahogany glider than for the other focal species; and

(3) no negative attributes were associated with the mahogany glider.

Therefore, the observed results seem consistent with the Fishbein-Ajzen theory of human behaviour (Fishbein and Ajzen, 1975). The information imparted by the presentation influenced the beliefs of participants about the glider and interacted with their attitudes to influence their behavioural intentions, in this case their WTP. According to Green and Tunstall (1999, p. 216), willingness to pay is a behavioural intention in terms of the Fishbein-Ajzen theory.

However, the Fishbein-Ajzen theory needs to be supplemented to explain the results. This is indicated by results from changes in participants' allocation of constrained available funds for conservation of mammal species. In the constrained case, involving the allocation of $1000, the relative increase in funds allocated to the mahogany glider in Survey II compared to Survey I was greater than increases in funds allocated to all other focal mammal species. Information was supplied about all focal mammal species and none of this information was negative. Therefore, it seems likely that the relatively greater 'information' conveyed about

the mahogany glider tended to crowd out participants' awareness of the other mammal species. This probably contributed to the high level of relative elevation in the WTP for the conservation of the mahogany glider. Hence, if another mammal species (for example, the northern bettong) had been the focus of the lecture and if the information about the mahogany glider had been confined to that in the booklet provided to participants, then a much smaller allocation in relative WTP could be expected for the glider and a much larger one could be expected for the northern bettong if it had a true but interesting story. Thus, there is the possibility of a 'substitution effect' similar to that mentioned by Bateman and Mawby (2004, p.49) and demonstrated by Whitehead and Blomquist (1991). Thus, variations in the composition of information provided to individuals, even when all the information provided is truthful, seems capable of having a major influence on their relative levels of contingent valuation.

At least two types of factors play a role in this result. One is the element of awareness as highlighted in the elaborated Fishbein-Ajzen theory (Green and Tunstall 1999, Fig. 8.4). As Bateman and Mawby (2004, p.49) suggest, positive information about goods that people have not thought much about and hence for which they have not formed any clear preferences (e.g., environmental goods with high non-use value) could significantly increase their stated values for these goods. The second factor is the relative crowding out of one set of information by an additional set, as would accord with the theory of Simon (1957) about the limited capacities of individuals for storing and processing information. To some extent also, the results accord with the views of Spash (2002) that information provision can be preference forming. This can occur even when all the information provided is true and is presented in as objective a manner as possible (i.e., avoiding normative statements).

4.2. Decay of WTP following cessation of stimulation

It was noted that WTP for conservation of the glider was greatly elevated in Survey II compared to Survey I following the lecture concentrating on it and information obtained in the booklet provided to participants. What are the chances that such an elevated level of contingent valuation will be maintained in the absence of further stimuli focusing on the mahogany glider?

The WTP value in this case is likely to decline with the passage of time. This may be partly a result of forgetting information gathered initially about the glider or the object being valued;

the neural trace of information that is unused weakens or decays with time (trace or natural decay) (Ebbinghaus, 1885; Wickelgren, 1972, 1974; Wixted 2004, p. 265). Furthermore, information about other subjects will come to hand as time passes, and this will tend to crowd out pre-existing information given limited human capacities. This is a form of retroactive interference (new memories disrupting and pushing out older memories) (Slamecka, 1960; Gleitman, 1971, Bouton, 1993). With the passage of time, awareness of the object being valued, in this case the glider, can be expected to decline in the absence of further stimuli about the glider.

Therefore, following Survey II and in the absence of further focus on the glider, WTP might follow the pattern illustrated in Figure 2 by CDF. There, segment AB of the function for WTP to conserve an environmental good is its 'pre-information' value (corresponds to this Survey I) and C represents its value following information about the good (corresponds to Survey II) and CDF represents WTP subsequently in the absence of further focus on the good. Zarnikau (2003) in his study of WTP for renewable energy investments reported a similar pattern. He found that intensive exposure to information about energy resource issues led to an increase in the number of respondents willing to pay a modest premium to support renewable energy investments, but the average reported premium declined following the polls as very high outlier responses moved to more reasonable values over time. Now in this model, the Kealy et al. (1988) and Loomis (1989) test results may have produced a WTP value at Point A and a re-test result at Point B (no change in stimulation occurs between Point A and B). This may explain the stability of their test-retest results over time.

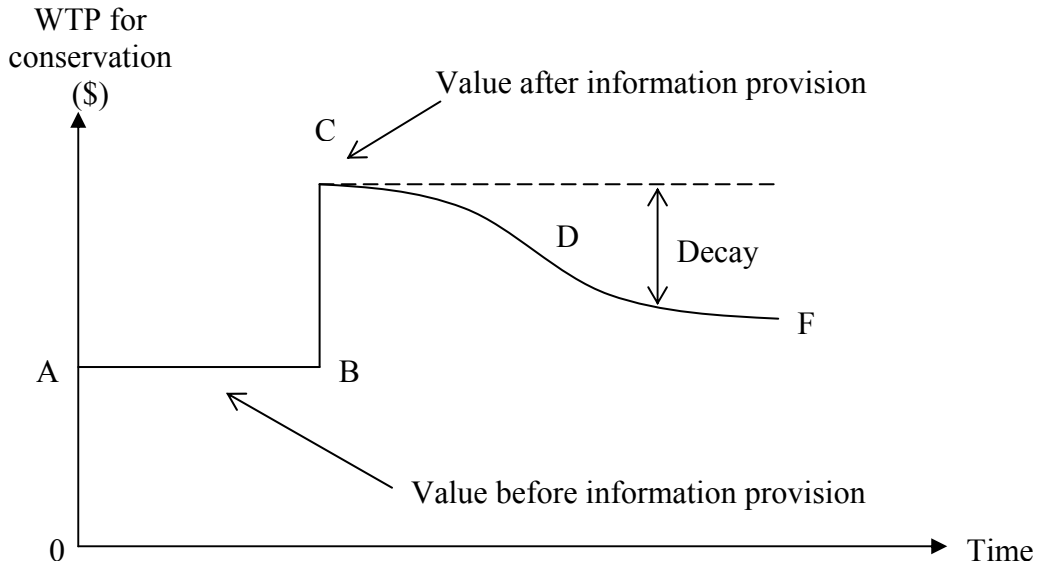

Figure 2: A hypothetical dynamic form of the contingent valuation function where WTP is influenced by information provision.

On the whole, given the theoretical relationship shown in Figure 2, one wonders what is the level of WTP that corresponds to the 'true' contingent valuation of the mahogany glider by individuals. Could it be that there is no such definite value? It seems likely that the most we could determine is a range in which the 'true' value lies.

4.3. Impact on WTP of the experience of viewing a live focal animal

Some of the participants in our experiment had the experience of seeing a live mahogany glider after they completed Survey II. We found that this resulted in a decline in their WTP for its conservation in Survey III compared to the value in Survey II. By contrast, no significant change in this WTP occurred for those who visited the wildlife park but did not see the glider. How might this be explained? It is possible that Dr. Van Dyck's lecture painted the mahogany glider larger than real life, even though nothing false was conveyed in this lecture to participants. Therefore, it is likely that those who saw the glider had negative disconfirmation of their expectations about it.

The mean WTP of participants who saw the glider may have followed a path like ABCDFG shown in Figure 3. The decline from Point D to F may represent a correction or an

overcorrection of participants' valuation of the species after a negative disconfirmation— i.e., results were poorer than anticipated and produced a less favourable evaluation of the good (Cardozo, 1965; see also Oliver, 1977 and Olson and Dover, 1979). In fact, when asked in Survey III their impressions of the glider, 58.6% of the participants who saw the glider said that they thought it was about as they had expected, compared to 36.4% who said it was more impressive than expected. Nevertheless, those who said their impression of the glider was about as expected may not be fully expressing possible dissatisfaction due to compliance bias or "yea-saying" (see Schuman and Presser, 1981; Mitchell and Carson, 1989, p. 238; Blamey et al., 1999, p.126), or to express attitudes on held values, or due to the social-norm effect (i.e., participants give answers to accord with what others would expect of them in the evaluation of a socially desirable good; Green and Tunstall 1999, p. 220).

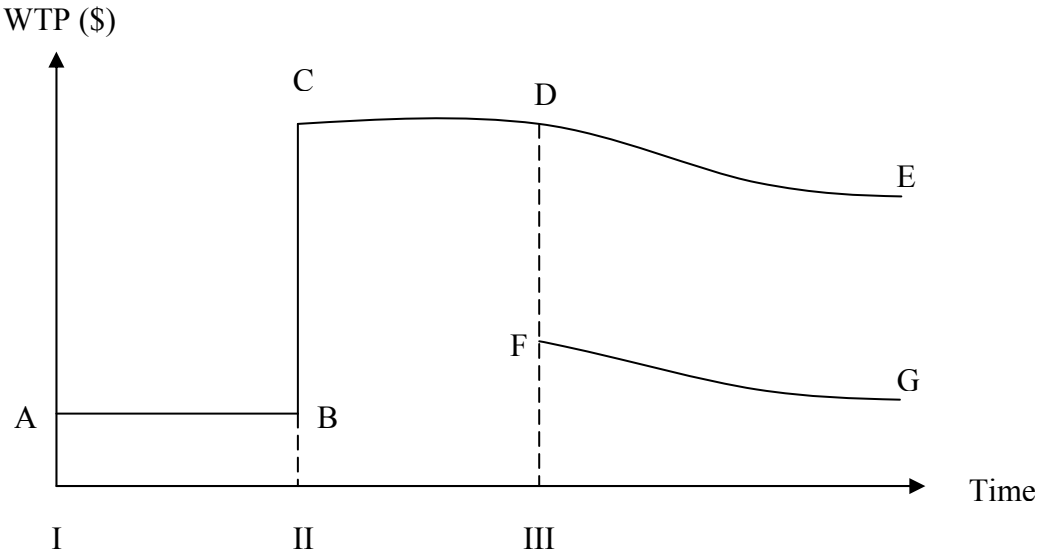

Figure 3: **Mean WTP to conserve the mahogany glider and its dynamics given the following conditions: no stimuli (Survey I), stimulus in the form of presentation and information provision (Survey II) and stimulus in the form of experience (Survey III). In Survey III, there were two outcomes: participants did not see the mahogany glider at David Fleay Wildlife Park (mean WTP represented by Point D) and participants who saw the mahogany glider (mean WTP represented by Point F).**

Amongst those who visited the wildlife park but said that they did not see the glider, the impression left by previous learning/stimulus (illustrative presentation, booklet of readings)

continued as the sole influence on its valuation, hence the similarity of their mean WTP in Survey III with their mean WTP in Survey II. Their mean WTP could follow path ABCDE (Figure 3). Paths DE and FG represent decay in WTP over time as a result of forgetting with the passage of time (natural decay of information) or as a result of retroactive interference, or as a result of reduced relative awareness of the glider for other reasons mentioned earlier. We cannot also dismiss the possibility that an embedding effect was present for this group (compare Green and Tunstall, 1999).

The pattern of mean WTP observed here for the mahogany glider differs from WTP results obtained from Tisdell and Wilson's study of sea turtles (Tisdell and Wilson, 2001). In the sea turtle experiment, participants were probably exposed to a lower initial stimulus than in the experiment involving the glider. Nevertheless, participants who visited Mon Repos Conservation Park (Bundaberg, Queensland) to view turtles were exposed to information about sea turtles in the exhibition and displays section and some movies before proceeding to the turtle viewing section of the park. This exposure (which was probably a little subdued) may have raised their initial level of WTP to some extent, e.g., from B to C in Figure 4. However, those values were not measured. WTP for the conservation of sea turtles was only measured after participants had had an opportunity to view sea turtles. It was found that the mean WTP of those who saw sea turtles was higher than those who did not (Tisdell and Wilson, forthcoming). The mean WTP probably followed a path like ABCDKL (Figure 4) for those who saw the turtles. The prior knowledge/information received by participants seemed to have a positive, reinforcing impact, observed from the rise in mean WTP shown by DK. A positive disconfirmation of expectations occurred. For those who did not see the turtles, the mean WTP path could be ABCDH. A decay effect over time along CH and KL is similar to that described for Figure 3. Or alternatively, it might be like ABCDMN, the gap DM reflecting the disappointment of those who failed to see turtles.

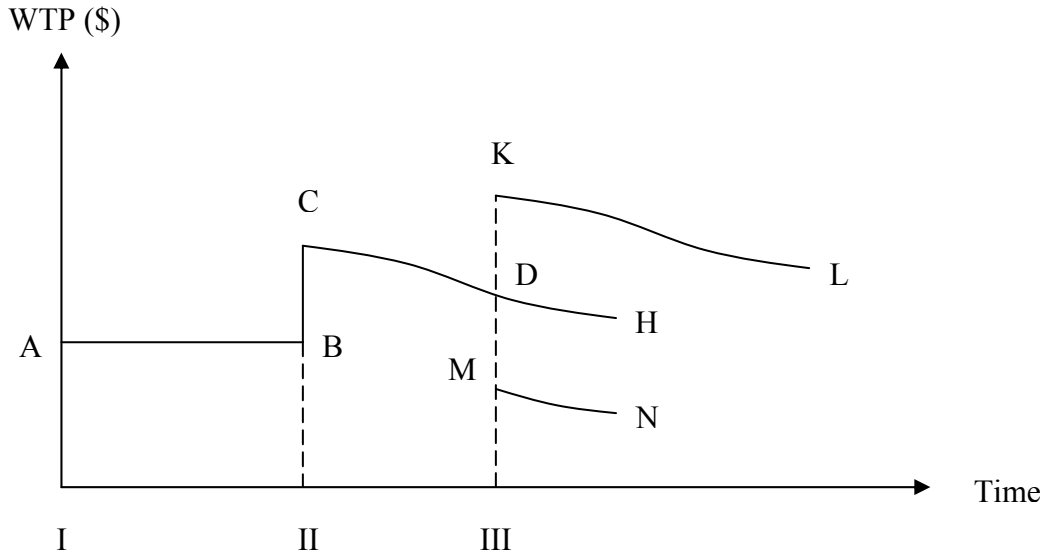

Figure 4: **Mean WTP to conserve sea turtles. At Stage I, initial mean WTP is at the level described by Point A. At Stage II, mean WTP rises to Point C after exposure to information about sea turtles. At Stage III, there were two outcomes: survey participants who saw the sea turtles at Mon Repos Conservation Park had a mean WTP represented by Point K and participants who did not see the sea turtles had a mean WTP represented by Point D.**

The following could be inferred from the two cases we have discussed so far. Elevation in WTP when seeing the animal depends on positive, satisfactory or non-negative experience when seeing the animal (expectations are met or exceeded) and on previous impression of the animal not being larger than life (i.e., the absence of excessive hype or puffery). Conversely, depression or decline in WTP is more likely of an unsatisfactory or negative experience when viewing the animal and/or if previous impression of the animal is greatly inflated or hyped. This hype or puffery phenomenon has been described mostly in relation to consumer products evaluation in the marketing literature (see Olshavsky and Miller, 1972; Kamins and Marks, 1987). However, Kamins and Marks (1987) pointed out that an assimilation effect could occur whereby a slight exaggeration in information provision could still be effective in positively influencing evaluation, provided it is within a reasonable range of expectation. A CV experiment to verify this could be a possible avenue for future research.

4.4. Do true contingent values exist and does the provision of 'true and accurate' information reveal true contingent values?

Individuals have only limited knowledge of many public goods, and hence may not have formed preferences or settled values for these (Diamond and Hausman, 1994, p. 63). This is true for example of many wildlife species. We found it to be so for the mahogany glider, and to be the case for other Australian tropical wildlife species. As Munro and Hanley (1999, p. 277) point out, where we wish to estimate the CV of a good, citizens often have limited information about it. They suggest that the provision of information is justifiable in such a case but they are uncertain about how much information should be provided and emphasise that it should be unbiased. In doing this, they touch on 'the tip of an iceberg', and indirectly raise a major problem.

In a world in which many commodities are to some extent substitutes, the provision of accurate information on one or a few may increase citizens' awareness of these and reduce their awareness of others, especially those for which they have little knowledge. In this experiment, accurate extra information about all mammal species in the sample was provided but relatively more information was presented in an interesting way about the glider. This significantly raised the awareness of participants of the mahogany glider. This raised the relative mean WTP to pay for conservation of the glider. It is hypothesised that if less information had been presented on it and more on another species in an interesting way, such as the northern bettong, then relative valuations would have altered in favour of the latter species. Furthermore, pre-existing levels of knowledge may be uneven between respondents. How do we get the balance of information 'right' if WTP depends on this balance? This is a major dilemma and is one of the reasons why Gregory et al. (1993) suggest that the CV approaches should strive to *build* defensible values. They propose a multiattribute utility survey as part of a CV to aid preference construction and help reduce the embedding problem (Gregory et al., 1993, p. 191). However, Pouta (2004, p. 232) reports that due to the complexity of carrying out such surveys, results have not been very satisfactory so far (e.g., Russell et al., 2001). But this approach is still evolving; Schiller et al. (2001), for example, have proposed guidelines to improve the communication of complex information about environmental goods to the public in such valuation undertakings.

The psychological set or the personal relevance of information and experience provided to individuals is likely to influence the way in which they respond to information and

experiences provided to them and hence the contingent valuation that emerges. Thus, CV may show path dependence. Furthermore, an interviewer may consciously or subconsciously raise the perceived personal relevance of a focal object to respondents. This could, however, conceivably block out to some extent the personal relevance of other objects and thereby bias estimates of WTP. Thus, the more information that is provided about a particular focal good, the more likely 'bias' is to arise, given the partial nature of the exercise and the fact that human beings only seem capable of taking into account a limited amount of information at one time. This gives particular force to the contention that information provision tends to form preferences in many cases involving environmental valuation (Spash, 2002). Separately, Svedsäter (2003, p.134) points out that the WTP value for an environmental good may, after all, not be entirely an expression of the respondents' valuation of the good *per se*; it could be an expression of well-developed opinion of or stand towards a broader, entrenched environmental concern (hence the stability in WTP) (Schuman and Presser, 1981).

5. CONCLUSION

This case study reveals that variations in information provided to citizens and differences in their experience with environmental commodities can substantially alter their stated valuations of these commodities. These variations depend on the patterns of information conveyed and the nature of the experiences of citizens with an environmental good. Even when only 'authentic' information and experiences are provided to individuals, the presentation of different sets of these is capable of generating considerably different relative valuations of commodities and objects. Thus, it is not merely a matter of whether to convey accurate information to individuals but also a matter of deciding on the appropriate set of a large variety of possible sets of accurate information to convey if one wishes to elicit the 'true' preferences of individuals. Then, a 'standardised system' might be desirable so that different valuation exercises can be meaningfully compared. The multiattribute utility/CV approach may be one way to deal with this. The incorporation of the experience element in the CV could be fruitful in value formation.

However, this whole matter is complicated by the fact that the provision of information and experiences alters subjects' *relative* awareness of objects. One, therefore, wonders if WTP values have an objective and independent existence of the type suggested by Hanley et al. (1997, p. 377) and Cummings et al. (1986). If so, finding such values would be a formidable task given the type of complications identified in this paper. The best one might hope to do is

to discover a range in which such values might lie. The magnitude of this problem is brought home by the type of dynamic paths of valuation described above. In considering such paths, one is left wondering which value on the path is the appropriate one to choose for valuation. For example, is it the value corresponding to Points B, C, D or F or neither of these in Figure 2? If one selects the value immediately or soon after information or a favourable stimulus is given to respondents about the good to be valued, the good may be overvalued because of their reduced awareness of *other* related objects. But then, what is the appropriate degree of awareness? Then there is the issue of allowing a sufficient time-gap after a stimulus to re-evaluate CV.

Future research is required to determine the pattern of WTP (i) over a longer time-frame (say, more than one year, to verify whether WTP remains statistically stable or subsides), (ii) by providing adequate information and framing the question correctly (taking into account the hype/puffery effect and embedding), and (iii) if possible, by providing experience of or a 'feel' for the environmental good concerned so that a better appreciation of it is attained. Loomis (1989, p.83) also stressed that for a long-term time path evaluation for natural environments, panel data is required. Repeating the experiment with a comparable sample taking into account all the preceding factors may be worthwhile to test for reliability.

The empirical results reported in this paper accord with several of the recent suggestions made by Bateman and Mawby (2004). For example, the mahogany glider is an environmental good having very high non-use value (Tisdell et al., 2005) and respondents' initial knowledge of it was poor. In this circumstance, Bateman and Mawby (2004, p. 49) predicted that provision of information about such a public good could significantly elevate its stated value. This elevation happened in the case of the mahogany glider but the dynamic analysis indicates that the effect of this elevation was not sustained. It is apparent that adequate consideration of dynamic factors is required for us to obtain a better appreciation of stated valuation.

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