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ECONOMIC THEORY, APPLICATIONS AND ISSUES

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**KNOWLEDGE AND THE VALUATION OF PUBLIC GOODS AND
EXPERIENTIAL COMMODITIES:
INFORMATION PROVISION AND ACQUISITION**

ABSTRACT

Provides empirical evidence of significant lack of relevant knowledge of some public goods and experiential commodities. It also analyses whether information provision about the attributes or characteristics of commodities is likely to result in individuals' finding their 'true' preferences for these, and identifies the type and nature of information that should be conveyed to enable commodities to be appropriately valued. It also recognizes that sometimes commodities may contain attributes that individuals are unable to evaluate. Furthermore, individuals acquire and filter information about commodities. Factors influencing these activities require analysis. A cost-benefit analysis of information acquisition suggests that individuals are less likely to acquire information about public goods than private goods. Even in a world in which underlying meta-values of commodities are stationary, perceived values of commodities may show dynamic variation due to elicitation procedures and the provision of information about them, followed by crowding out and forgetting of information about the focal commodities. This possibility makes it difficult to determine the appropriate value to use in contingent valuation studies for policy purposes, and in similar approaches to determining individuals' valuation of commodities. Policy consequences of this are considered.

Keywords: behavioral economics, contingent evaluation, experiential commodities, information, knowledge, public choice, public goods, nature conservation, valuation

KNOWLEDGE AND THE VALUATION OF PUBLIC GOODS AND EXPERIENTIAL COMMODITIES: INFORMATION PROVISION AND ACQUISITION

1. Introduction

Individuals' valuation of commodities plays a central role in mainstream normative economics, or welfare economics, because it is a consideration in judging the social optimality of the allocation of limited resources, including their conservation. Mainstream economics assumes that individuals are knowledgeable about the existence of commodities, are aware of their relevant qualities and know their preferences for the available commodities. While complete knowledge of the type assumed in neoclassical theory is stronger than is necessary for perfectly rational behavior (Tisdell, 1996, Chs. 2 and 3), sometimes individuals lack sufficient information about commodities to value them or to value them in a rational manner.

Such deficiencies in knowledge may occur relatively often for public goods and for experiential private goods. Empirical evidence of such deficiency is given in this essay using knowledge of wildlife species (these can be regarded as public goods or mixed goods), as an example, and by considering visits to a relatively remote national park in Australia, which for first-time visitors is essentially an experiential private goods, that is goods that individuals cannot (adequately) evaluate until they have consumed or experienced them. Users of the contingent valuation method (and other stated preference methods) widely recognize that individuals' knowledge about objects to be valued may be deficient. They, therefore, usually provide respondents with background information about the object(s) to be valued in order to obtain 'more informed or accurate' valuations from them. However, Spash (2000, 2002) has claimed that such information provision can be preference forming rather than merely informative. The effect of information provision on valuations will be analyzed theoretically in this article. The role of information acquisition by individuals for the purpose of determining their valuations of commodities will be discussed, and dynamic aspects of variations in economic valuation will be considered. Policy and normative aspects of each of these matters are given particular attention.

2. Empirical Evidence of Lack of Relevant Knowledge of Some Public Goods and Experiential Commodities

Lack of knowledge of natural commodities, such as wildlife species and natural areas, provides an illustration of the possible extent of deficiencies in the public's knowledge of available public goods and experiential goods. Two empirical Australian examples are considered. One provides results from a survey of sample of 204 persons 18 years old and over selected so as to be representative of the population of Brisbane, the capital of Queensland. The second is based on a survey of visitors to the Jourama Falls section of Paluma National Park, located between Townsville and Cairns in Northern Queensland.

In the survey conducted in Brisbane, respondents were asked to state whether they knew selected wild species of Australian birds, mammals and reptiles, and if they knew them, to indicate on a Likert scale how well, in their view, they know them. The relevant results for the bird species are shown in Table 1. Information about their stated knowledge of respondents about mammal and reptile species is available in Tisdell and Wilson (2006). These results show considerable lack of knowledge of some species and considerable variation in knowledge of the focal species.

Table 1 Percentage of a sample of 204 members of the Brisbane public indicating no or poor knowledge of the Australian bird species listed. Species ordered in terms of increasing frequency of complete ignorance

Species (Common names)	Scientific Name	Not known	Known but poor knowledge (%)	Do not know or have poor knowledge (%)
		(1)	(2)	(3)
Australian magpie	Gymnorhina tibicen	2.9	28.4	31.4
Kookaburra	Dacelo novaeguineae	3.4	25.0	28.4
Southern cassowary	Casuarus casuarius	11.8	44.1	55.9
Brolga	Grus rubicundus	18.6	47.1	65.7
Red-tailed black cockatoo	Calyptorhynchus banksii	19.1	53.9	73.0
Golden- shouldered parrot	Psephotus chrysoterygius	71.6	19.6	91.2
Eclectus parrot	Eclectus roratus	75.0	16.7	91.7

All the bird species listed in Table 1 occur in the state of Queensland where the respondents resided. Knowledge of the species varied greatly. While only 2.9% of respondents stated that they did not know the Australian magpie, 75% said they had no knowledge of the Eclectus parrot. The two best known species occur in Brisbane, whereas the least known species are confined to the north of Queensland. The Queensland state government is primarily responsible for the conservation of wildlife in Queensland. The fact that some northern wildlife species are not known or are poorly known in the southeast of Queensland, the most populous area of this state, implies that many individuals have not been able to value them or can do so only imperfectly. This may limit political support for their conservation; there may be less political support or average for the conservation of northern species than might be expected if the public happened to be better informed about them. Tisdell and Wilson, (2006) found that respondents' support for the conservation of northern species increased when they were better informed of their attributes. This presumably was because the northern species were on average found by respondents to have more favorable attributes than respondents knew of initially. However, one would expect valuations to alter in the opposite direction if respondents were to learn that those species had less favorable attributes than they were initially aware of.

A survey conducted by the author of visitors to Jourama Falls in northern Queensland also reveals that a large proportion of visitors were ignorant, or relatively unaware, of the attributes of this site prior to visiting it for the first time. For first-time visitors, visits were essentially an experiential private good.

In my study of a sample of 451 visitors to the Jourama Falls section of Paluma National Park in Northern Queensland between Townsville and Cairns, 69% of the sample reported that they had not previously visited it. Considering that about 43% of the 431 visitors were from overseas, this is not surprising.

The sampled visitors were asked how they would rate their knowledge of this site (Jourama Falls) before leaving on their visit to Jourama Falls. They could answer on a scale – excellent, very good, good, poor and non-existent. More than half (52.1%) said that their knowledge was poor (25.7%) or non-existent (28.4%). Approximately 27.4% of respondents said that they visited the site almost by chance or that chance was an important element in their decision to visit it. In addition, 27.3% of respondents reported that they spend little or not item in gathering information about tourism places and attractions to visit when they are on holidays in a region, 52.3% reported spending a moderate amount of time on this, and 7.8% reported spending a lot of time. Therefore, visitors to sites, such as Jourama Falls, appear to vary considerably in how well they are informed prior to visiting these. Most of those who visited Jourama Falls for the first time either had no information about it or were poorly informed.

3. Information Provision and Valuation

The above examples indicate the occurrence of considerable lack of knowledge and variation in knowledge of commodities by the general public. Economists, particularly those involved in contingent valuation studies, have recognized this, and have attempted to counteract it by providing relevant background information in advance to respondents about commodities that they wish to have valued. However, Spash (2000, 2002) has raised the possibility that this could lead to bias. He does not analyze the possibilities but merely states that information provision, while it can be informative, may also be preference forming. Analysis is needed to clarify Spash's hypothesis. Lancaster's theory of demand (Lancaster, 1966) provides a possible basis for this analysis.

To simplify the subject, assume that there are two commodities, A and B , to be valued by an individual, and that the valuation of each depends on the extent to which they contain two characteristics or attributes, x_1 and x_2 . In a world of perfect knowledge, an individual's valuation function for each of these commodities might be expressed as

$$U_A = U_A(x_{1A}, x_{2A}) \quad (1)$$

$$U_B = U_B(x_{1B}, x_{2B}) \quad (2)$$

The individual's preference relationship between the two commodities is assumed to be determinant rather than stochastic. This meta-preference function is supposed to be the individuals 'true' one, not a normative one.

However, the individual's knowledge of the commodities may be deficient. The individual may not know of the existence of one or more of the commodities, or may have very poor knowledge of their attributes. Therefore, information may be provided to the individual about the existence of the commodities and their attributes in an attempt to elicit the individual's 'true' valuation of these.

Assuming that the individual has a pre-existing meta-preference function based on the attributes or characteristics possessed by commodities (cf. Lancaster, 1966), then the provision of complete information about the characteristics of the focal commodities should enable the individual to value these accurately if the individual can comprehend and process this without difficulty. However, if the information imparted is complex and considerable, the individual may experience bounded rationality constraints in processing it. Usually complete information is not conveyed; only selected information judged by the observer to be most relevant. The fact that only limited information is conveyed raises the question of what is the most relevant information to convey, what type of information needs to be relatively accurate, and what type is relatively unimportant for preference formation. A choice problem arises.

For example, valuation may be much more sensitive to variation in one attribute than another. In equations (1) and (2), the change in U_A and U_B for a change in x_2 may be much greater than for a variation in x_1 . In such a case, it will be more important to convey accurate information about attributes x_2 than x_1 because valuation is most sensitive to the former.

In the case indicated by equations (1) and (2), information provision is not fundamentally preference forming since a meta-preference function is assumed to exist based on characteristics of commodities. Adequate information provision could enable the individual to make up his or her mind about whether or not he or she prefers A to B and to value the alternatives accurately if bounded rationality is not a constraint. There is, however, always a risk that information provision will be inadequate, or unbalanced, and add to inaccuracy in valuation.

For example, consider a hypothetical case. Suppose that in a fully informed state that the individual would prefer A to B but is initially in an uninformed state. If accurate information is revealed to the individual about x_{1A} and about x_{2B} , but no information is provided about x_{2A} and x_{1B} , the individual may express a preference for B over A . If on the other hand, accurate information is provided about x_{2A} and x_{1B} , but no information about x_{2B} and x_{1A} , A may be stated to be preferred to B . Although meta-preferences are constant and all information provided is true, differences in the sets of information revealed alter the individual's stated preferences for the focal commodities. Thus, the information provided does not alter meta-preferences but changes the preferences for the focal commodities. Which set of preferences does Spash (2000, 2002) have in mind?

Nevertheless, meta-preferences based on possible attributes or characteristics of commodities may not always exist, or they may occur imperfectly. For example, some individuals may be unfamiliar with some possible attributes of commodities. As a result of this lack of experience, individuals may be unable to evaluate the commodities or they may be unfamiliar with the combinations of characteristics contained in some commodities. The value of attributes may not be additive. In such cases, information provision, especially if accompanied by any normative statements, might play a role in the formation of values about attributes, as suggested by Spash (2000, 2002).

In reality preference functions for attributes of commodities are probably heterogeneous. Some may be as well specified as in equations (1) and (2) and others may be of the nature suggested in the previous paragraph.

However, it should be pointed out that one reviewer of this article objected to the above formulation. This reviewer stated: “I do not share the author’s pessimistic view of people’s ability to process information provided to them. And even if people’s information is unequal, ‘as they will only store or retain information that they judge to be of interest or of value to them’, this equal information provision will to a large degree reflect people’s pre-existing preferences, and as such should not lead to a distorted measurement of people’s ‘true’ preferences. Moreover, concerning the ‘inadequate or unbalanced’ provision of information, if the point of providing information is to fill people’s information gaps (that are due to ‘biased’ self-driven information search), this situation should be highly unlikely”.

In response, I do not believe that individuals are mere receptors of information supplied for them. They exercise various degrees of skill and judgment in processing communications and in doing so may be influenced by their prior beliefs to some extent. However, prior preferences are not necessarily ‘true’ preferences because they may have been based on faulty or inadequate information. The reviewer’s scenario suggests that all information provision normally confirms pre-existing preferences. However, empirical evidence shows that this is not so. For example, as illustrated in Tisdell and Wilson (2006), respondents altered their preferences for conservation of various wildlife species considerably after they were provided with extra information about the focal species. If the reviewer’s hypothesis holds, this should not have happened.

The second point about filling in of information gaps, suggests that the researcher should first identify those gaps before beginning a major survey. This might possibly be by undertaking a pilot survey. However, if the gaps in knowledge of those to be surveyed are quite large, decisions may still have to be made about how much instruction and what information to convey. Consequently, the information selection problem does not disappear.

4. Information Acquisition

Individuals are not mere receptors of information. They filter the information provided to them, and are also active in acquiring information. They may only store or retain information that they judge to be of interest or value to them. This is a psychological aspect worthy of further study. Similarly, we need to study factors that influence the acquisition of information by individuals.

One influence on the individual's acquisition of information may be the individual's perceived net benefit from collecting the information compared to the cost of collecting it. In general terms, it will only be economically worthwhile collecting information about the attributes of a commodity if the expected net benefit of doing so exceeds the cost of gathering the information. Furthermore, it will only pay to collect information about a commodity (for which information gathering is at all beneficial) up to the point where the extra cost of collecting the information equals the extra expected benefits from doing so (Baumol and Quandt, 1964).

Given this view, there will be little economic incentive for individuals to become well informed about the attributes of public goods (see Downs, 1957) compared to private goods, even when the provision of public goods has a high economic value for the individuals. This is because the individual has direct control over his or her supply of private goods; the supply depends only on the payment of their market price. On the other hand, the supply of public goods involves collective or political processes over which the individual has limited (virtually no) control because of the large number of 'players' involved. Thus, even when a public good is found to be highly valued by an individual, the individual's knowledge may have a very low probability of influencing its supply. If this is so, self-interested rational individuals have little or no incentive to collect information about the nature of public goods. Consequently, the public's knowledge about the attributes of public goods is likely to be considerably less than for private goods. This may result in less accurate valuation of the public goods compared to private goods.

Of course, knowledge is not gathered purely for economic reasons. Some individuals are motivated by curiosity to gather information about public goods and other subjects. In some cases, information-gathering can become a path-dependent process; individuals may become fascinated by particular types of public goods, for example, and 'specialize' in collecting information about these.

Niemeyer (2005), after discussing aspects of value change as a result of information provision, highlights the relevance of path dependence in information collection and valuation. Niemeyer (2005, p.266) states: "Changes to attitudes, or subjectivity will also bear upon the acquisition of information for judgment purposes (Elster, 1983, p.19). If this

contention is correct, a positive feedback occurs where increased valuation of nature stimulates the desire for more knowledge about nature ...”.

Nevertheless, it should also be recognized that individuals sometimes want to experience commodities without being well informed about them in advance. Sometimes, individuals value trying the ‘unknown’ and experiencing novelty and surprise. There is some evidence that a subset of first-time visitors to Jourama Falls followed this perspective in their holiday behavior. They did not seek to be well informed before visiting many holiday attractions.

5. Non-Stationarity of and the Dynamics of Valuation

Even in otherwise stationary conditions (1) the process of eliciting individuals’ valuation of commodities, as well as (2) the provision of information about poorly known commodities or experiences with these, can alter individuals’ stated valuation of these.

Experiences can include seeing a species for the first time at some stage in its life-cycle and possibly interacting with it. This may provide individuals some information about the species as well as an emotional experience. When such an experience is positive, available evidence indicates that valuation of the object experienced increases, at least initially. For example, Tisdell and Wilson (2005) found, from a sample of turtle-watchers at Mon Repos Beach near Bundaberg in Queensland, that their valuations of sea turtles were positively related mathematically to whether or not they had observed turtles during their visit to this rookery. This suggests it was a favorable experience to have observed them.

The first mentioned effect (1) is a Heisenberg or observational effect or arousal effect and arises from the mere process of eliciting values. It may either elevate or depress individuals’ values existing prior to elicitation of values. Elevation of values via the Heisenberg effect seems more probable if the commodity to be valued is liked, and depression may occur if the commodity has negative associations. A Heisenberg effect could arise because the process of elicitation results in arousal and or focus of the respondents on the object(s) to be valued. Given bounded rationality which implies among other things limited capacity to store, span and monitor information, this may reduce the subject’s concentration on or consideration of other objects. Thus, the individuals’ span of attention becomes relatively focused on the objects to be valued during the elicitation process and this can give rise to a Heisenberg effect.

Very often in contingent valuation studies, individuals are presented with background information about the objects or commodities to be valued and then within a short period following this, elicitation of values occurs. The provision of information is likely to add to the arousal or Heisenberg effect (Heisenberg, 1930), and may also result in subjects significantly altering their pre-existing valuations of the commodities being considered.

When the information provided to subjects about a commodity reveals positive attributes previously unknown to the subjects, elevation in their values for it can be expected following information disclosure about it. The opposite result can be expected when negative attributes previously unknown to the subjects are revealed to them.

Suppose that elicitation of values and provision of information about the attributes of a commodity are considered theoretically as simultaneous activities. Then in a stationary world, the values that an individual places on a commodity, such as a public good, might follow a path like that shown in Figure 1 if information provision initially enhances the individual's valuation of the focal commodity, or the path shown in Figure 2, if information provision depresses the individuals' valuation of the focal commodity. Where positive information about the commodity being evaluated is provided and elicitation of the stated value of the commodity occurs at t_1 , the value placed on the commodity by the subject may follow a path typified by *ABDEFG* shown in Figure 1, a pattern similar to that observed by Zarnikau (2003) for support for investment in renewable energy following intensive provision of information about the commodity. Where negative information about the commodity is revealed at t_1 , a path like *HIKLM* in Figure 2 might apply.

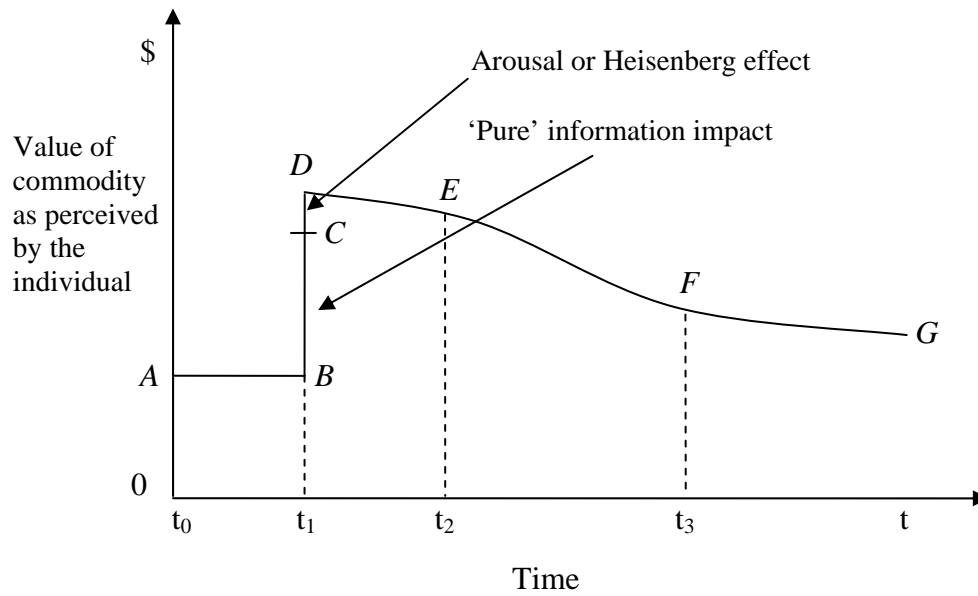


Figure 1 Subject's valuation relationship assuming that information provision at t_1 provides a positive impression of the commodity to be valued. Here elicitation and information provision are assumed to be simultaneous.

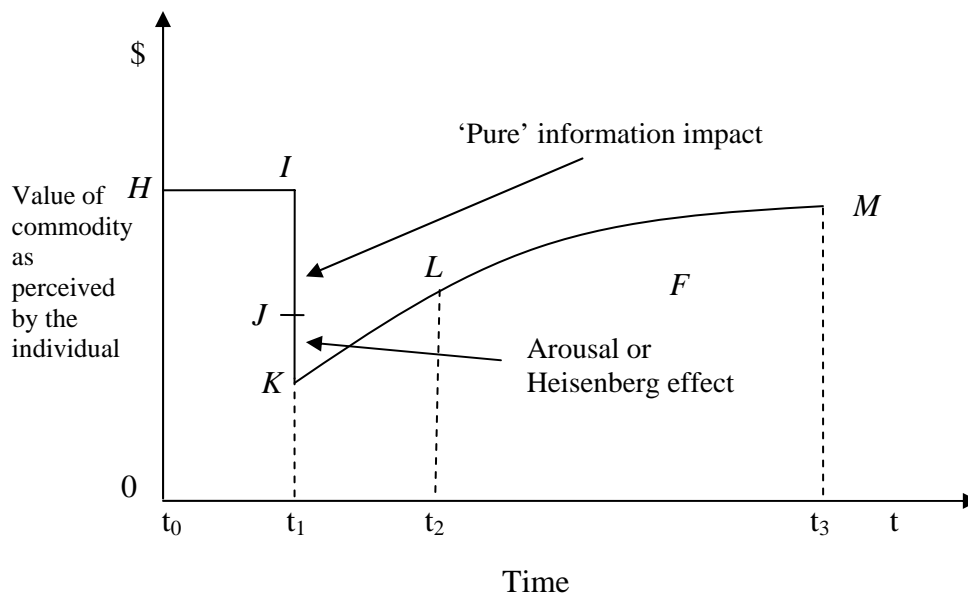


Figure 2 Subject's valuation relationship assuming that information provision at t_1 provides a negative impression of the commodity to be valued

The elevation at t_1 is likely to consist of two components, an increase due to the informative content of the information communicated (for example, the amount BC) and a quantity due to the arousal or Heisenberg effect (for instance CD). In practice, it may be very difficult to measure each of these components independently. It is expected that the Heisenberg or arousal effect will operate in the same direction as the impact of provision of information or experience on valuation. If the latter elevates values, the Heisenberg affect will add to this elevation, and if depression of values occurs then it is anticipated that the Heisenberg effect will add to this depression. Both effects are likely to decay with the passage of time. Arousal will subside, and the informative component can also be expected to decay in the absence of further stimuli about the object to be valued. Information provided will decay because of the normal process of forgetting when information is unused (Ebbinghaus, 1885; Wickelgren, 1972, 1974; Wixted, 2004, p.2005). Furthermore, knowledge and impressions about other objects may crowd out recall and retention of information about the commodity previously valued (Slamecka, 1960; Gleitman, 19971; Bouton, 1993). In the case where information provided at t_1 depresses similar processes can be expected to operate. In addition, with the passage of time, the individual may be better able to assess the value of the commodity in relation to other commodities and correct for initial impressions.

Whether or not the value placed on the commodity originally assessed will eventually return to its initial value is unclear. Where the information provided by the investigator gives a positive impression of the commodity being evaluated, there may be a permanent increase in the value placed on the commodity compared to its initial value. A similar negative effect could occur when negative information is conveyed.

The provision of information about an object, e.g., a species (cf. Samples et al., 1986), and experience with the object often alters individuals' stated valuation of it. Particularly when the object is not well known, variations in these values can be large. For example, consider an experiment involving 204 members of the public in Brisbane, in which participants were asked to state how much as a one-off payment they would be prepared to pay to help conserve the mahogany glider, *Petaurus gracilis* (Tisdell et al., 2005). They stated, prior to being given any information about the mahogany glider, that they were prepared to pay AUD24.29, on average, to help conserve it. After they attended a lecture which dealt with the mahogany glider and they were able to read a booklet giving information about the

mahogany glider and other focal species, their stated willingness to pay (WTP) rose, on average, to AUD35.67, that is by 43 %. This is not a trivial difference.

If the types of relationships shown in Figures 1 and 2 exist, they raise a major issue for those policy-makers who want to adopt policies based on contingent valuation. Which one of the values along the paths shown is the appropriate one to adopt? Evaluation at t_1 may overstate the individual's 'true' value of the commodity in the case shown in Figure 2. At point t_1 arousal of interest in the object to be valued and crowding out of other objects is likely to be of a maximum. Would elicitation at t_2 be better than at t_1 with information only being provided at t_1 ? Or should elicitation be delayed until t_3 ? At point t_3 , the subject may have forgotten most of the information conveyed at t_1 about the object to be valued and his or her interest in others objects may have risen. Both information and arousal effects might be low. There are not as yet any definite answers to such questions. Nevertheless, they are of potential significance for whether or not particular public goods should be supplied and in what quantities.

Some writers claim that individuals' valuations vary in their quality and that those that are determined after greater consideration are of 'better' quality than those subject to less deliberation (O'Neill, 1997; Elster, 1997). This may be so but it could be difficult to determine which valuations involve greater consideration. For example, in the theory illustrated in Figures 2 and 3, it might be that the valuations at t_2 are based on greater consideration than those at t_1 . However, do the valuations at t_3 involve greater consideration than those at t_2 or t_1 ? Because of memory decay and the intervention of new distracting stimuli, it is possible that valuations at t_3 will be of poorer quality than at t_2 , or even than at t_1 . However, more detailed specification of the information-processing mechanism would be needed to determine this. Therefore, although consideration of the quality of values is relevant from a policy and philosophical point of view, how to determine operationally this quality is not yet resolved.

6. Discussion and Conclusion

Economic valuation is a core consideration in economics because it influences the socially optimal allocation of scarce resources. This is traditionally regarded as the central economic problem. However, this article reveals that individuals often are relatively ignorant about the existence and values of some public goods, as well as experiential goods. Theory suggested

that this ignorance is greater for public goods, than private goods. The question then arises of whether information provision may, in such cases, be a means of eliciting subjects' 'true' preferences or valuation.

Possible ways in which information provision may reveal 'true' preferences, and limitations to these processes, have been outlined. However, individuals are not just passive recipients of information but filter it and also actively gather it. This is an area worthy of further study in economics. Analysis revealed that individuals, on the whole, may be less inclined to gather information about public goods compared to private goods. This may often result in an undersupply of public goods relative to private goods, or more generally imperfect decisions about the supply of public goods because of the deficient knowledge set available to the constituents.

Therefore, when contingent valuation is applied to guide public policies involving the supply of public goods, investigators correctly feel compelled to provide subjects with background information about the good(s) to be evaluated. However, this also raises difficulties because of the Heisenberg effect and because of behavioral features which result in the non-stationarity of values perceived by individuals as illustrated in Figures 1 and 2. When these features are taken into account, it is unclear which value on the time-path for values of a commodity is the correct or appropriate one to choose for policy evaluation.

This choice can alter the optimal supply of public goods. This problem is undoubtedly 'a fly in the ointment'. However, there can be cases where optimal public choice is not sensitive to recorded values of a public good. For example, if the good is a wildlife species, the aggregate value of ensuring the survival of a minimum viable population of the species may exceed the cost of doing so for all perceived values for the species (Tisdell et al., 2005; Tisdell, forthcoming).

The question was also discussed of what information should be conveyed by investigators using stated preference methods, such as contingent valuation methods. Important choice problems are involved because incomplete information is of necessity conveyed by investigators. This restricted information needs to be chosen in a manner that is likely to help reveal or closely approximate the 'true' preferences of the subjects. Hence, some judgments have to be made about the sensitivity of revelations to the information conveyed. This

phenomenon should be the subject of further scientific investigation because it could provide guidelines about priorities for the type of information to be conveyed. It was demonstrated that provision of 'true' information need not reveal 'true' preferences if it involved unbalanced coverage of the objects to be valued. It is not adequate to claim, as one reviewer of this paper did, that such problems "should not occur at all if information provision is done carefully (so it is the responsibility of the researcher!)". We need scientific information about the type of care that is required.

In this paper, the view of Berg (2003) that behavioral economist should be more active in considering the policy implications of their findings has been accepted. This would demonstrate the utility of the behavioral approach and would counter the view that behavioral economics has only been critical of orthodox economics without offering credible alternatives and applications. However, in the beginning a new approach is always exploratory. The first priority of behavioral economics has been to establish that regular behavioral patterns do exist and that these differ in some important respects from those assumed in mainstream economics. Once these regular patterns are identified, then they are bound to have applications for prediction and for policy purposes. As behavioral economics evolves more and more policy applications are likely to be revealed.

An unresolved policy question raised by this article is what should be the role of governments in providing constituents with information about public goods. What priorities should governments set in providing this information? Can governments be trusted to provide this information in a balanced way? If not, are there desirable and workable alternatives for information provision about public goods? This is an important issue because information provision plays a central role in the formation of individual preferences and these in turn influence policy in democracies.

In conclusion, note that this article is not arguing for the abandonment of stated preferences methods of valuation in economics, because some types of behavioral 'imperfections' that have been identified. Despite such 'imperfections', it was shown that optimal policy conclusions may still be obtained in some cases. Nevertheless, this article does identify several behavioral features that call for modifications of the way in which revealed preferences methods are applied, reconsideration of the interpretation of their results and the

need for extra care in deriving policy conclusions from them. The theory also suggests that further investigation of the type of behavioral phenomena identified would be worthwhile.

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References

- Baumol, W. and Quandt, R. (1964) Rules of thumb and optimally imperfect decision. *American Economic Review*, **54**, 23-46.
- Berg, N. (2003) Normative behavioral economics. *Journal of Socio-Economics*, **32**, 411-427.
- Bouton, M.E. (1993) Context, time and memory retrieval in the interference paradigms of Pavlovian learning. *Psychological Bulletin*, **144**, 80-99.
- Downs, A. (1957) *An Economic Theory of Democracy*. Harper and Row, New York.
- Ebbinghaus, H. (1885) *Memory: A Contribution to Experimental Psychology*. Translated 1913 by H.A. Ruger. Columbia University Press, New York.
- Elster, J. (1983) *Sour Grapes: Studies in the Subversion of Rationality*. Cambridge University Press, Cambridge.
- Gleitman, H. (1971) Forgetting of long-term memories in animals. W.K. Honig and P.H.R. James (eds) *Animal Memory*. Academic Press, New York.
- Heisenberg, W. (1930) *The Physical Principles of Quantum Theory*. Translated by C. Eckart and F.D. Hoyt, University of Chicago Press, Chicago.
- Lancaster, K. (1996) A new approach to consumer theory. *Journal of Political Economy*, **74**, 132-157.
- Niemeyer, S. (2005) Preference transformation through deliberation: protecting world heritage. Pp.263-289 in M. Getzner, C.L. Spash and S. Stagl (eds) *Alternatives for Environmental Valuation*. Routledge, London.
- O'Neill, J. (1997) Managing without prices: the monetary valuation of biodiversity. *Ambio*, **26**, 546-550.
- Samples, K.C., Dixon, J.A. and Gowen, M.M. (1986) Information disclosure and endangered species valuation. *Land Economics*, **62**, 306-312.
- Slamecka, N.J. (1960) Retroactive inhibition of connected discourse as a function of practice level. *Journal of Experimental Psychology*, **59**, 104-108.
- Spash, C.L. (2000) Ecosystems, contingent valuation and ethics: the case of wetland creation. *Ecological Economics*, **34**, 195-215.
- Spash, C.L. (2002) Informing and forming preferences in environmental valuation: coral reef biodiversity. *Journal of Economic Psychology*, **23**, 665-687.

- Tisdell, C. (1996) *Bounded Rationality and Economic Evolution*. Edward Elgar, Cheltenham, UK and Northampton, USA.
- Tisdell, C. (forthcoming) Linking policies for biodiversity conservation with advances in behavioral economics. *Singapore Economic Review*.
- Tisdell, C. and Wilson, C. (2005) Perceived impacts of ecotourism on environmental learning and conservation: turtle watching as a case study. *Environment, Development and Sustainability*, **7**, 291-302.
- Tisdell, C. and Wilson, C. (2006) Information, wildlife valuation, conservation: experiments and policy. *Contemporary Economic Policy*, **24**, 144-159.
- Tisdell, C., Wilson, C. and Swarna Nantha, H. (2005) Policies for saving a rare Australian glider: economics and ecology. *Biological Conservation*, **123**, 237-248.
- Wickelgren, W.A. (1972) Trace resistance and the decay of long-term memory. *Journal of Mathematical Psychology*, **9**, 418-455.
- Wickelgren, W.A. (1974) Single trace fragility theory of memory dynamics. *Memory and Cognition*, **2**, 775-780.
- Zarnikau, J. (2003) Consumer demand for 'green power' and energy efficiency. *Energy Policy*, **31**, 1661-1672.

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