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# **Discrimination of the Decision Structure of Suburban Park Users by Environmental Attitudes**

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Additional information is available at the end of the chapter

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## **1. Introduction**

Interest in environmental attitudes arose in the early 1970s. In general, there are several factors such as age, gender, educational status, income and other socio-economic factors for example, see [1] that affect citizens' environmental attitudes. Other factors, which have been included in previous studies, are related to politics or active participation in environmental organizations or the rural/urban character of the place where a household is located, in references [2-3]. Working from another standpoint, sociologists and psychologists have developed various theoretical approaches, such as the Theory of Planned Behaviour in [4] and the Value-Belief Norm Theory in [5], to explain how environmental attitudes affect citizens' behaviours. Thus, most research has evaluated the environmental attitudes of individuals towards political participation in different plans of action; environmental conservation and willingness to pay for the use and conservation of different natural landscapes, see [6-11]. Therefore, environmental literature has focused on explaining the factors which condition individuals' environmental attitudes and the effect of environmental attitudes on different Behaviours have been widely studied. However, no studies have analyzed how environmental attitudes determine individuals' decision structure. This study takes 'decision-making' to be the cognitive process leading towards a decision.

Recent studies have focused on factors affecting the decision structure of individuals to various natural landscapes for example, see [12,13]. Natural landscapes have been widely interpreted as a source of aesthetic, psycho-physical and social benefits in people's lives; and as a means to improve the emotional state and restore good health, see [14-17]. Thanks to the identification of the benefits provided by these goods for the general welfare of the population, the literature has focused on determining those factors which determine

citizens' decision making structures and which lead them to perceive and use natural resources differently, in reference [18]. The perception of the landscape is a complex process which involves tangible issues related to vision, and psychological questions related to cognition, affect and evaluation. The perception of the resources that the natural areas have to offer and the extent to which it caters to the user's personal interests can either strengthen or weaken usage behaviour, depending on whether or not the experience is judged to be positive, in [19]. As noted by [20], the experiences felt by visitors to natural areas are not the only determining factor in their evaluation of the area or their behavioural response towards it. It is the individual's personal values that seal the decision-making process, by dictating the user's mode of action. In exploring the role of personal values, Researchers, see for example [21], have focused on human attitudes and behaviours towards natural areas, based on the theory that they derive from underlying personal values, regarded by some as the simple principles that guide evaluations or cognitive inferences. Given their role in determining people's attitudes and responses toward specific aspects of the environment, personal values need to be integrated into the analysis of decision-making processes, in [22].

The above context of analysis, which examines the individual decision structure in terms of the relationship between attitudes and personal values, provides the framework for this study, which has two objectives. The first is to determine, in a cognitive model, whether the differentiating attributes of a given environmental good provide users with benefits and reasons for use and enjoyment, later leading to the fulfillment of their personal end values; through the Means-End Chain (MEC) methodology, in reference [23]. The MEC theory assumes that the decision-makers subjective perception of a good is the result of associations between its attributes (the "means") and more abstract cognitive schemata, which include the personal values underlying certain behaviour (the "ends"). Such associations determine the appeal of the characteristics of the good in question, see reference [24]. The second is that it aims the role of environmental attitudes as a factor to explain variation across individual decision structures. Thus, the analysis tests whether this attitudinal variable discriminate the visitor's decision-making structure in terms of perceived benefits and desired values in relation to the use of a suburban park. For the implementation of these objectives, the natural area selected for this study is the Monte San Pedro Park that is located in the north-west of the Iberian peninsula (Spain).

This study aims to contribute to the existing literature in three ways. First, this work contributes to the expanded use of the MEC technique. This methodology, adopted from the field of marketing and to date rarely used in environmental studies, enabled us construct a cognitive model of how the use of a particular natural space can help people achieve a desired end state. Therefore, the results of this study will allow us to verify the validity and applicability the means-end chain method in environmental assessments. The second contribution is the relationship between visitor decision structure and their environmental attitudes, no tested at the moment in the literature. This can help to detect the influence of the environmental profile of individuals in their perceptions and evaluations of natural areas. The final understanding of the personal values that drive the green space decision-making processes may assist managers to know the factors to improve the environmental proclivity. Additionally, the analysis of landscape preferences, in terms of park users'

environmental attitudes, may provide a useful tool for the design of environmental education programmes. Finally, the third contribution is the examination of “suburban parks”. Areas of great natural value on the outskirts of metropolitan areas with a combination of natural and manmade landscapes. Suburban parks are generally neglected in the environmental literature, but they are the most frequently visited natural areas because of their location and potential for leisure activities. Thus, it is important to determine the needs and motivations of people who use and assess these areas.

## **2. Theoretical framework. Means-end chain theory**

Knowing how a decision is linked through the cognitive structure of visitors may be of interest in environmental economics and could be of particular importance to land managers. Research on this topic has largely focused on the most concrete level of visitors’ decision-making, that is, the attributes that the natural area has to offer. The intricacies of the cognitive structure, however, are such that perceptions and valuations of the attributes of the good often result in complex choice structures.

With roots in the work of Kelly [25] and developed as a tool research into human behaviour in reference [23], the Means-End Chain Theory shows the underlying reasons which justify the importance of personal values in people’s decision making structures and demonstrates that there are several levels in the cognitive structure of the decision maker when making a decision for example see [26]. It is thus assumed that the decision-makers subjective perception of a good is the result of associations between its attributes (the “means”) and more abstract cognitive schemata, which include the personal values underlying certain behaviour (the “ends”). Such associations determine the appeal of the characteristics of the good in question, in reference [24].

According to this theory, consumers’ product knowledge is organized into hierarchical levels of abstraction, where the higher the level of abstraction, the stronger and more direct the connection to the self. Six ascending levels of abstraction describe the cognitive structure linking product knowledge (concrete attributes, abstract attributes and functional consequences) with self-knowledge (psychological consequences, instrumental values and end values), as noted by [27]. In the case in hand, the attributes are those properties or characteristics of the park, service or performance that visitors may desire or pursue. The abstract attributes are those whose verification is impossible to check prior to use except through internal or external information sources. Exploration of the knowledge structure in the environmental context clearly established the distinction between concrete and abstract attributes for example, see [28]. Functional consequences are the benefits obtained directly from the use of the park. Psychosocial consequences are of a more personal, social and less tangible nature. Instrumental values are intangible goals related with the behavioural means used to achieve the end aims and, finally, terminal values refer to desired end states, see reference [29].

Within the environmental field it is appropriate to highlight several previous studies in a context close to this one which use this methodological approach. For example, there is the

work of [30] who studied social structure and social relations to determine the quantity and quality of the environmental impacts derived from economic activity, finding that the dynamic of the time structure depends on the skills of the citizens and human capital. In [31] it is used the Means-End Chain theory to study people's motivation in connection with obligatory recycling in the Netherlands, and showed that it was environmental values and values related to the duty of the citizen which led people to recycle. Prior research attempting to identify recycling goals and their effect on the decision to recycle had reached similar conclusions; see for example [32]. Finally, the paper closest to our area of study is by [33], who signaled usefulness of the Means-End Chain perspective for the management and planning of the recreational services to be found in green spaces. Thus, by way of this approach, they obtained a better understanding of the landscape's features and the consequences, values and needs of users that determine preferences for certain goods and services associated with these spaces.

Recently, Means-End Chain theory has been applied to suburban parks to determine the similarities and differences in the decision making structure of visitors, through the study of willingness to pay for the recreational use of the good analyzed or through attitudinal variables such as satisfaction, in references [34, 35]. It has thus been shown that the visitors willing to pay for the use of the parks, or those most satisfied with them, have a more complex decision making structure with regard to the benefits and personal values received in the parks than the visitors that are unwilling to pay or are less satisfied, respectively. In this study the intention is to apply Means-End Chain theory, to determine the cognitive structure of suburban park visitors based on their environmental attitudes. Following the results obtained in previous studies, we hypothesize that the stronger the pro-environmental attitudes individuals have, the greater will be the complexity of their decision making structure, as due to this positive attitude towards the environment they will receive greater benefits and values during their stay in the parks.

Initial hypothesis: Individuals with a strong pro-environmental attitude have a more complex decision making structure than individuals with weak environmental attitudes.

### **3. Methodology**

#### **3.1. Study area**

The area selected for the study was 'Monte San Pedro Park', opened on June 6 1999, is located in the north-west of the Iberian Peninsula (Spain). It is a large leisure-oriented, extra-urban, aesthetically up-to-date, topographically-varied area measuring 7.84 ha, and offering vistas of the city of A Coruña (Galicia) and a wide strip of coast line, stretching from Cape San Adrián and the Sisargas Islands which lie to the west as far as Cape Prior and Cape Prioriño to the east. The seashore is of particular interest due to characteristic rock formations, flora and fauna. The flora is dominated by yellow gorse and pink heather interspersed with other typical coastal plants, some of them unique to the area. A great variety of small birds including warblers, goldfinches and linnets add their touch of life and colour.

Abandoned army bases have left underground shelters, barracks, lookout posts and shore batteries. The panoramic view as one descends from the park includes all the major landmarks of the city below. In addition to what nature itself has provided, there are plenty of tracks and pathways, landscaped areas, public amenities, ponds and information panels, etc. Finally, the location of this park on the coast of Cantabria overlooking the Atlantic Ocean makes this an ideal place for visitors to enrich their leisure time and enhance their enjoyment and quality of life. The Monte San Pedro Park, open to the public free of charge, is an example of first class territory management and planning, offering visitors an excellent opportunity to enjoy the views, engage in sports and other recreational activities and generally relax.

### 3.2. Procedure and measures

Prior to the survey, a pilot study was carried out on a sample of 30 subjects to ensure the validity and user-friendliness of the questionnaire. The pilot study was developed and administered in a series of meetings and interviews with experts and focus groups (made up of potential visitors to the areas under analysis) That help us make minor adjustments. Once the pre-test was carried out, a random sampling stratified by age and gender of visitors to the suburban park was implemented. The data was collected between April and June 2010 in 230 face to face interviews carried out with citizens of A Coruña who were visiting the Monte San Pedro Park at the time of the survey. On average respondents took 20 to 25 minutes to orally complete the questionnaire with the assistance of the interviewer. The final sample consisted of 194 usable questionnaires, 36 questionnaires were rejected. This sample size exceeds the average used in other studies applying MEC theory, which [36] report as 60 interviews due to the numerous links generated by this type of methodology. Thus the acceptance rate was 84.3%. On the basis of the final sample it can be deduced that the regular visitors, for this kind of area, are women (58.2%) aged 40 (42.9 years), who have completed secondary school (31.4%) or are graduates (35.6%) and have a medium level of income (57.7%).

A four-part questionnaire was used. Part 1 contained questions about users' attitudes and behaviours during their visit to the park. Environment-related questions made up part 2 of the questionnaire. It consists of six questions designed to elicit the user's environmental attitudinal and behavioural response. One of these questions measures the New Environmental Paradigm (NEP). Following the work of [37], the NEP scale measures "*a paradigm or worldview that influences attitudes and beliefs toward more specific environmental issues*". In this case, the NEP scale was chosen to assess the general pro-environmental attitudes of respondents with regard to the environment and its components. Table 1 shows the average valuations offered by respondents on the NEP scale.

The third set of questions was designed for the laddering interviews, to elicit means-end chain data from respondents and thus determine the benefits expected and values pursued through use of the park. The laddering interview questions are shown in Annex. A literature revision and the pilot survey guided the choice of attributes, consequences and values

considered in the survey designed to reveal park visitors' cognitive structures. It comprised eight attributes representing the concrete and abstract characteristics of the park in [18,38] and eight functional and psychological consequences in [10,14] relating to its use. The values for the analysis presented in this paper were adapted from the LOV (list of values) proposed by [39], later modified by the Rokeach Value Survey (RVS), which identifies nine key personal values that influence people's lives. The final part of the questionnaire was used to collect data to identify the socio-economic profile of the respondents.

Attitudinal measure	Scale items	Mean	SD
<b>New Environmental Paradigm</b> <i>9 items on 5-point Likert-scale.</i> <i>Fully disagree-fully agree</i>	The so-called "ecological crisis" facing humankind has been greatly exaggerated	3.07	1.11
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	2.45	.91
	Humans will eventually learn enough about how nature works to be able to control it	2.65	.88
	Human ingenuity will insure that we do NOT make the earth unlivable	2.53	.89
	Humans were meant to rule over the rest of nature	2.25	.86
	Humans have the right to modify the natural environment to suit their needs	2.22	.85
	When humans interfere with nature it often produces disastrous consequences	3.32	1.09
	Plants and animals have as much right to live as humans	3.46	1.08
	Humans are severely abusing the environment	3.49	.97
	The balance of nature is very delicate and easily upset	3.55	.93
	If things continue on their present course, we will soon experience a major ecological catastrophe	3.23	.85
	We are approaching the limit of the number of people the earth can support	3.29	.99
	The earth is like a spaceship with very limited room and resources	3.31	.99
	Despite our special abilities humans are still subject to the laws of nature	3.29	.99
The earth has plenty of natural resources if we just learn how to develop them	3.03	.93	

**Table 1.** Complete NEP question and descriptive findings.

### 3.2. Data analysis

With respect to the choice of data collection method for the MEC application, the most widely known information-gathering technique is one known as “Laddering”, which was first developed by [40]. Based on the personal construct theory proposed by [25], it is a face-to-face, one on-one, in-depth, semi-structured interviewing technique designed to develop a understanding of how consumers translate product attributes into meaningful associations with respect to themselves in reference [23]. In other words, its purpose is to reveal people’s motives for choosing a particular good, as noted by [41]. The general laddering interview is a three-stage process. In the first stage, respondents are required to name the main attributes on which they focus when comparing and evaluating goods. The revealed key attributes are the starting point for the second stage, which is an in-depth interview, where respondents are required to explain their relevance in terms of the perceived associated consequences and personal values. Interviewers repeatedly ask respondents “Why is that important to you?” pushing them to increasing levels of abstraction (from attributes to consequences and from there to values) until they can go no further. These results in sequences of concepts or “ladders”. The objective in the third stage is to plot the concepts drawn out by the laddering technique on a so-called implication matrix, in [42]. This matrix enables the construction of a Hierarchical Value Map (HVM), which is a tree diagram mapping the respondents thought process through the various levels of abstraction in the form of a graph, as noted by [24]. implication matrix, in [42]

The two possible approaches when conducting laddering interviews are soft laddering and hard laddering, in [43]. Hard laddering refers to all interview and data collection techniques in which subjects are compelled to generate or verify associations between elements within individual ladders, in sequences that reflect increasing levels of abstraction. In soft laddering, a natural and unrestricted flow of speech is encouraged during interviews, with associations between attributes-consequences-values being reconstructed subsequently during the analysis, in [44]. Hard laddering was selected for the purposes of this study because it is quicker and less expensive than soft laddering, places less pressure on the respondent and is more suitable when working with large samples (more than 50 subjects), for example see [41,43]. Concretely, the technique used in this study is the Association Pattern Technique (APT), see [42]. The APT is based on the general laddering interview technique proposed by [23] but differs in that it is more structured and uses two independent matrices: an AC matrix (attributes-consequences) and a CV matrix (consequences-values). Gutman already proposed that, for measurement purposes, the means-end chain can be conceived as a series of connected matrices. The matrices presented to the survey participants show all the attribute-consequence and consequence-value linkages shown initially in the survey. This results in two tables showing all the possible attribute-consequence and consequence-value combinations, and thus providing a dataset of binary observations, in [42].

Another methodological issue requiring consideration when working with the APT is how many links to include on the HVM in order to obtain the most meaningful results, or “Cut-

Off Level". This indicates the number of linkages registered before a connection ceases on the map, as noted by [36]. It is not easy to determine what frequency of linkages between two levels of abstraction is meaningful or significant enough to be included on the HVM. A high cut-off level (a high frequency of linkages) will give a simpler map, involving fewer connections, hence some loss of relevant information, but greater ease of interpretation. A low cut-off level (a lower frequency of linkages) will result in a complex map that will contain a large amount of information but will be more difficult to interpret. Prior research has shown various ways of determining the cut-off point for example, see [26], but, generally, the optimum cut-off point is the one that produces a HVM with the maximum amount of information and the greatest ease of interpretation. The cut-off determination method used in this study, known as "Top- Down Ranking" developed by [36] is based on the premise that a whole group of respondents will not necessarily make the same number of linkages between two levels of abstraction. It may therefore be inappropriate always to use the same cut-off point when the number of linkages between the different levels of abstraction varies. Top-down ranking enables the HVM to include only the most frequent linkages between different levels of abstraction. In other words, it selects the linkages in order of importance (the most important linkage being the one with the most cell entries).

Having designed the data collection process and selected the methods of analysis (in this case, APT and Top-down ranking), the data are processed using MecAnalyst Plus 1.0 software. This provides an ordered set of HVMs, where the first map is the simplest and easiest to interpret while showing the most important linkages. Each successive map is more complex and features a greater number of the attributes, consequences and values mentioned by each group of respondents. The process continues until the analyst decides to end it; that is, when the right cut-off point appears to have been reached, and continuation of the process would result in uninterpretable data. The advantage of this method is that it allows observation of the linkages between levels and permits between-group comparison.

### 3. Results

#### 3.1. Characterization of visitors based on environmental attitudes

Based on the stated purpose of this study, which is to analyze the cognitive structure of visitors to suburban parks and to identify the role that environmental attitudes play in the variation across individual decision structures, two groups of respondents were created. One for the group whose reported "weak environmental attitudes" (attitudes less than or equal to 3); and another for those who reported "strong environmental attitudes" (higher than 3). The two groups were first characterized to reveal their socio-demographic characteristics and between-group differences using the sample of 194 visitors. The weak environmental attitudes group represents 51% of the respondents (99/194), while the strong environmental group represents 49% of the respondents (95/194). From Table 2 it can be deduced that visitors with strong environmental attitudes are mainly female, aged between 31 and 50 on average, with a university education and a middle-class based on household income. Furthermore, it can be seen that there exist differences in gender and educational

level between users with weak and strong environmental attitudes. These differences show that women and people with higher education have a stronger environmental attitude by comparison with men and people with basic education, respectively. Various authors have shown that women and people with a higher level of education are more environmentally concerned, for example see [1,45].

	Group 1 Respondents with weak environmental attitudes 51%	Group 2 Respondents with strong environmental attitudes 49%	$\chi^2$
<i>Age</i>			
Under 20	5.1%	3.2%	1.29
21-30	19.2%	22.1%	
31-50	41.4%	45.3%	
51-65	28.3%	23.2%	
Over 65	6.1%	6.3%	
<i>Gender</i>			
Male	51.5%	31.6%	7.92***
Female	48.5%	68.4%	
<i>Income</i>			
Low	30.3%	24.2%	0.91
Average	55.6%	60.0%	
High	14.1%	15.8%	
<i>Level of education</i>			
None	26.3%	16.8%	8.00**
Primary/secondary	12.1%	10.5%	
High school	35.4%	27.4%	
University Degree	26.3%	45.3%	
n=194			

**Table 2.** Characterization of subjects based on reported environmental attitudes.

<sup>a</sup> Level of statistical significance determined by Pearson's chi-square tests (\*\*sig<0.05, \*\*\*sig<0.01).

### 3.2. Decision structure analysis by means-end chain theory

#### Hierarchical Value Maps

HVM were constructed using a Top-Down 'Ranking' Cut-Off approach [36]: a top 7 cut-off was chosen meaning that the HVM gives a representation of the seven most frequently chosen links between two levels of abstraction. Moreover, this method to determine the cut-off can be used to obtain between-group comparisons. Table 3 shows the cutoff points at each level analyzed. As can be seen, the cutoff point differs from one map to another and between the types of relationships established. Level 1 represents the most important chain for each group of respondents. The "sport-fitness" consequence-attribute chain and

the “fitness-fun” consequence-value chain were the most important for the two groups of respondents. Thus, among the respondents with weak environmental attitudes, these chains were chosen by 65.7% and 63.6%, respectively, while among those with strong environmental attitudes 70.5% and 51.6%, chose these options, respectively. However, this similarity between groups in attributes, consequences, and values obtained does not continue at later levels, with notable differences appearing between them. In this case what is shown is an example of the most important chain for the two groups of respondents corresponding to level 1. All the attribute-consequence and consequence-values chains for each group of respondents up to level 7 can be seen together in Figures 1 and 2.

		Group 1 Respondents with weak environmental attitudes		Group 2 Respondents with strong environmental attitudes	
		Cut-off point	%	Cut-off point	%
Level 1	AC <sup>a</sup>	65	65.7	67	70.5
	CV <sup>b</sup>	63	63.6	49	51.6
Level 2	AC	44	44.4	49	51.6
	CV	51	51.5	48	50.5
Level 3	AC	41	41.4	47	49.5
	CV	49	49.5	43	45.3
Level 4	AC	35	35.4	45	47.4
	CV	45	45.4	42	44.2
Level 5	AC	31	31.3	40	42.1
	CV	40	40.4	40	42.1
Level 6	AC	29	29.3	36	37.9
	CV	39	39.4	39	41.1
Level 7	AC	25	25.3	35	36.8
	CV	34	34.3	37	38.9

**Table 3.** Cut-off points for the 7 levels of abstraction and percentage of total cases

<sup>a</sup> Attribute-Consequence <sup>b</sup> Consequence-Value

As the level increases so does the complexity of the number of attributes, consequences and values selected for each group until level 7 is reached, from which point the quantity of information becomes impossible to interpret. Thus the cutoff point for level 7 between the attributes-consequences relationship is 25 for the group with weak environmental attitude and 35 for the group with strong environmental attitudes. In the case of the consequences-values relationship, the cutoff points are to be found between 34 and 37, respectively. This shows, a priori, that the group with a strong environmental attitude achieves a higher cutoff point and so a higher level of abstraction than the groups with weak environmental attitudes.

Figures 1 and 2 show the HVM for the two groups for a cut-off level of 7. Each element in the chain (attributes, consequences and values) is shown together with the percentage of respondents who made that particular linkage. Each chain represented on the maps varies

in thickness depending on the percentage of respondents who chose it. Both groups show a high frequency of linkages between the different levels on the ladders, which provide an initial indication of the relevance of the aspects upon which the subjects were asked to form attribute-consequence-value chains. That is, visitors establish a considerable number of linkages between the attributes of the park, the benefits they obtain from it, and their own personal values. Thus, confirmation is found for the implication of personal values in subjects' perception of the various attributes or differentiating features of the environmental good, depending on the desired consequences or benefits in each case. Furthermore, in the maps there are arrows with broken and continuous lines. The arrows with continuous lines represent chains formed by an attribute, a consequence and a value, while the arrows with broken lines represent segmented chains, formed by an attribute-consequence or a consequence-value.

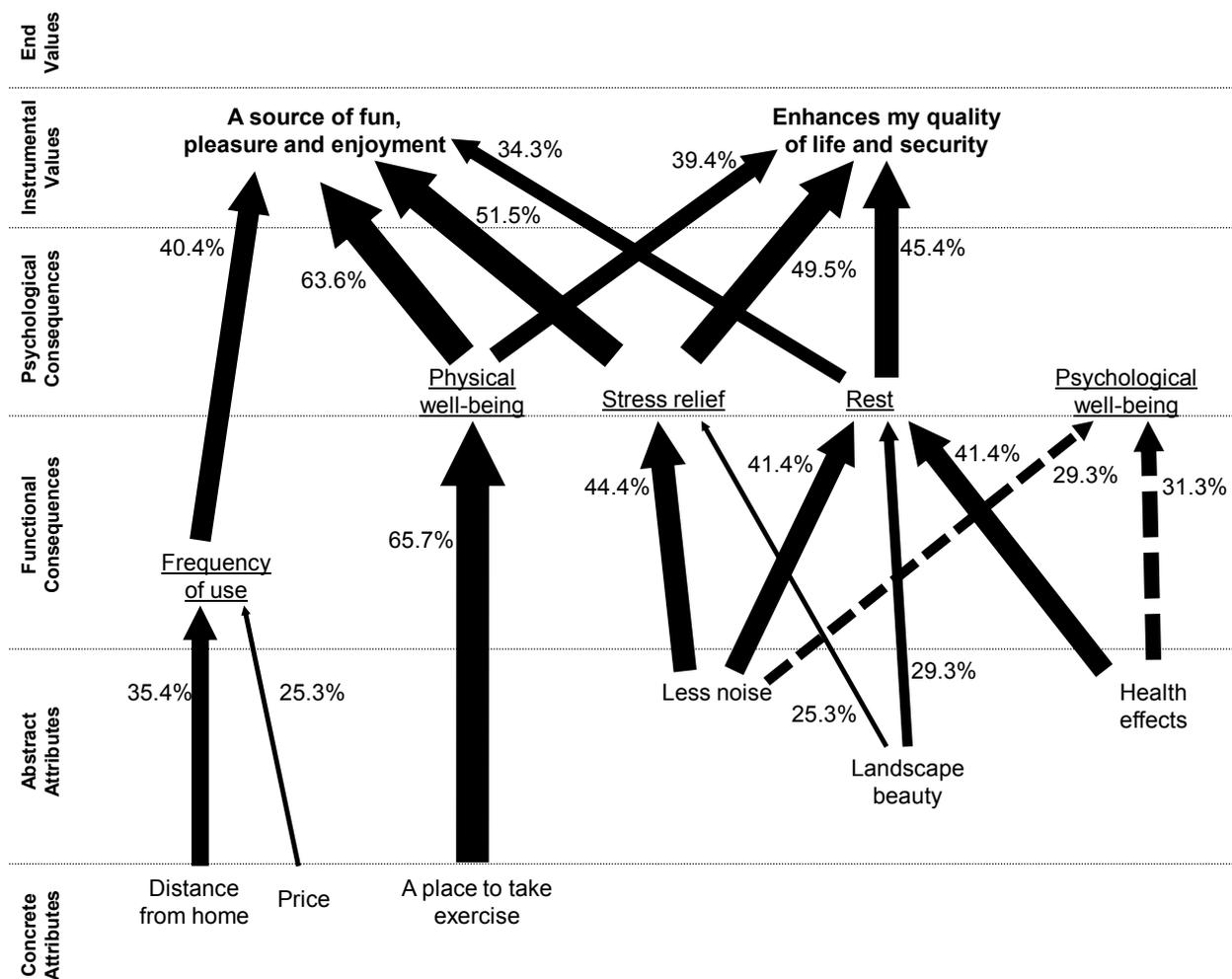


Figure 1. Hierarchical Value Map for Group 1 "Respondents with weak environmental attitudes".

An initial partial analysis of the results reveals interesting similarities between the two groups. Thus, in relation to attributes, there is a shared interest in doing sport activities, distance from home, less urban noise and landscape beauty. As far as consequences are concerned, both groups show interest in the frequency of visits and concern in physical and

mental well-being. A final key aspect of the between-group comparison concerns the personal values included in the hierarchical structure, where both search values such as enjoyment and enhancing their quality of life.

On the other hand, some differences emerge between the groups. Only the group with a strong pro-environmental attitude is interested in the functional consequences “ecological habits” and “help the environment”, suggesting that the environmental component arises with greater impetus among those with a more pro-environmental attitude. Furthermore, the terminal values “a sense of fulfillment” and “peace of mind and self-respect” appear only in this group. This reveals how the users who have strong environmental attitudes are more concerned with achieving personal end values, while weak-environmental attitudes users are only concerned with instrumental values. The mention of more values, and the fact that they are terminal values, suggests at first sight that those with a strong environmental attitude reach a higher level of abstraction. These initial results should be analyzed in more depth, however, and the ladders generated by the MEC application should be examined further in order to draw conclusions regarding the different levels of abstraction reached by the two groups.

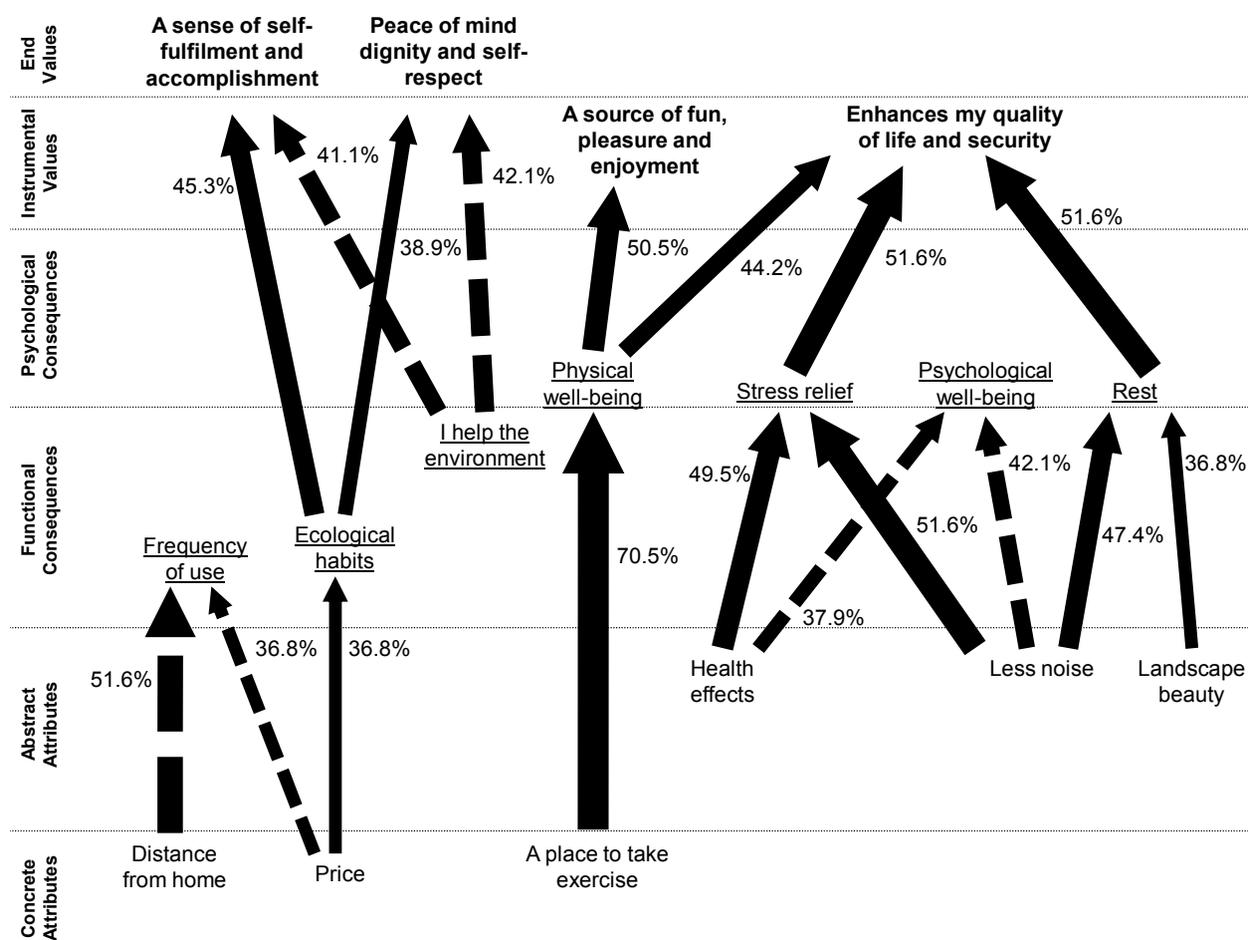


Figure 2. Hierarchical Value Map for Group 2 “Respondents with strong environmental attitudes”.

### Analysis of the HVMs ladders

The results described above are eligible for further analysis aimed at advancing in the understanding of the means-end chain formation process through which users' link park attributes to consequences and thence to values. Among the ladders observed in this study, it is possible to discern that four linkages are shared by all respondents, irrespective of their environmental attitudes. The first and foremost is the concrete attribute "a place to practice sport and take physical exercise" which is linked to the psychological consequence "physical well-being" (formed by 65.7% of the weak-environmental-attitude group and 70.5% of the strong-environmental-attitude group) and the instrumental values "a source of fun, pleasure and enjoyment" (63.6% versus 50.5%) and "enhances my quality of life" (39.4% versus 44.2%). This appears to suggest that one of the main values users hope to fulfill through using a suburban park is, as might be expected, the enjoyment that comes from doing exercise and improving physical fitness. Secondly, another linkage common to both groups is the one between the abstract attribute "less noise" and the psychological consequences "stress relief" (44.4% versus 51.6%) and "rest" (41.4% versus 47.4%) and the instrumental value "enhances my quality of life and security" (49.5% versus 51.6%) and (45.4% versus 51.6%), respectively. Thirdly, the abstract attribute "landscape beauty" is linked to the psychological consequence "rest" (29.3% versus 36.8%) and the instrumental value "enhances my quality of life and security" (45.4% versus 51.6%). It would therefore be interesting to improve the aesthetic appearance of the spaces with the aim of improving the visitor's emotional state and, consequently, increase the visitors' welfare and the use placed on the environmental good in question. Finally, both groups share an interest in the distance from the place of residence to the suburban park (35.4% versus 51.6%) and the cost of access to the park (25.3% versus 36.8%), which influences the frequent use of this type of area.

With regard to the differences between the two groups, only those with a strong pro-environmental attitude did not condition the enjoyment of some ecological habits to the price of access to the area (36.8%). Furthermore, this ecological attitude had a positive influence on their conscience and personal respect (38.9%) and their desire for personal growth (45.3%). At the same time, the incomplete chain which links environmental help with feelings of personal growth (41.1%) and personal conscience is of particular importance (42.1%).

### Comparison of abstraction levels

With the attributes, consequences and personal values pursued by each group in accordance with the environmental attitude of the respondent, and the chains between them, established, we go on to determine the degree of abstraction attained by each of the groups. This is determined by the average number of ladders and the average number of elements (attributes, consequences and values) of each level, in order to determine whether there were differences between groups based on these criteria.

The total number of ladders constructed by the groups of visitors was 2382, of which 986 corresponded to the weak-environmental-attitude group and 1396 to the strong-

environmental-attitude group. Breaking down the number of ladders proposed by each of the groups, statistically significant differences in the average of incomplete ( $F = 6,019$ ,  $\text{sig} < 0.05$ ) and complete ( $F = 8,692$ ,  $\text{sig} < 0.01$ ) ladders can be observed. Thus, the group with a strong environmental attitude has an average of 14.69 complete ladders and 9.96 incomplete ones, with the other group having an average of 9.96 complete ladders and 3.03 incomplete ones. These results already begin to indicate the presence of a greater degree of abstraction in the decision making structure of the groups with a strong pro-environmental attitude, as they establish associations between attributes, consequences and values.

To complete the analysis of the abstraction, Table 4 summarizes the average number of attributes, consequences and values provided by each group. Statistically significant differences were observed in the presence of more concrete and abstract attributes, functional consequences and terminal values among respondents who have a strong environmental attitude. These results indicate that respondents who have stronger environmental awareness have higher complexity or abstraction in their decision making structure, as they incorporate more aspects of their personality.

	F Snedecor	Group 1 Respondents with weak environmental attitudes	Group 2 Respondents with strong environmental attitudes
Concrete attributes	7.762***	1.94	2.44
Abstract attributes	3.903**	2.64	3.01
Functional consequences	5.028**	2.34	2.82
Psychological consequences	1.867	3.22	3.45
Instrumental values	2.560	1.85	2.08
Terminal values	11.419***	1.49	2.35

**Table 4.** Average numbers of attributes, consequences and values used by each group.

\*\*\*sig<0.01

### Complexity indices

Finally, the complexity indices developed by [46] were estimated in order to determine which group showed the more complex means-end chains in the HVMs. Two complexity estimates were calculated. The first, labeled C1, measures the complexity of the maps in terms of the concepts used. It is obtained by dividing the number of attribute-consequence-value chains by the total number of attributes, consequences and values used in the maps. The other, labeled, C2, measures the complexity of the maps in terms of the connections between ladders. It is obtained by dividing the total length of the chains by the total number of individual connections.

As can be seen from Table 5, the C<sub>1</sub> index is verified (index value 187 for strong environmental attitudes and 174.7 for weaker). The results show that the maps of the groups of respondents with a strong environmental attitude are more complex in terms of the number of attributes,

consequences and values received during the stay. On the other hand, it has not been demonstrated with this test that this group also has greater complexity in the relationships established between the elements of the chain. Therefore, to explain the "complexity" that exists in the decision making process of individuals requires further analysis.

	Number of Cognitions (a)	Number of Links (b)	Number of Paths (c)	Total length of Paths (d)	C <sub>1</sub> (b/a)	C <sub>2</sub> (d/c)
Group 1 Respondents with weak environmental attitudes	13	2272	17	30	174.7	1.76
Group 2 Respondents with strong environmental attitudes	17	3179	18	22	187	1.22

**Table 5.** Complexity indices.

#### 4. Discussion

This study differs from the existing research in two main aspects. The first is the use of Means-End Chain methodology in a cognitive model to determine whether the differentiation attributes of a given natural area are associated with benefits and reasons for use that ultimately relate to individuals' terminal values or personal values. The second aspect that is worthy of note has to do with differences in perception and the previous decision making structure of the individual depending on his or attitude to the environment and its components (whether the individual has a strong pro-environmental attitude or not), in terms of the benefits expected and the personal values that he or she wishes to achieve.

To achieve these ends the Means-End Chain methodology was used by way of a laddering interview. The observation of the Hierarchical Value Maps leads to two types of results. Firstly, there are the results shared between the two groups analyzed. Thus, we see that both respondents who have a strong pro-environmental attitude as well as those with a weak environmental attitude shared an interest in tangible characteristics such as sports, the price of access to the park and the distance from the residence of the visitor. This finding confirms the results of previous studies [47,48]. Among the most valued intangible characteristics in the study are effects on health, noise reduction and the beauty of the landscape. Numerous authors, for example see [17,49], have shown that the search for beautiful landscapes and the restorative and therapeutic power offered by nature are highly valued factors. As for the benefits received, there is special emphasis on the physical and mental wellbeing produced by being in these areas. Interest in these benefits was also found by researchers in other environmental contexts, in [14,50,51]. Finally, there is also the shared interest in various personal values, individual in nature, such as entertainment and improvement of the quality of life. In general terms the relevance of personal factors in the valuation of these natural areas was confirmed in [15,52,53]. Therefore, we may affirm that the attributes, consequences

and values mentioned are appreciated and sought after by all kinds of people when they use and place a valuation on suburban parks, points to note for land managers in their management strategies.

Secondly, there is another type of result, concerning the analysis of the differences obtained from the cognitive structures of the interviewees on the basis of their environmental attitudes. The presence of different benefits and values suggests that the perceptions of the users vary in accordance with the degree of their environmental pro-activeness. Thus the degree of involvement in environmental and ecological questions as well as consciousness raising and personal development of those with a strong pro-environmental attitude is noteworthy. That is to say, the groups with a strong environmental attitude show a greater level of ecological awareness and are more interested in achieving terminal type personal values. It is thus shown that environmentally conscious individuals have a more significant emotional dimension, i.e. they have a greater level of abstraction in their decision-making structures when it comes to using and placing a value on natural areas, so confirming our initial hypothesis. The environmental literature to date has focused on various socio-economic and socio-demographic factors that determine the environmental attitudes of individuals and how these attitudes condition the behavioural decisions of individuals, with regard to environmental conduct, for example [1-3,8-11,54] The present study shows, for the first time, how environmental attitudes determine individuals' decision making structures. This information may be of use to land managers as ecological issues have been shown to be a differentiating element in the decision-making structure of visitors to suburban parks.

## 5. Conclusions

On the basis of these results we can conclude that people are emotionally linked to the environment in terms of their preferences and the personal values satisfied during their stay. The possibility of doing sports, distance from place of residence, health benefits received and the search for fun and to improve quality of life have emerged as key factors in the use and valuation of suburban parks. For this reason, planning strategies could include the provision of sport and relaxing landscapes to improve the physical and emotional state of the visitors and their recreational and well-being opportunities. In the context of the current urban reality, where there are multiple leisure opportunities, it is necessary to conduct studies of the population near the location of urban and suburban and natural areas to help managers to become acquainted with the decision-making process of these citizens. As these results have demonstrated, knowledge of citizens' psychology is indispensable for ensuring that the provision of services in natural areas is in accordance with the expectations, desire and necessities of their potential visitors. The satisfying of these desires and necessities could lead to positive behaviour from citizens such as, for example, greater use, global valuation and conservation of these places are so valuable for human existence.

Furthermore, individuals with a strong attitude in favor of the environment have a more pronounced emotional dimension, which manifests itself in the fact that they have a greater degree of complexity in their perception of benefits and values during their stays in urban

parks. Thus, interest in ecological practices and values relating to personal conscience and respect, are only seen in this group of visitors. For this reason, managers should also seek to strengthen the pro-environmental attitudes and beliefs of individuals in order to differentiate suburban parks on the basis of their uses and the necessities of individuals. For managers to achieve these objectives, the main strategy employed must be environmental education. The design of environmental education programs (e.g. courses, conferences and/or talks) may increase environmental awareness through encouraging introspection in the community into environmental attitudes and ethical issues that should be promoted in order to induce changes in the behaviour of individuals. As noted by this study, attitudes determine visitors' decision-making structure and, consequently, affect their perception and decisions regarding behaviour.

Other interesting conclusions may include the fact that the greater the benefits received from environmental goods, the greater is the involvement of the person concerned with these goods. It would therefore be interesting to communicate to the whole population the benefits, both physical and psychological, that are freely offered to us by the environment in order to get them more involved in pro-conservation attitudes, in respect and protection of the environment. Of course the receiving of health and psychological benefits has an effect on the social cost of healthcare, which is another positive aspect to be considered about these spaces. Furthermore, the closeness of suburban parks allows easy access to them by urban residents, and a resulting greater capacity to transmit the benefits provided by the presence of these goods. These factors could be taken into account by land managers who could include the health benefits produced by these natural resources in their calculations and use them in decision making when the relationship between their costs and benefits arise. It would thus be very interesting for experimental designs to be jointly carried out with the managers of these areas, and to the degree that it might be possible, representatives of the local population as well.

Finally, the results of this study have confirmed the validity of the Means-End Chain methodology in the valuation of the environment. This technique allows a more precise definition of the user experience of the visitor. Thus, it identifies those elements that are unique to the park, which serves as a bridge to understand the underlying motives in the minds of visitors and determine their environmental preferences. The greater the success of managers in identifying Means-End Chains, the greater will be their capacity to help visitors to achieve their leisure goals, which will have a positive effect on their current and future use of this environmental good. It has also been shown that Hierarchical Value Maps provide a basis for effectively communicating the search for individual or social values by potential park visitors. These maps thus hierarchically link the attributes, consequences and values that define the way these individuals see themselves, their place in the world and later, how they develop these preferences in certain types of experiences. From all of which it can be concluded that Hierarchical Value Maps provide sufficient information on which to base research.

Future researchers may find it interesting to employ other methodological perspectives or social psychological theories to examine the discriminating power of the environmental

attitudes of individuals in order to better calibrate its capacity to explain the decisions of users of the environment, or regarding the decision not to make use of the environment. It would also be interesting to learn about the cognitive structures of people who do not make use of these spaces, in order to establish differences between users and non-users. Finally, other attributes and benefits of natural spaces could be identified as well as other personal values involved, which might influence the economic valuation of this type of areas.

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## Appendix

### Annex. Laddering interview

Now, using the tables below, we would like you to identify, first, the relationships between the characteristics of the San Pedro Park and the consequences of your visit as you see them, and then the relationships between those consequences and the benefits you wish to obtain from your visit. In both tables you are asked to indicate linkages between the rows and the columns. The idea in the first table is to tick a box (or boxes) to indicate the link(s) between each characteristic (a1, a2, ..., a13) and the benefit(s) which, in your experience, it provides (c1, c2, ..., c22). In the second table, you are asked to do the same to link each benefit in the columns (c1, c2, ..., c22) with the personal value(s) to which, from your experience, you think it caters (v1, v2, ..., v9).

		a1	a2	a3	a4	a5	a6	a7	a8
c1	I have good ecological habits								
c2	Stress relief /relaxation								
c3	Physical well-being /improved fitness								
c4	Rest								
c5	I help the environment								
c6	A way to escape from routine								
c7	Frequency of use /regular user of green space								
c8	Mental well-being								

**Table 6.** Attributes-Consequences. Link attributes (a1, a2,...) with consequences (c1, c2, c3...)

		v1	v2	v3	v4	v5	v6	v7	v8	v9
c1	I have good ecological habits									
c2	Stress relief /relaxation									
c3	Physical well-being /improved fitness									
c4	Rest									
c5	I help the environment									
c6	A way to escape from routine									
c7	Frequency of use /regular user of green space									
c8	Mental well-being									

**Table 7.** Consequences-Values. Link consequences (c1, c2, c3,...) with values (v1, v2, v3...)

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