

THE STUDY OF ENVIRONMENTAL BELIEFS BY FACET ANALYSIS

Research in the Canary Islands, Spain

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ABSTRACT: The relation between different levels of public concern about the environment and sociodemographic and behavioral variables are main issues in several recent investigations. Many of these are based on the idea that environmental interest is shaped by personal beliefs. However, the internal structure of those beliefs is not well understood. In this investigation, 3 studies ($N = 96$; $N = 397$; $N = 400$) explored what different types of beliefs concerning people/environment relationships exist and how they are internally organized. Multidimensional techniques such as INDSCAL and facet theory were used to analyze the similarity structure of items asking for beliefs toward the environment. Three viewpoints were identified: ecocentric,

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anthropocentric, and beliefs based on an interest in material progress. Most participants reported an ecocentric belief. Results concerning the structural analyses are compatible with a strong relation between the anthropocentric and material progress approaches and with the assumption of independence of all 3 beliefs.

People/environment relationships are considered increasingly more important as a crucial issue in environmental studies. It has been suggested that environmental behavior may be influenced by elements such as social paradigms and attitudes as well as by value systems. The series of ideas forming what is known as “concern for the environment,” which is an understanding of the relationship between people and nature, were initially considered as exclusive to developed countries. However, they are seen to be more present in developing countries than in developed ones (Adeola, 1996; Berberoglu & Tosunoglu, 1995; Corral, Bechtel, Armendáriz, & Esquer, 1997; Dunlap & Merting, 1995; Furman, 1998; Gooch, 1995).

Following this train of thought, observed high levels of interest in the environment are attributed mainly to changes in attitudes toward the environment and to the emergence of what is known as the *New Environmental Paradigm* (NEP). The NEP can be defined as a vision of the world consisting of a series of ideas that oppose the dominant antiecolological social paradigm. These new ideas refer to the inevitability of imposing limits to human growth, the importance of conserving a balance in nature, the need for developing a sustainable economy, or the need to review the idea that nature exists solely to satisfy human needs (Dunlap & Van Liere, 1978).

The NEP can be contrasted with the traditional model, called the *Human Exceptionality Paradigm* (HEP), which is based on the assumption that humans are exceptional beings. According to the traditional paradigm, humans are exempted from the laws of nature, and human activity is not determined by ecological elements but by technological ability, a fundamental element for unlimited growth and development (Arcury & Christianson, 1990).

The NEP originally was viewed as a one-dimensional representation of the relations between environmental quality and human existence. This paradigm is socially well accepted and highly representative of organized environmental groups' ideology. The characteristics of the original NEP were partially modified at a later stage and the paradigm was no longer considered one-dimensional but was seen as being composed of a more complex structure of up to three elements (Albrecht, Bultena, Holberg, & Nowak, 1982). One of those elements is related to ecological balance, another is associated with the concept of limited development, and the third is related to the idea that humans do not have a dominant position over nature (Corral et al., 1997; Furman, 1998; Noe & Snow, 1990). However, when the NEP is administered

in different countries, the factors and their interrelations differ markedly. For example, Corral et al. (1997) suggested that Mexican students differentiate between the NEP and concepts of the dominant social paradigm, but the level of covariance between both models shows an absence of conflict insofar that aspects of both paradigms were accepted simultaneously. In a comparison between three countries (the United States, Brazil, and Mexico), a three-factor structure was found, but its internal composition was different (Bechtel, Corral, & Pinheiro, 1999). In the Baltic States, a high level of support for the NEP has been established, although the solution comprises only two factors, one related to the HEP and a second described as "respect for nature and belief that development should be restricted" (Gooch, 1995).

Other psychological and philosophical theories argue that a differentiation should be made between anthropocentrism and ecocentrism to determine existing relationships between people and the environment (Altman & Chemers, 1980; Ariansen, 1998; Eckersley, 1992, 1998; Stern, Dietz, & Kalof, 1993). Both standpoints entail concern for the environment but, whereas the first involves valuing nature in terms of material profit with which it provides us, the second implies concern for the conservation of the environment in itself.

Thompson and Barton (1994) carried out two studies that allowed them to develop a scale for each of these two concepts. Almost no correlation was found between anthropocentrism and ecocentrism in these two studies. Furthermore, ecocentrism was seen to be related to proenvironmental attitude and behavior and not at all related to apathy toward environmental issues. Ecocentrism, then, presents itself as a proenvironmental position not incorporated in earlier environmental attitude measurements. Results obtained by these authors mostly confirmed their hypothesis. However, anthropocentrism deserves separate consideration, because its correlation with behavioral variables was unexpectedly low. Ecocentrism, then, could be associated with ecological behavior, whereas anthropocentrism could not. Amérigo, González, and Aragonés (1995) attained similar results in a replication with Spanish samples, except that these authors detected a negative correlation between anthropocentrism and concern for the environment.

From our point of view, the previously mentioned theories are based on the idea that environmental views differ according to whether they are of an anthropocentric or ecocentric nature. However, contradictions found in this field of research lead to some questions: (a) whether these two aspects are the fundamental elements; and (b) whether considering humans, individuals as well as collective, as exceptional is the basis for more or less related types of beliefs, opposed to ecological beliefs. To analyze these problems, we have carried out three studies, which have the following aims in common: the

identification of beliefs explaining how people conceive of the environment and the analysis of the interrelations among those beliefs.

In the first study, we constructed a questionnaire to identify different environmental views. The second and third studies were designed to analyze the extent to which each type of belief was accepted and how the different types were interrelated.

The methodological approach for the first study was multidimensional scaling (MDS) of similarity judgments. For the second and third study, we used facet analysis. These approaches are used as techniques of data reduction, independent of assumptions regarding the general linear model. Within facet theory, a hypothetical correspondence between the definition of a behavior domain and the empirical structure of the observed variables representing that domain can be tested (Borg & Shye, 1995; Donald, 1995; Shye, 1998). This methodology already has obtained satisfactory results in psychoenvironmental investigations (Canter, 1983b, 1995; Oseland & Donald, 1993; Wilson, 1996).

THE FIRST STUDY

This study focused on the creation of a group of sentences, representing views about people-environment relationships. The main target of the first study was to develop a method of categorizing environmental views. As a secondary goal, we aimed to explore the manner in which these views on the environment correlate and to propose an interpretation of these correlations.

METHOD

Participants. Ninety-six people (48 men, 48 women), ranging in age from 18 to 65 years ($M = 25$, $SD = 7$, $Mdn = 23$) participated in this study. Seventy-five were university students, and the remaining 21 were white-collar employed.

Instruments. In this study, we used three questionnaires including 21 (one questionnaire) and 22 (the other two) statements regarding people-environment interactions. The sentences, for example, refer to environmental problems and solutions, environmental education, new technologies, and human effects on environmental preservation. Participants were asked to estimate the degree of similarity between those statements. Each page contained an initial statement and the remainder of the sentences with which the original

sentence was to be compared. The scale of similarity between the standard statement and the other statements ranged from 1 (*not at all similar*) to 7 (*very similar*).

Each statement was used as a standard sentence to be compared. In this manner, all the statements were compared with each other. The instructions given to the participants indicated that the task to be carried out was to compare a group of sentences with each other and to decide the degree of similarity between the ideas behind each. It was emphasized that an evaluation of the similarity between ideas was required and not an evaluation of length, grammatical structure, or syntax of the statements. The participants also were informed that they should not base their judgments on the extent to which they agreed with what was being said in the sentences. Respondents were also asked to use criteria of their own choice in making comparisons and to keep these criteria constant for all comparisons.

To select statements, first, a study was conducted of books, papers, magazines, articles, and written press on different domains and topics about the environment. Six brainstorming sessions also were held as part of the study. There was a final total of 108 different sentences related in some way to the environment, the state of the environment, and the role of people in relation to the environment. Examples of these statements are "Simple and direct solutions to environmental problems do not produce the necessary results," "To solve environmental problems it is necessary to change our style of living," "It is very risky to make our future depend on technological success," and "The satisfaction and happiness of citizens will only be possible if we progress economically." After this initial selection, the 108 sentences were revised, studying the degree of grammatical complexity and ambiguity of contents. According to this, the grammatical structure of the sentences was revised, dealing, for example, with double negatives or unusual verbal tenses. Those that could have ambiguous interpretations were eliminated, as were those that expressed very similar opinions and used similar wording.

This process reduced the number of sentences to 65, and these were then randomly divided into three groups. Each group of sentences was used to create a questionnaire. Questionnaire A contained 21 statements; Questionnaires B and C each contained 22 sentences.

Procedure. Participants were divided into three subgroups. Forty participants filled out the first questionnaire, 32 filled out the second, and 24 filled out the third. The questionnaires were completed in collective sessions, using lecture rooms for groups of students and individually (for nonstudents) to suit the time availability of involved people. Sessions took between 60 and 75 minutes.

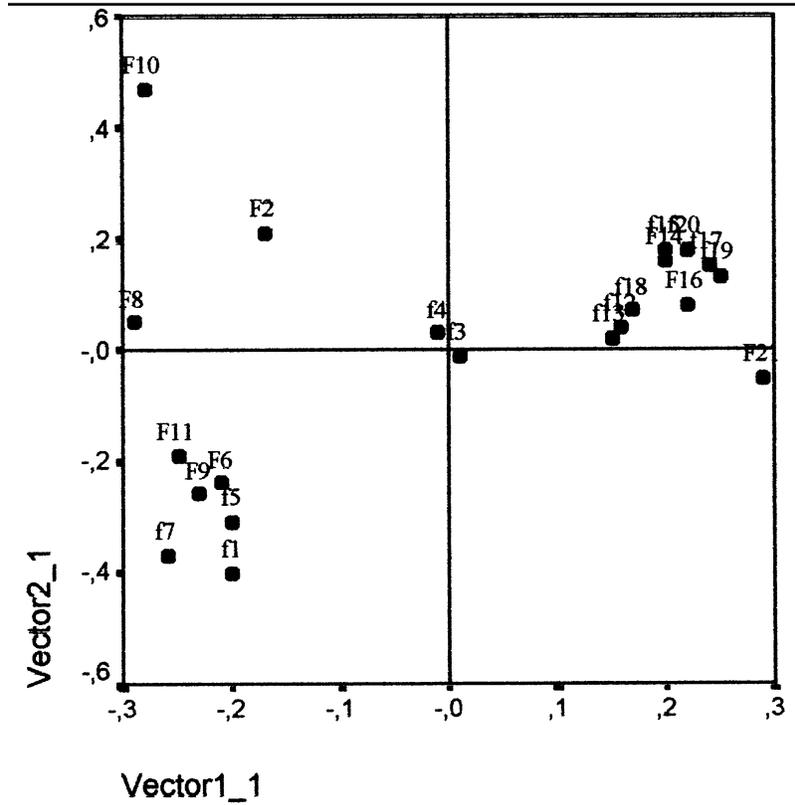


Figure 1: First Multidimensional Scaling Bidimensional Solution

RESULTS

Participants' responses to the three questionnaires were analyzed using the MDS program INDSCAL (Carroll & Chang, 1970). This technique identifies the dimensions used by participants in forming their ideas of similarity on the sentences with which they were confronted. These dimensions are represented as vectors characterizing aspects on which individuals tend to differentiate ideas concerning human-environment relationships.

A two-dimensional solution was selected for all three MDS procedures due to the very low increment of explained variance implied by the adoption of a third dimension (approximately 5%). This proceeding resulted in two vectors per scale and a total of six vectors. On completion of the MDS, our next objective was to prepare a questionnaire on environmental views. Therefore, items fulfilling the following three criteria were selected. First, we ensured that the chosen sentences were relatively polarized on one of the

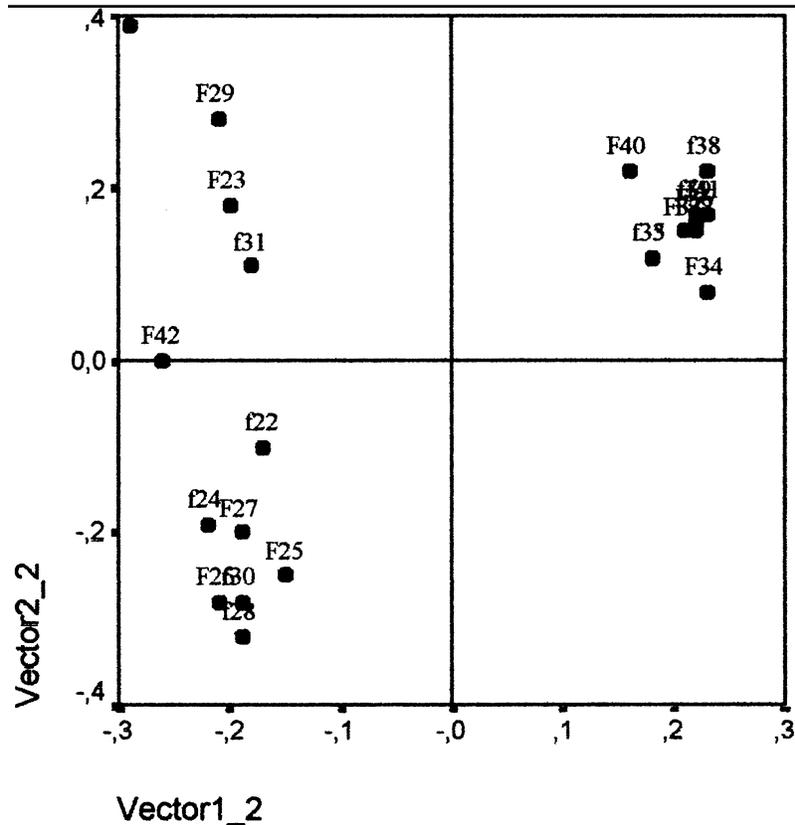


Figure 2: Second Multidimensional Scaling Bidimensional Solution

vectors. Second, where clusters of items existed, the sentences that were selected had to be central to the cluster. Finally, we selected items that were dispersed across all four quadrants formed by the interaction of two vectors. Applying these criteria resulted in the selection of sentences indicated by the capital letter *F* in Figures 1, 2, and 3 for further studies (The selected sentences are listed in the Appendix).

Figure 1 is a graphic representation of the two-dimensional space corresponding to the weight of the 21 sentences from Questionnaire A on the two vectors obtained. In the figures, the first vector is always represented by the horizontal axis, and the second vector is always represented by the vertical axis.

The solution as a whole accounts for 39.2% of the variance in the answers. The first vector alone accounts for 70.8% of the total explained variance, and the second catches the remaining 29.2%. The correlation between both vectors is .29 ($p \geq .05$). The selection of sentences marked with the numbers 10,

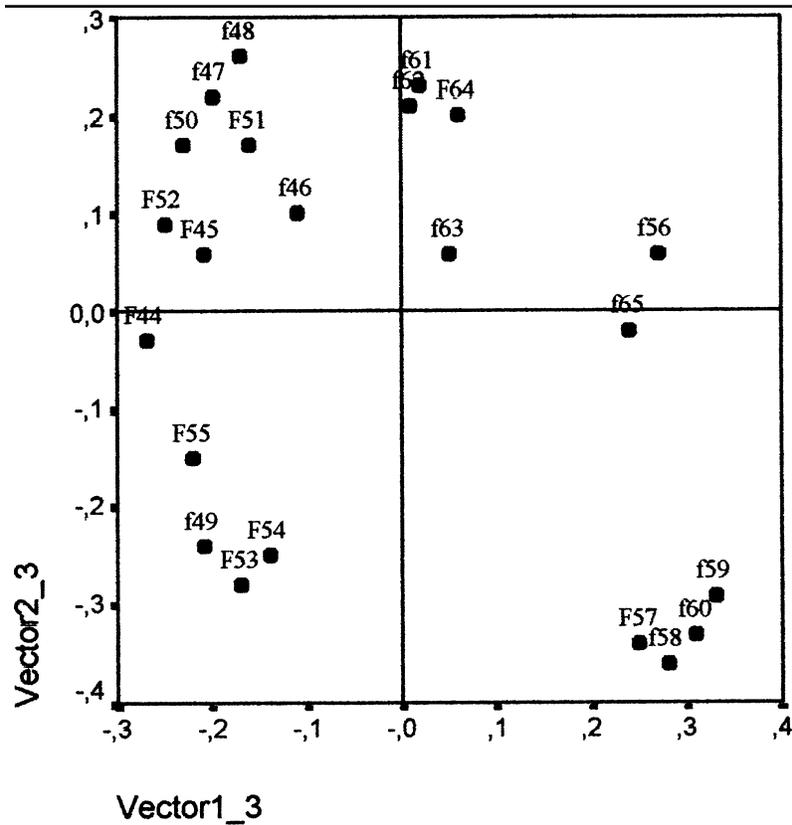


Figure 3: Third Multidimensional Scaling Bidimensional Solution

2, and 8 was indisputable, because they were the only ones present in their quadrant (see Figure 1). These are sentences like “We should feel proud of the amount of material goods we could produce on earth.” Sentences 21, 16, and 14 were selected based on the marked criteria of their extreme and representative location (e.g., “The consumer society is inconsistent with the respect of nature”). The selection of sentences corresponding to the lower space on the left of Figure 1 proved to be more difficult. Although Sentences 1 and 7 were the most extreme on both axes, they did not represent the content of the remainder of the sentences in the same spatial region. Therefore, Sentences 6, 9, and 11 were chosen for later studies, because they were central to the configuration of sentences. These sentences express ideas like “Many people could be devoted to art and to science only because of the economic development.” Figure 2 is a graphic representation of the two-dimensional space corresponding to the weights of the 22 sentences of Questionnaire B.

The two-dimensional solution accounts for 37% of total variance. The first vector alone accounts for 67.3% of the total explained variance, and the second explains the remaining 32.7%. The correlation between the first and second vector is .43 ($p \leq .05$), which shows a moderate interdependence between both. As with Questionnaire A, in this case a group of sentences was selected for use in later studies. However, this time 12 sentences were chosen using the same criteria as in the first scale. In this manner, 4 sentences were selected from the upper-left space (23, 29, 42, and 43), 3 from the immediate lower area (25, 26, and 27), and 5 from the top right (32, 34, 36, 37, and 40). Examples of each of these three groups are "human development has always been a fight against nature"; "Humans should be more humble with regard to their relationship with nature;" "It doesn't matter that the zones of fishing are depleted, because we will always have fish farms."

The two-dimensional solution selected for the third scale accounts for 35% of the total variance, the first vector accounting for 61.2% of explained variance and the second for 38.8%. The correlation between both vectors is $-.39$. They are, then, two opposite vectors interdependent of each other (Figure 3).

A slightly different configuration from that of former scales was obtained in this analysis, although the same criteria were used for the selection of sentences for the next study. These criteria resulted in the selection of nine sentences (44, 45, 51, 52, 53, 54, 55, 57, and 64), which are shown in Figure 3; as with the two former ones, they are marked with a capital *F*. The sentences propose proenvironmental as well as progress ideas, such as "Because of the technological advance, we will dedicate less time to work and so we will enrich human relationships," "The base of a true progress is saving and not wasting energy," and "Nuclear energy is one of the greatest discoveries of the [XX] century."

DISCUSSION

We have chosen 30 sentences, representative of beliefs people take into account when considering human-environment relationships. Those sentences were chosen using both qualitative and quantitative measures. At a later stage, the criteria underlying the interpretation of this type of information were detected using similarity judgments of sentences. This process, the reliability of which has been proved (Correa, Díaz, Suárez, & Hernández, 1993; Suárez, Hess, & Camacho, 1998), avoids asking people about their own beliefs. This makes it particularly useful in research on topics of great social significance or that affect people's privacy. It has been demonstrated in this study that similar conceptual solutions are obtained by using different groups of sentences from the same universe of beliefs. This, in turn, indicates satisfactory levels of validity. In this sense, the chosen sentences are good

indicators of beliefs regarding the environment. Therefore, we believe that by using these 30 sentences, it is possible to evaluate environmental ideas and the extent with which each person shares one or more of these beliefs. Moreover, the results obtained permit a conceptual interpretation of each vector in each MDS.

Sentences that reflect the need to change lifestyles and consumer habits to avoid serious deterioration of the environment are located at one end of the vector in the first dimensional solution (Vector 1.1). The opposite end of the vector represents those concepts in which quality of life is associated mainly with economic progress and material goods. The vector represents the concepts of quality of life and standard of living and the need for change and compares a naturalist vision of our relationship with the environment with one focused on economic development.

The second vector (Vector 2.1) has been interpreted as valuing growth and distinguishing a human perspective from an ecological one. The anthropocentric point of view is found in those sentences, which assume that human existence is the main factor to be considered in the relationship with the environment. Meanwhile, the ecocentric viewpoint considers nature and the environment to be fundamental factors of utmost importance. This vector differentiates two kinds of developmentalist sentences—on one hand, sentences considering natural resources to be used to generate wealth for people (anthropocentrism) and, on the other hand, those sentences emphasizing the importance of material growth.

Vector 1 of the second dimensional solution (Vector 1.2) can be interpreted in much the same way as Vector 1.1. It represents aspects related to human welfare and their link with nature. In one pole of this vector, welfare is associated with the idea of technological development and exploitation of nature. The opposite pole represents acceptance of humans as integrated with nature, love for nature, and the rejection of exploitation of resources to generate wealth. Vector 2.2 polarizes around similar terms as those mentioned in the previous paragraph: anthropocentrism versus ecocentrism. As in the previous MDS, this vector mainly relates to developmentalist sentences that are separated into two groups. Sentences that emphasize the importance of respecting nature to achieve human well-being are found in one group, and the other group consists of sentences that consider material progress to be the objective of human activity and the relationships of humans with the environment.

The third MDS allowed two more vectors to be identified, which were similar to those defined in previous scales. Vector 1.3 displays the differentiation of ideas about human progress, polarizing between a materialistic concept of progress, based on supremacy and control over the environment, and an integral concept of the same, based on the concept of planned and

sustainable development. Vector 2.3 illustrates the different types of solutions to ecological problems, differentiating people-dependent solutions (saving, social action, or awareness) from scientific and technological ones. In the three MDS solutions, we have observed that the most informative vectors (the first vectors of each two-dimensional solution) all can be interpreted according to a similar basic concept. Thus, two contrasting views regarding the relationship between humans and the environment can be identified: a developmentalist perspective and a naturalist one, which coincide with the NEP-HEP dichotomy obtained by Dunlap and Van Liere (1978, 1984), Milbrath (1986), and Gooch (1995).

The second vectors alone in each of the three two-dimensional solutions do not form one clear conceptual axis, although they show the emphasis placed on human factors as a common element. They particularly define concerns on the centrality of humans or ecology (anthropocentrism/ecocentrism vector of the first MDS), the acceptance of ecological limits to guarantee survival of the species (second MDS), and the differentiation between solutions and environmental problems based on technological changes versus changes in personal conduct (third MDS). This may be evidence of a system of beliefs emphasizing interest in human existence.

In summary, it seems reasonable to establish three types of views regarding person-environment relationships: a naturalist and ecocentric point of view, an anthropocentric system of beliefs, and a developmentalist view interested in material progress. The first view, seeing humans as part of nature, assumes that humans and all other living beings are equal. Harmony and regularity are the two basic principles underlying this concept. The naturalist pole proposed in the NEP and ecocentric values combine in the first viewpoint (Thompson & Barton, 1994). We decided to use the term *ecocentric* viewpoint in the remainder of the investigation because this concept emphasizes the terminal value of the environment. The second viewpoint suggests the importance of wealth and material growth, in which the environment is valued in terms of the human perspective. The *anthropocentric* viewpoint is based on the concept of the human as a superior being. This idea of exceptionality explains the rights and obligations of humans to control nature and use it to satisfy their needs. Humans, then, are not subject to the laws of nature, as they recognize and manipulate them. The third view—*developmentalism* and material growth—considers maximum use of the potential that nature offers us to be the most important factor. This point of view draws together the developmentalist ideas of the HEP and the value of material growth. In the remainder of the investigation, we preferred to use the term *material progress* rather than developmentalism because the latter includes ideas of both material growth and anthropocentrism.

These vectors should be interpreted with considerable caution, for two reasons. First, as they have been defined using each MDS, it has not been

possible to evaluate empirically the different relations between the group of dimensions as a whole. Second, each MDS has been attained using a particular limited group of sentences. Therefore, it is possible that the dimensional contents could be the specific product of each configuration. We also should be aware that we do not know to what extent a similar solution could be obtained with a different combination of stimuli. In this study, the dimensions were studied without a hypothesis regarding their contents. In the second study, this limitation is transcended using facet analysis, as it hypothesizes the correspondence of a model about the structure of variables with the empirical observations. Furthermore, although the earlier study illustrates the contents of the different points of view, it does not refer to the manner in which these different views are shared or rejected by participants in this study. This will be the second objective of the further studies.

THE SECOND STUDY

According to the results obtained in the earlier study, a group of vectors were identified, which underlie the beliefs held by people regarding the similarity of the 65 environmental sentences. These vectors define the boundaries of the different environmental opinions, allowing them to be grouped under three main concepts: ecocentrism, anthropocentrism, and material progress. It was necessary to discover the concept behind each of these views, using a process testing the hypothesis of three different environmental dimensions. It was also important to analyze the relation between the dimensions in question and to study the degree to which the different views on the relationship with the environment are influenced by society. Facet theory is used because it is based on the same multidimensional analysis techniques used in the previous study. It requires a hypothesis that establishes a link between the definition of a particular behavior domain and the structure of empirical observations of the variables that represent the domain (Borg & Shye, 1995; Donald, 1995; Shye, 1998).

METHOD

Participants. Ranging in age from 18 to 57 ($M = 23$, $SD = 6$, $Mdn = 22$), 397 students from the Faculty of Psychology, the Faculty of Educational Science, the University School of Social Work, and the University School of Agricultural Technical Engineering at the University of La Laguna (Canary Islands, Spain) participated in this study.

Instruments. A questionnaire containing 30 sentences regarding the relationship between humans and the environment was used. These sentences,

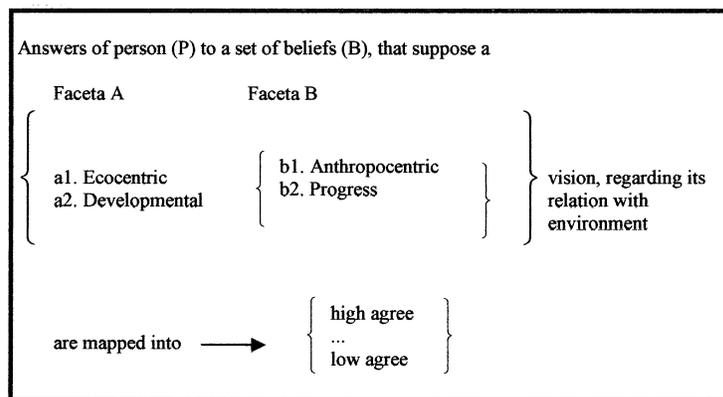


Figure 4: Mapping Sentence

which had been chosen in the previous study, are marked with a capital *F* in Figures 1, 2, and 3.

The participants were to indicate to what extent they agreed with the 30 statements given. A 7-point scale was used, which ranged from *disagree totally* to *agree totally*. Three versions were presented, which varied in the order in which the items were presented. The items corresponding to the scale are listed in the Appendix. The questionnaire was administered to student groups in lecture halls of the University of La Laguna. Average time for responding was 25 minutes. Participants agreed to participate in the study and fill out the questionnaire on a voluntary basis and were not paid to do so.

Design. To test the hypothesis that distinguishes three elements in the structure of environmental views, we propose a facet theory design and analysis. This strategy of investigation is based on a structural framework that includes design and analysis of data, beginning with a generic approach to the object of study. Evidence on the adjustment of empirical data to a determined theoretical structure is searched, repeating the process with different samples of participants and variables to consolidate a model (Borg & Shye, 1995; Canter, 1983a; Donald, 1995). This process indicates that an optimum strategy to form a theory is to hypothesize a correspondence between the definition of a certain behavior domain and the structure of the empirical observations of the variables chosen to represent the aforementioned domain. These internal structures are found using various techniques that analyze proximity of stimuli, fixing the stimuli structure in a dimensional space known as spatial solution. This spatial solution is determined by the similarity of variables in that the more alike two variables are, the nearer they will be in space. In brief, the aim is to test empirically a given structure on a semantic level through a pattern of similarities between variables.

TABLE 1
Structuples

<i>Sentence</i>	<i>Structuple</i>
1	a2b1
2	a2b1
3	a2b1
4	a2b1
5	a2b1
6	a1
7	a2b2
8	a1
9	a1
10	a1
11	a1
12	a2b1
13	a2b1
14	a2b1
15	a2b2
16	a1
17	a2b2
18	a2b2
19	a2b2
20	a2b1
21	a1
22	a1
23	a1
24	a2b2
25	a2b2
26	a2b2
27	a2b2
28	a2b1
29	a1
30	ab1

To apply facet theory techniques, a model of the content universe must be devised using a formal and detailed definition. This definition includes facets that, according to its elements (in our investigation, the three environmental views), should classify the variables that represent the domain of interest. A mapping sentence comprising two nested facets with two elements each (see Figure 4) was then set up, following the results of the previous study. Elements of Facet A—ecocentrism and developmentalism—establish a quantitative difference between the items of the scale (axial role). Elements of Facet B—anthropocentrism and progress—establish a qualitative distinction between items that gather in the development pole of the first facet (polar role). Therefore, we expect a spatial structure with an axial division for Facet A and, on its developmentalism extreme, a polar division for Facet B.

The assignment of facet elements to the items occurs in only three possible combinations: a1, for ecocentric items; a2b1, for anthropocentric-developmental items; and a2b2, for progress-developmental items. In Table 1, we can see the definition of each item through these combinations, called *structuples* in facet theory, in accordance with the semantic content of the items in the questionnaire.

RESULTS

To analyze the items at a later stage, using facet theory, we verified that there were no significant differences in participants' responses regarding the order of presentation of the questions in the questionnaire. MDS (Alscal program of SPSS v7.5; SPSS, 1997) was carried out on the matrix of indexes of item proximity. It produced a stress index of 0.052 ($R^2 = 0.99$). Figure 5 represents the spatial solution obtained, showing the simultaneous division in Facets A and B. There is an axial separation of poles in Facet A and a wedge-shaped division defined by the elements of Facet B.

The internal consistency of the three viewpoints was assessed using Cronbach's alpha. A value of .67 for the 9 items of the progress scale resulted. The alpha value for Ecocentrism, consisting of 10 items, was .70 after eliminating Item 23, which was marginally correlated with the rest of the scale. The anthropocentrism scale had a .73 alpha and consisted of 9 items, after deleting Sentence 28. Finally, three scores were calculated using unweighted linear combinations of those items characterized by each element of the facets. Means and standard deviations for each environmental view (progress, anthropocentrism, and ecocentrism) were obtained: The average scores, on a scale of 1 to 7, were 3.17 for progress ($SD = 0.84$), 2.39 for anthropocentrism ($SD = 0.86$), and 5.69 ($SD = 0.73$) for ecocentrism. Ecocentrism correlated significantly and negatively with the other two views ($p < .05$). Correlations were $-.23$ with progress and $-.37$ with anthropocentrism. The correlation between the two developmentalist views was $.43$ ($p < .05$).

DISCUSSION

Results from this second study confirm the hypothesis we propounded based on the results obtained in the first study. The view people hold regarding their relationship with the environment may take three different forms: ecocentrism, anthropocentrism, and material progress.

The obtained spatial representation separates the questionnaire sentences into the three proposed spatial regions. All but Sentences 23 and 28 comply with the hypothesis. Defined by that hypothesis as belonging to the ecocentric viewpoint, Item 23 is located in a region that could be classified as

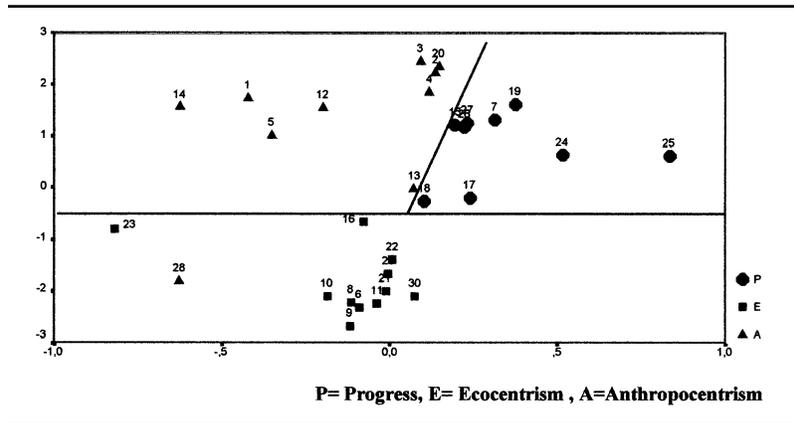


Figure 5: Second Study's Spatial Solution

such. However, its correlation with the rest of the items in its group is very low. This suggests that its content has been interpreted and thus answered by participants as though it dealt with something else. Regarding Item 28, the misclassification from its original ascription can be seen in the graph (Figure 5). We observe that although the sentence was originally considered anthropocentric, respondents answered it as though it were a naturalist sentence. In Figure 5, then, we observe that the two sentences that were incorrectly classified are close to each other and located in a spatial region separate from other sentences. This seems to suggest that these sentences should be disregarded in the next study.

The ecocentric viewpoint contains sentences defending the importance of the environment and rejecting exploitation of resources to create wealth. Our results consider the anthropocentric viewpoint to be a form of developmentalism, given that it coincides with ideas of progress in which human welfare is the most important factor. This aspect clearly differentiates it from ecocentrism: It does not consider nature as a whole to be the most important value in our relationship with the environment. In this regard, our studies do not accept the idea that anthropocentrism is a form of ecocentrism or proenvironmentalism; on the contrary, it appears more closely related to views associated with the HEP. The progress viewpoint links welfare to the idea of technological development and exploitation of nature. Material growth is considered important and the idea that human progress has boundaries affected by natural resource limits is not accepted. This point of view coincides substantially with the developmentalist ideas of the HEP.

According to the results of this study, ecocentrism is widely accepted, whereas anthropocentrism and progress have scores indicating their

rejection. These are similar to results of most investigations regarding the introduction of proenvironmental views and attitudes into society. In most members of the population, a highly positive attitude toward nature is generally detected (Adeola, 1996; Berberoglu & Tosunoglu, 1995; Dunlap & Merting, 1995; Vogel, 1996).

The correlations among the three scales show that anthropocentric and material progress viewpoints are interrelated and that the scores in both these scales are opposite to those obtained for ecocentrism. Although these results support the hypothesis of bipolar relations between ecocentrism and the two developmentalist viewpoints, they do not clarify the relations among the three environmental views, because their correlations were low and the sample was not very representative. Furthermore, given the graphic distribution of items in the spatial solution, it is not clear whether the types of relation between the ecocentric viewpoint and the developmentalist ones correspond to the hypothesized quantitative relation. The fact that the elements were not well dispersed vertically and that the negative correlation was low makes difficult a delimitation of degrees on the position people have with respect to the ecocentric-developmental axis.

THE THIRD STUDY

To confirm the stability of the two proposed facets, we studied the extent to which the obtained structure was reproduced. To do this, a new group of individuals from the two most populated cities in the Canary Islands (Santa Cruz de Tenerife and Las Palmas de Gran Canaria) was investigated. Our objective was to determine whether environmental beliefs could be explained by dimensions of progress, anthropocentrism, and ecocentrism, assuming that, if there were a confrontation between proenvironmental and developmentalist orientations, the latter in turn would divide internally into anthropocentrism and material progress. Additional objectives of this investigation included analyzing the relation between the different types of environmental beliefs. Maintaining the hypothesized structure, an attempt was made to clarify the types of links (quantitative/qualitative) existing among the three views. We also explored the degree of acceptance of each belief in a representative group of the population of the two main cities of the Canary Islands.

METHOD

Participants. This study began with 400 participants, 50% of whom were residents of Santa Cruz de Tenerife and the remaining 50% of Las Palmas de

Gran Canaria. The surveys were refined using psychometric procedures, which allowed us to detect cases with exaggerated regularities or continued inconsistencies in responses, such as the same answer being chosen more often than expected, answers always taking one perspective and ignoring the meaning of the question, or more items left unanswered than items answered. In the end, the survey consisted of 346 people, 51% (178) of whom were residents of Santa Cruz de Tenerife and the remaining 49% residents of Las Palmas de Gran Canaria ($n = 168$). The ages of these participants were between 14 and 72 years ($M = 34$, $SD = 12$, $Mdn = 32$).

Instruments. The list described for the earlier study (see the appendix) was used, excluding Items 23 and 28 because of their low correlation with the rest of the sentences in the earlier study. The list consisted of 28 items on which the people being surveyed judged the extent to which they agreed with the statements on a 7-point scale. Two versions were drawn up, which differed only in the order in which the sentences were presented.

Procedure. A field study was undertaken in Las Palmas de Gran Canaria and in Santa Cruz de Tenerife to obtain a representative sample of both capitals in the Canary Islands. A total of 400 interviews were conducted with fixed quotas per neighborhood, gender, and age group. The fieldwork was carried out by a team of six surveyors (three in each city) who each had at least 2 years of research experience and by two psychologists with experience in consultancy; the psychologists acted as coordinators and supervisors. The person conducting the survey carefully read each question and sentence in the questionnaire, and the persons being interviewed, who had the answers on a page in front of them, expressed their belief in each case.

Design. The same design as that in the previous study was used (Figure 4). Two facets were considered to exist, one that distinguishes ecocentric beliefs from developmental sentences and the other, nested in the developmentalist pole of the first facet, that differentiates an anthropocentric orientation from a belief in progress.

RESULTS

The matrix of indexes of proximity (Euclidean distances) between items was subjected to MDS (Alscal program of SPSS v7.5). The Kruskal stress index obtained for the solution was .046 ($R^2 = .99$). Figure 6 represents the space solution obtained with the division lines according to the hypothesis. We can observe a separation due the three combinations of facet elements, clearly differentiated into three regions. Applying Facets A and B shows that

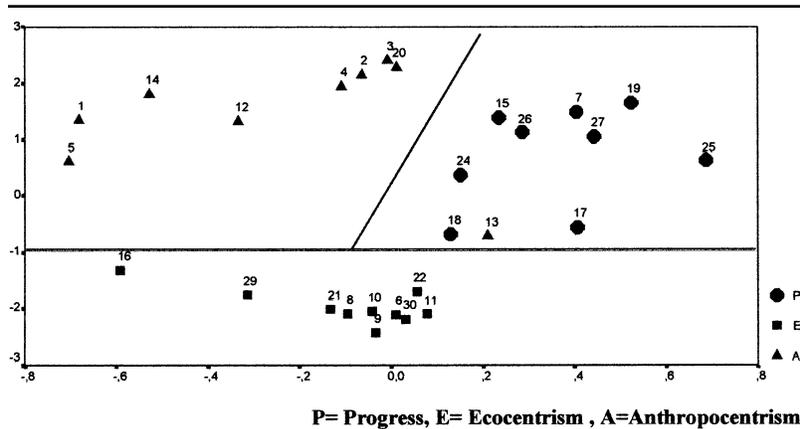


Figure 6: Third Study's Spatial Solution

these play the same roles and divide space in the same manner as in the earlier study. This confirms the hypothesis.

At a later stage, three variables were created with unweighted linear combinations of items making up each element of the facet. This was done to calculate the averages and deviations of the participants in progress, anthropocentrism, and ecocentrism. Three scores were calculated for each participant corresponding to each type of environmental view. The average scores, on a scale of 1 to 7, were 3.30 ($SD = 1.05$) for progress, 2.45 ($SD = 0.8$) for anthropocentrism, and 6.09 ($SD = 0.6$) for ecocentrism. The correlations between ecocentrism and the other two viewpoints were negative and significant in both cases ($p < .05$), $-.28$ with progress and $-.31$ with anthropocentrism. The correlation between the two developmentalist viewpoints was $.34$ ($p < .05$).

DISCUSSION

In this third study, we observed again that the position of items in the facet spaces adapted satisfactorily to the concept of three viewpoints regarding the person-environment relationship. With some variations for the second study, the results regarding the extent to which people hold these three environmental views illustrated again that the majority is in favor of ecocentrism, clearly overriding middle positions, and anthropocentrism and progress were hardly accepted at all. It should be emphasized that the lowest score corresponds to the subscale of anthropocentrism. It is possible that the participants were much more critical of the utilitarian character of anthropocentrism than are those who consider anthropocentrism to be proenvironmental. Bearing in mind the average scores, these results indicate that people agree more on the

concept that the environment is in itself worthwhile than on the idea of it as a resource for development.

On the other hand, the correlations among the three subscales do not provide clear conclusions on the relation between the views themselves. More specifically, the correlation between the two developmentalist views was lower than that observed in the second study. The correlation between ecocentrism and the other two views was also negative in this study. Although this correlation was significant, probably due to the large number of participants in the study, caution should be taken when interpreting it, because the measurement quotients indicate a low common variance percentage. The size of explained variance in terms of the correlations does not confirm that people who are inclined toward the ecocentric viewpoint reject the other two. The correlation between progress and anthropocentrism is equally low in accordance with the suggested difference between these viewpoints.

It is interesting that Bechtel et al. (1999) found the same results in a study with Brazilian students, as did Corral and Armendáriz (in press) with a representative sample of Sonora, Mexico. These findings, opposite to results obtained in North America and the north of Europe, could point out a particular vision of relationships with environment in Latin culture countries. Basically, the qualitative distinction between both developmentalist views—anthropocentrism and progress—proposed in Facet B is confirmed. However, the quantitative difference between the ecocentric viewpoint and both the developmentalist views remains again unclear. As in the second study, neither the correlation among the three elements nor the dispersion of items proves the proposed quantitative definition.

Nevertheless, the fact that the same trend was also present in the previous study confirms reliability of results. It appears that when people take a certain position, they do not necessarily reject another, as implied in paradigmatic approaches. It is possible that no relation exists between the degree of acceptance of one and another viewpoint. In this sense, our results follow the same path indicated by Grendstad and Wollebaek (1998), who observed more empirical arguments in favor of anthropocentrism and ecocentrism as independent factors than as different extremes of the same dimension.

Recall that we hypothesized that ecocentric beliefs would be negatively correlated with the developmentalism views of anthropocentrism and material progress; instead, ecocentric beliefs were independent of the other two.

GENERAL DISCUSSION AND CONCLUSIONS

This study of beliefs has emphasized that the two defining elements of the internal structure are *complexity* (defined in terms of the dimensionality of

beliefs) and *ambivalence* (the extent to which the favorable and unfavorable beliefs are shared). Results of the second and third study confirmed the results obtained in the first study concerning the complexity of environmental beliefs. In this sense, the anthropocentric, ecocentric, and material progress orientations form the nucleus of the belief system regarding relationships between humans and the environment. Analysis of the internal structure of these beliefs emphasizes that, apart from complexity, ambivalence is a defining element of the aforementioned structure. In this regard, in our first study, the spatial structure confirmed the existence of a dimension in which the analyzed sentences are distributed along the dimension. The other dimension hardly modifies the space of one of the poles, but it differentiates those of the other poles in two clear separate groups. This could mean that the second vector regulates the first in one of its extremes but does not affect the other extreme. In the second and third studies, a spatial structure, characterized by a bipolar dimension, was obtained. The ecocentric items were grouped into one region of one extreme, and beliefs referring to a developmentalist view were characteristic of the other extreme. The latter one was further divided into two qualitatively distinct regions—beliefs of an anthropocentric and a progressive nature.

With regard to the type of relation between belief orientations, our first hypothesis, dimensional and bipolar, assumes that the orientations are regions of interrelated beliefs—an interrelation due to the contrast between the ecocentric orientation and the two developmentalist ones. From this point of view, the more in favor of the ecocentric orientation people are, the less they will accept developmentalist beliefs. However, the obtained beliefs do not fully confirm this idea, given the caution with which the obtained correlations should be interpreted. An alternative explanation could be considered by which each orientation would correspond to independent groups of beliefs that gather together. Furthermore, beliefs are classified according to the polarity of their orientation. This means that the position people take on ecocentric beliefs does not determine the acceptance or denial of developmentalist beliefs. This also means that they have independent positions in each of the three orientations, to the extent that they could be seen to hold apparently contradictory beliefs. Our initial interpretation corresponds, in facet theory terms, to a vision of nested facets, whereas the second alternative hypothesis implies that the sentences spatially are distributed within each orientation according to its quantitative properties, a *Radex* in facet theory terms (Borg & Shye, 1995). In any case, our results do not allow either of these two options to be rejected.

To solve this dilemma, then, in future investigations it would be appropriate to use sentences that have different degrees of polarity with the

orientations and not only extreme sentences like those used in this investigation. If more or less extreme beliefs were found in each orientation, the final spatial structure would clarify the quantitative or qualitative distinction proposed. A linear dispersion of beliefs within each orientation would mean a quantitative differentiation that causes the ecocentric positions to confront the developmentalist positions—both anthropocentric and progressive. On the other hand, a radial dispersion of beliefs in the field of each orientation would imply an independent qualitative differentiation among the three orientations.

APPENDIX
List of Sentences

<i>In MDS</i>	<i>Identification Number</i>		<i>Statement</i>
	<i>In MDS</i>	<i>In Questionnaire</i>	
23	1		Human development is always a struggle against nature: it or us.
25	2		Wild animals are not productive; they are of little use to society.
26	3		It doesn't matter that the zones of fishing are depleted, because we will always have fish farms.
27	4		Nature imposes obstacles that negatively effect our well-being.
29	5		Humans can only reach maximum comfort through technology.
32	6		Humans should be more humble with regard to their relationship with nature.
52	7		Nuclear energy is much safer than many people think.
34	8		We can learn a lot from animals about living in harmony with nature.
36	9		The education system should develop respect for nature.
37	10		We should only take from nature what is absolutely necessary to live.
40	11		Leading a more simple life does not mean regressing to the past.
42	12		If we put limits on the use of nature we are putting limits on the welfare of human existence.
43	13		Humans should control nature.
2	14		Protection and conservation of green zones is detrimental to economic progress and growth.
53	15		With adequate control, nuclear energy is that

(continued)

APPENDIX Continued

<i>Identification Number</i>		<i>Statement</i>
<i>In MDS</i>	<i>In Questionnaire</i>	
		which least contaminates.
6	16	The agricultural community should use chemical products to increase production and profits.
8	17	We should feel proud of the amount of material goods we could produce on earth.
9	18	Many people could be devoted to art and to science only because of the economic development.
10	19	Firing grounds and military practice zones are areas that are compatible with protection of the environment.
11	20	It is necessary that banana plantations be substituted by tourist resorts that improve the standard of living.
14	21	Nature can harmonize its laws to fit in with those of the human race; however, we haven't been able to do so.
16	22	Attempts to solve environmental problems using simple methods have not produced the required results.
21	23	The consumer society is incompatible with respect for nature.
44	24	Because of the technological advance, we will dedicate less time to work and so we will enrich human relationships.
45	25	Being opposed to progress is being opposed to the essence of human existence.
51	26	Nuclear energy is one of the best discoveries of the [XX] century; progress is not possible without it.
54	27	If we did not dominate nature, the human race would remain underdeveloped.
55	28	We do not have the right to jeopardize our future with the life-threatening risks posed by nuclear energy.
57	29	Alternative energy, like solar, wind energy, etc., would satisfy the basic needs of contemporary society.
64	30	Economic progress often does not coincide with true human progress.

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