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Environment and Behavior 2001; 33; 400
DOI: 10.1177/00139160121973052

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An Exploratory Study

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ABSTRACT: Using the framework of social representations theory, this article examines predictors of two belief systems linking beliefs about the environment with beliefs about scientific knowledge. In a survey study with 460 Portuguese respondents, the following four hypotheses were tested: (a) New ecological beliefs were expected to receive higher levels of agreement than old anthropocentric ones, (b) social identities (not only objective positions) were expected to be important predictors of respondents' beliefs, and (c) the explanatory power of social identity variables was expected to be higher for those beliefs receiving lower levels of agreement (d) and for respondents expressing coherent representations. Analyses reconstructed two belief systems: prudence, linking new ecological ideas with a relativist view of science, and confidence, linking old anthropocentric ideas with a positivist view of science. Results support the hypothesis and show that although these systems can be viewed as contradictory, some respondents manage to agree with both.

AUTHORS' NOTE: *This research was supported by the Foundation for Science and Technology through the PRAXIS Program, Process PCSH/C/PSI/0074/96. We would like to express our gratitude to the anonymous reviewers of this article for their helpful suggestions and comments on a first draft. E-mail for the first author: Paula.Castro@iscte.pt.*

ENVIRONMENT AND BEHAVIOR, Vol. 33 No. 3, May 2001 400-423

Over the past decades, environmental issues and problems have been widely acknowledged and discussed. Nowadays, a majority of respondents all over the world state that they are concerned or very concerned with environmental problems (Diekmann & Franzen, 1999; Dunlap & Mertig, 1995; Finger, 1994). There are, however, also a number of studies showing that although environmental issues and environmental concern have hit the public agenda, behavioral changes have not—or not to the same extent (Inglehart, 1995; Krause, 1993; Oliver, 1999; Tarrant & Cordell, 1997). This puzzling gap between concern and behavior has stimulated research guided by the idea that in order to understand why some people are willing to change their behavior while others are not, we have to gain a better understanding of their environmental beliefs and values (Jodelet & Scipion, 1992).

In line with these studies, the present article also wishes to contribute to a deeper and more detailed understanding of the general public's environmental beliefs. Examining a Portuguese sample, we attempt to do it by describing the predictors of two belief systems linking beliefs about the environment with beliefs about scientific knowledge. Many attempts have been made in the past years to identify different contents of environmental beliefs. Quite a significant number of these attempts were conducted using the New Environmental Paradigm (NEP) Scale (Bechtel, Corral-Verdugo, & Pinheiro, 1999; Christianson & Arcury, 1992; Furman, 1998; Mainieri, Barnett, Valdero, Unipan, & Oskamp, 1997; Parker & McDonough, 1999; Schultz & Zelezny, 1998; Scott & Willits, 1994; Stern, Dietz, & Guagnano, 1995). The NEP Scale comprises both new ecological beliefs and old anthropocentric beliefs (Dunlap & Van Liere, 1978; revised and enlarged version in Dunlap, Van Liere, Mertig, Catton, & Howell, 1992). However, research has usually assumed that participants identify either with one type of view or the other, although recent evidence shows that this may not always be the case (Bechtel et al., 1999).

The innovative aspects of this article are its attempts to (a) connect beliefs about the environment with beliefs about scientific knowledge, (b) deal with the complexity of these issues by taking seriously the idea that people may hold seemingly contradictory views on them, and (c) conduct these analyses within the theoretical context of social representations theory.

We will first summarize the reasons why it is important to study the associations between environmental beliefs and beliefs about science; we will then give a brief overview of the literature, showing the variability in beliefs about scientific knowledge and beliefs about the environment; and finally, we will outline the theoretical context of the present study.

SCIENCE AND THE ENVIRONMENT

Environmental issues and scientific issues are currently very closely associated. This relationship seems to include three main dimensions. Science is blamed for an ever-increasing number of environmental problems, but science is also both the lens through which those problems are detected and considered the place to look for solutions to them (Beck, 1986/1995; Yearley, 1993, 1996). A consequence of this association was that "widespread concern about environmental problems has brought a set of scientific issues to public attention" (Yearley, 1996, p. 173). In current debates around environmental issues, and namely those associated with the environmental impact assessment processes now mandatory in many countries throughout the world, science receives a lot of attention from the public and is under close scrutiny—so close that its controversies gain strong public salience (Jasanoff, 2000; Wildavsky, 1995).

Analyzing the origins of scientific controversies around environmental matters, both Hannigan (1995) and Wynne (1994, 1996), for instance, suggested that different visions of science may be at stake. One of these visions presupposes that there are many things we still do not know, but because scientific knowledge is cumulative, we will eventually know for sure. All we have to do is persist in using the same methods, isolating the relevant variables, and definite answers will be found. The other vision of science states, by contrast, that a certain level of indeterminacy is inherent in scientific knowledge because the scientist has many decisions to make (e.g., how to aggregate variables into categories, where to sample, and which instruments to use) and these decisions inevitably introduce a certain margin of subjectivity into science (Wynne, 1994). A scientific study will thus always incorporate subjective values and interpretations. According to Hannigan (1995), green science abides by this more contingent vision of science and insists on the need to see the world in a holistic way because causality may be multiple or indirect.

This is, of course, one of the applied sides of a number of discussions and critiques that since the early years of our century have been directed to science (for a summary, see Gergen, 1994). And these critiques, besides being in possession of experts, are also diffused by the media, in public discussions and hearings, and in everyday communication. They can thus be appropriated by the "thinking society" (Moscovici, 1988) to build different representations of science. One of the aims of this study is to examine the linkages between representations of scientific knowledge and representations of the environment as held by the general public to see whether new ecological beliefs are associated with a more contingent view of science and old

anthropocentric beliefs associated with a more positivist view of science (Hannigan, 1995).

As is the case with science, the environment can also be represented in different ways. As environmental issues and problems become a salient issue in society, a huge literature is still growing that addresses them. Part of this literature is mainly concerned with analyzing and redefining the relationship between humankind and nature, trying to devise a new environmental ethic (for an overview, see Elliot, 1995). Put in a simplistic way, this literature divides along the lines of *anthropocentrism* versus *ecocentrism*. Ecocentrics adopt a nonhumanistic conceptualization of the relationships between nature and humankind, giving no priority to humans. Some examples are deep ecology (Naess, 1973), ecofeminism (Sessions, 1996; Warren, 1996), or the ethics strand (Singer, 1975/1983). From a less radical or a still humanistic perspective, we find authors such as Moscovici (1972) or Soromenho-Marques (1998) advocating respect for nature because to show respect for nature is to show it for future generations (for summaries of these discussions, also see Ferry, 1993; Grendstad & Wollebaek, 1998; Hayward, 1994; Pepper, 1996).

Another body of literature aims mainly at analyzing the views of the public about the environment. A prominent tradition is the one developed by Dunlap and colleagues (Catton & Dunlap, 1980; Dunlap, 1993; Dunlap & Catton, 1979, 1992-1993; Dunlap & Mertig, 1995). These authors have been arguing that throughout the world, the general public's beliefs and attitudes toward the environment are changing in the direction of a more ecological worldview. For them, these changes are due to objective reasons, these being the wide recognition that "human activities are disrupting the functioning of ecosystems to the point of possibly causing irreversible damage, not only at local levels but all the way to the global level" (Dunlap & Catton, 1992-1993, p. 275). For these authors, this wide recognition of our capability for harming the environment is the reason behind a profound change occurring throughout the world. This change implies the abandonment of the old world vision—where humans are seen as the center of the universe and exempt from natural laws and constraints—and the adherence to a new world vision that is more respectful of nature. They name the old world vision the *human exemptionalism paradigm* (HEP) and the new vision the *new environmental paradigm* (NEP).

To measure and follow the changes toward the NEP in the public sphere, Dunlap and Van Liere (1978) developed the New Environmental Paradigm Scale. This scale has been widely used since the 1980s by many different researchers (Arcury & Christianson, 1990; Gooch, 1995; Schultz & Stone, 1994; Scott & Willits, 1994). The accumulated knowledge derived from the

intense use of the scale provided the authors with an opportunity to revise it. In more recent years, it was renamed the New Ecological Paradigm Scale (Dunlap et al., 1992), three items were added, and it now comprises a balanced number of pro- and antiecological items.

The high levels of agreement with the ecological beliefs found throughout the world are a recurrent finding of the research conducted with this framework (Dunlap & Mertig, 1995; Dunlap et al., 1992; Furman, 1998; Gooch, 1995; Schultz & Zelezny, 1998; Scott & Willits, 1994). These high levels of agreement with the ecological items are considered the result of a consensual new social and cultural trend that views nature in a more respectful, ecological way (Dunlap & Mertig, 1995).

However, some authors from different theoretical positions challenge the interpretation of these levels of agreement as indicating a new social and cultural trend independent of other ideological positions or social preferences (Inglehart, 1995). From the perspective of cultural theory (Douglas, 1985; Douglas & Wildavsky, 1982), Ellis and Thompson (1997) argued that this may be a surface consensus that can tap neither the differences between environmental activists and the general public nor differences in different publics. Cultural theory argues that people can be classified in the following four groups according to their views and values: egalitarians, hierarchists, fatalists, and individualists. According to this perspective, a detailed analysis of these cultural biases and their linkages to environmental attitudes would clarify the significance of this trend because different cultural biases are associated with different environmental attitudes. For instance, egalitarianism is positively correlated with environmentalism, whereas individualism is negatively correlated with environmentalism (Ellis & Thompson, 1997; Marris, Langford, & O'Riordan, 1996; Steg & Sievers, 2000).

To join these discussions about the interpretation and the levels of penetration of ecological ideas, we will in this article describe the views of the environment held by a Portuguese sample, examine whether they are closer to the old (anthropocentric) or to the new (ecological) ideas, and analyze some of the predictors of these preferences.

SPECIFIC FRAMEWORK

Although many studies have so far been conducted to understand public beliefs about the environment, this aim has been only partially achieved. As Stern, Dietz, and Kalof (1993) acknowledged, "a number of critics have suggested that the lack of a general theoretical frame may be one reason that

research on environmental attitudes and environmentalism is not cumulative" (p. 323). In a more recent contribution, Stern et al. (1995) underlined the need to link this research and the use of the NEP Scale to a "more explicit social-psychological model" (p. 724). Stern et al. (1995) put forward a model that to explain behavior toward the environment posits the need to start by understanding people's social positions and values as well as beliefs relating to the environment, measured by the NEP Scale. That is, they chose concepts—such as values and beliefs—with a long tradition of study within social psychology, and they also chose a line of reasoning that links these concepts to this same discipline. They proposed that we build representations of the world with the building blocks that are our beliefs, values, and attitudes, and that these representations are the elements that organize and give sense to our behavior.

Within the broad field of social psychology, it is nevertheless possible to identify two main assumptions about the origins of these representations of the world (Castro, 1995; Flick, 1998; Gergen & Semin, 1990; Harré, 1989). One locates those origins mainly in people's experiences with the world, that is, assumes an individual origin for these representations (Markus & Zajonc, 1985). It is thus mainly concerned with the processing of information through these cognitive structures. The other suggests that these representations are mainly of social origin—they assume different contents and are assembled in different ways depending on the groups we belong to, identify with, or communicate with (Moscovici, 1976, 1988).

Social representations theory is perhaps the more widely known proponent of the social origins of representations. Moscovici's (1976) formulation of the original tenets of the theory has undergone many developments (Doise, 1993; Farr, 1999). But in general, to abide by this theory means assuming that for their thinking activities, groups and individuals appropriate the "material for thought" that circulates within their groups and through the society. And it also means assuming that it is with this material that people assemble different social representations of the objects that are relevant for them (Breakwell, 1993a, 1993b; Moscovici, 1988; Vala, 2000). These representations help people to make sense of the world by making the unfamiliar seem familiar. In sum, social representations are organized systems of values, beliefs, and practices (Moscovici, 1976) that arise from and shape the communication between individuals and groups. The circulation of these representations through society contributes to the level of consensus they receive. Some representations are hegemonic, some emancipated, and some polemic (Moscovici, 1988). Polemic representations are those most closely associated with the specific objectives of particular groups. The other crossed the groups' frontiers and acquired supragroup status.

Because social representations theory assigns a prominent role to groups, in more recent years this has opened up the way for linking this theory with social identity theory (Tajfel, 1982). Social identity theory conceptualizes our identity as having two components—the personal and the social. The social component derives from our identification with the various groups to which we belong and the importance we accord to this identification. Social identities play an important role in the organization of intergroup relations and processes of differentiation and conflict. The linkage between these two theories has been accomplished namely by Breakwell (1993a, 1993b) and Vala (2000). Breakwell (1993b) underlined the benefits that the linking of the two theories could have for both of them. Social identity theory, by studying the group processes that shape in a specific way a particular social representation, could help strengthen the process side of social representations theory. There would be corresponding benefits for social identity theory—the study of social representations, with its emphasis on content and description, would deepen the analysis of groups beyond the processes of social differentiation and conflict.

In line with these theoretical perspectives, one of our objectives was to analyze the relationship between social identities and social representations. However, this last relationship is not simple. There are different contents of social representations circulating in our society, and their correspondence with social identities is not necessarily linear. For example, with this connection between social representations and social identity theories in mind, Breakwell (1993a) analyzed the results of a study on political and economic socialization of British teenagers. She concluded that "consistency in self-categorization is linked to the *coherent* [italics added] reproduction of a social representation of political issues matching that espoused by the political party preferred" (p. 192). Nevertheless, neither consistency nor coherence were the rule: "The majority [of respondents] hold mutually contradictory opinions on political issues" (Breakwell, 1993b, p. 208). And, social identity and social representations were linked in such a way that social identification played a more important role for those representations that were coherent (Breakwell, 1993a).

PRESENT STUDY

To attain the objectives mentioned, our starting point was Stern et al.'s (1995) model. In line with this model, we regard both the respondents'

objective social positions and their values as prior to their beliefs, because the latter are more specific and content driven (Stern et al., 1995). However, we depart from Stern's model when we also take into account people's social identities, or subjective social positions, as significant variables that shape their social representations. Because we are arguing that these representations have a social origin, we are also arguing that the social identities of individuals have an important role to play in shaping and explaining them.

Another point of noncoincidence with Stern et al.'s (1995) model is the inclusion of social representations of science as representations that may have important links to social representations of the environment. Within the framework of social representations, this link is theoretically sustained. Breakwell (1993a), for example, argued that "it seems reasonable to suggest that groups can often dictate to members which are the appropriate linkages between representations for them to make, constraining the individual degrees of freedom in association" (p. 189).

To explore the linkages between representations of the environment and representations of scientific knowledge was, then, our general aim. For the pursuit of this aim, the previous review of the literature led to the following predictions:

Hypothesis 1: Ecological beliefs were expected to receive higher levels of agreement than the anthropocentric ones. The high levels of agreement with the proecological NEP items, observed in many different countries, are the basis for this hypothesis.

Hypothesis 2: Both objective social positioning and the values people hold would be able to explain some of the variation in their beliefs about the environment and about scientific knowledge (Stern et al., 1995); it would nevertheless be possible to arrive at a better explanation for this variation if the participants' social identities were also analyzed (Breakwell, 1993a, 1993b; Vala, 2000).

Hypothesis 3: Social identity variables would play a more important role in the explanation of the more controversial beliefs (the ones with lower levels of agreement, i.e., the old anthropocentric beliefs) than in the explanation of the less controversial ones, because the former are the beliefs that are objects of conflict between groups (Moscovici, 1988).

Hypothesis 4: Following Breakwell's (1993a, 1993b) suggestions as well as results previously obtained with the NEP Scale (Bechtel et al., 1999), we expected some respondents to express coherent representations and other respondents to express noncoherent representations. The explanatory power of social identity variables was expected to be especially important for the coherent representations.

METHOD

PARTICIPANTS AND PROCEDURE

Our sample included 460 participants from the Lisbon district who completed a questionnaire. The sample was somehow gender imbalanced, women being overrepresented (men = 39.7%; women = 60.3%). The ages of the participants varied between 17 and 69 (M = 30.2, SD = 10.7), and their level of educational attainment, coded from 1 (elementary school) to 8 (postgraduation degree) varied from 2 to 8 (M = 5.81, SD = 1.25).

MEASURES

To test the guiding ideas mentioned earlier, we designed a questionnaire intended to tap the following constructs.

Values. To measure social values, we used a subset of Schwartz's (1992) Values Scale together with the environmental values added by Stern and colleagues (1993, 1995) to the same scale. The final 20 items were answered on a 7-point scale ranging from 1 (*not at all important*) to 7 (*very important*). The Values Scale, when factor analyzed with varimax rotation, yielded four factors, accounting for 57% of the total variance. These factors were similar to some of the dimensions on the original Schwartz (1992) model and were named after them. The first factor measures Traditional Values (e.g., obedient, respecting tradition, and national security; α = .84). The second factor assesses both Openness to Change and Altruistic Values (e.g., choosing own goals, freedom, and social justice; α = .77). The third factor comprises Environmental Values (e.g., unity with nature and respecting the Earth; α = .76). Finally, the fourth factor taps Egocentric Values (e.g., social power, wealth, and ambition; α = .74). Comparing our results with the ones presented by Stern et al. (1995), it is worth pointing out that for our sample Environmental Values are a separate factor, whereas in their results they were combined with Altruistic Values.

Environmental beliefs. The new version of the NEP Scale (Dunlap et al., 1992) was used to assess environmental beliefs. Its questions were answered on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Because the new NEP Scale has a balanced number of pro- and antiecological items (Dunlap et al., 1992), the proecological items were afterward reverse coded. The NEP Scale was also factor analyzed with varimax rotation, yielding a three-dimensional structure. Although its authors (Dunlap et al., 1992)

argued that the 15 items of the scale measure only one pro- or antiecological dimension, we decided to factor analyze it because the authors show that a first unrotated factor with the 15 items explains 31.3% of the total variance; for our sample, however, the first unrotated factor with the 15 items was able to account for only 21% of the total variance, whereas the rotated solution was able to account for 49% of the variance. Moreover, the three-dimensional solution we obtained makes sense from a psychological point of view, is similar to solutions found in other countries (see Bechtel et al., 1999), and it allows us to analyze people's environmental beliefs in a more complex way. In fact, this differentiation is coherent with our assumption that these beliefs are not monolithic, because it is possible to agree with some factors and to disagree with others. The first factor, Fragility of Nature, taps a dimension that has to do with the fragility of nature and human abuse of it (e.g., the balance of nature is very delicate and easily upset, and when humans interfere with nature there are often disastrous consequences; $\alpha = .58$). The second dimension (Human Capacity) assesses the belief that human effort and capacity for ruling over nature will eventually solve environmental problems (e.g., human ingenuity will ensure that we do not make the earth uninhabitable, and humans were meant to rule over the rest of nature; $\alpha = .58$). The third factor, Limits, taps beliefs about our own and nature's limits (e.g., despite our special abilities, we humans are still subject to the laws of nature, and the Earth is like a spaceship with very limited room and resources; $\alpha = .42$).

Scientific knowledge beliefs. A scale designed to tap beliefs about science and scientific knowledge was constructed with 10 items and answered by the participants on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). When factor analyzed with varimax rotation, the scale yielded a three-factor solution, accounting for 52.1% of the total variance. The first factor, Positivism, assesses beliefs associated with the positivist vision of science (e.g., science's main aim is to produce laws capable of explaining reality and scientific claims, and discoveries are independent of scientists' intimate beliefs; $\alpha = .52$). The second factor, Relativism, was used as a measure of participants' reliance on a more relativistic conception of science (e.g., scientific knowledge is a product of its time, influenced by the context of its production, and experimental testing never enables us to state that a scientific theory is definitively proven; $\alpha = .62$). The third factor was not used because its alpha (.35) was too low.

Social identity. The participants were also asked to express their identification with a set of social groups on a 4-point scale ranging from 1 (*I do not belong to that group*) to 4 (*I belong to that group, and that is very important to*

TABLE 1
Descriptive Statistics for the Measures of Values and Beliefs and Within-Subjects Differences (ANOVAs and Paired Samples *t* Test)

Values	M	SD	*Environmental Beliefs*	M	SD	*Scientific Knowledge Beliefs*	M	SD
Traditional Values	3.97a	.96	Fragility of Nature	4.13a	.61	Positivism	3.14	.66
Openness Values	4.56b	.68	Human Capacity	2.63b	.78	Relativism	3.86	.74
Environmental Values	4.30c	.82	Limits	3.77c	.67			
Egocentric Values	3.18d	1.02						
$F(401, 3) = 217.1$, $p < 0.000$			$F(404, 2) = 411.3$, $p < 0.000$			$t(417) = 15.6$, $p < 0.000$		

NOTE: For the first two columns, different letters indicate significant mean differences (Bonferroni, $p < .05$).

me). This included gender groups, ideological groups, age groups, and territorial groups.

Objective social positioning. Finally, to assess respondents' position in the social structure (Stern et al., 1995), the following variables were included: sex, age, and level of education.

RESULTS

Means and standard deviations for the measures of values and beliefs are presented in Table 1. Also displayed are the results of the within-subject ANOVAs and the paired samples *t* test performed to test the idea that some values and beliefs are more accepted than others.

Traditional, Openness, and Environmental Values have significantly higher means than the Egocentric Values. As expected, for the environmental belief measures, the agreement is especially strong for beliefs about the fragility of nature, and there seems to be disagreement about the human capacity to solve environmental problems. As for beliefs about scientific knowledge, the means profile shows that there is greater support for Relativism than for Positivism.

TABLE 2
Second-Order Factor Analysis: Factor Loadings After Varimax Rotation

	Factor 1	*Factor 2*	*Factor 3*
Openness to change values	**.79**	.10	–.05
Traditional values	**.78**	–.08	.27
Environmental values	**.71**	.28	–.15
Limits	.02	**.74**	–.10
Fragility of nature	.18	**.65**	–.20
Relativism	.03	**.52**	.08
Positivism	–.09	.38	**.74**
Human capacity	–.03	–.26	**.65**
Egocentric values	.40	–.21	**.55**
Explained variance (total = 55.1%)	22.9%	19.2%	13.0%

Reconstruction of the belief systems. To better understand the interrelationships among these first-order factors, we performed a second-order factor analysis using the measures for values, environmental beliefs, and scientific knowledge beliefs.

The second-order factor analysis yielded the three factors shown in Table 2. The first factor is solely a Values factor, comprising Openness to Change and Traditional and Environmental Values. The second factor seems to express a notion of Prudence, both toward science and our relationship with nature—we should acknowledge that science is a man-made and provisional answer, that nature is fragile, and that both humans and nature have limits. The third factor seems to be expressing a more Confident view of affairs: Science can explain the world independently of scientists' intimate beliefs, human capacities are wide ranging, and it is important to pursue goals such as success and power. These two belief factors are, of course, reminiscent both of the formulations of Dunlap and colleagues (the HEP and NEP paradigms) and of the divide between ecocentrism and anthropocentrism. The factors also reflect a time divide: new ideas (i.e., ecological and relativist ideas) are grouped together in the Prudence factor; old ideas (i.e., anthropocentric and positivist ideas) are associated in the Confidence factor.

An index was constructed for each of these two second-order factors by computing the mean of the variables that were included in each one.

As expected (Hypothesis 1) and as easily anticipated in view of the previous results, there is greater agreement in our sample for the Prudent ideas than for the Confident ones, as shown in Table 3.

TABLE 3
Mean and Standard Deviation for the Indexes Computed for the Second-Order Factors and Results for the Paired Samples *t* Test

	M	SD	N	t	p
Prudence	3.91	.46	413		
Confidence	2.99	.56	402	23.9	0.000

TABLE 4
Results of the Dichotomization of the Indexes Computed for the Second-Order Factors

	Low Confidence	*High Confidence*
Low Prudence	Disbelievers (*n* = 103)	Confidants (*n* = 99)
High Prudence	Prudents (*n* = 103)	Paradoxicals (*n* = 81)

Variability analysis. Having established these two main belief systems that link views of the environment and views of science, our next step was to carry out an analysis of the predictors of the rejection or acceptance of these systems.

Before, we needed to know whether these belief systems were mutually exclusive or if it were possible to find participants subscribing to both or even to neither of them. This was an important issue, because one of our guiding ideas was that social identity variables would play a more important role in the explanation of coherent representations.

To answer this question, the indexes of the two second-order factors (Prudence and Confidence) were first dichotomized through the mean, and then the two resulting variables were crossed. This procedure showed how many participants were below the mean for both factors, how many above the mean for both factors, how many below the mean in one of them and above the mean in the other.

Table 4 presents these results. They show that, indeed, some respondents do not consider these belief systems as mutually exclusive (Paradoxicals) because they score high in both of them; for another group of participants, none of these systems is a very good characterization of what they believe (Disbelievers). Table 4 also shows that the participants in the two remaining groups subscribe more clearly to only one of the belief systems (Prudents and Confidents). Participants in these last two groups seem, then, to be more coherent in their beliefs. The former two groups may be seen as gathering the noncoherent respondents.

TABLE 5
Correlations Between the Two Indexes of Prudence and Confidence

	r	N	p
Total sample	–.11	402	.03
Coherent participants (Paradoxicals and Disbelievers)	–.71	202	.000
Noncoherent participants (Prudents and Confidants)	.63	184	.000

The correlations between the two factors of Prudence and Confidence were also analyzed, because Bechtel et al.'s (1999) results showed that correlations between more ecological and more anthropocentric beliefs may vary in different countries. In view, however, of the very different combinations of beliefs that Table 4 shows, these correlations were analyzed for the total sample and also separately for the coherent and noncoherent participants. Table 5 shows that whereas for the total sample the overall relation is negative and weak, for the two separated groups, this relation is both strong and inverse.

Our next step involved examining the predictors of these belief systems through a set of regression analyses. To tap the differences between coherent and noncoherent participants, we performed these analyses separately (a) for the total sample, (b) for the group that comprises coherent respondents (those whose scores are low in one factor and high in the other), and (c) for the group that comprises those participants who either reject both of them or accept the two (i.e., noncoherent participants).

The regression analyses (method enter) were also performed in two steps. The first step (Model 1) included the variables that Stern et al. (1995) used to explain environmental beliefs (position in social structure and values). In the second step (Model 2), these same variables were entered together with the social identity variables. Table 6 shows the results for the Prudence factor.

As these results show, the predictive power of the models is low both when we analyze the whole sample (first column) and the respondents with noncoherent responses: Adjusted R^2s are small, the largest being .13.

But when we try to explain variation for those who are more coherent in their beliefs, then the second model, which includes position in the social structure, values, and social identities, is able to account for 25% of this variation. Variance in this factor is mainly explained by the rejection of traditional values and the identification with the group of people with environmental ideas.

The analyses for the Confidence factor are shown in Table 7. It is the acceptance of traditional values and of right-wing identity and the rejection of environmental values and environmental identity that significantly enter

TABLE 6
Results of Regression Analyses for the Prudence Factor

	Total Sample		*Coherent Participants*		*Noncoherent Participants*	
	Beta	*Significance*[a]	*Beta*	*Significance*[a]	*Beta*	*Significance*[a]
Model 1						
Age	–.06		–.08		.03	
Sex	–.00		**.13**	**.06**	**–.17**	**.03**
Educational level	.02		.04		.03	
Traditional values	**–.14**	**.03**	**–.36**	**.00**	.12	
Openness to change values	**.12**	**.05**	**.16**	**.05**	.13	
Environmental values	**.24**	**.00**	**.32**	**.00**	.12	
Adjusted R^2	**.06**		**.16**		**.08**	
F	5.0	**	6.7	***	3.1	*
N	378		181		157	
Model 2						
Age	–.04		–.03		.03	
Sex	.04		.13		–.04	
Educational level	.02		.07		.02	
Traditional values	**–.12**	**.05**	**–.29**	**.00**	.09	
Openness to change values	**.17**	**.01**	**.21**	**.01**	**.16**	**.06**
Environmental values	**.11**	**.08**	**.16**	**.05**	.03	
Masculine identity	–.07		.05		.14	
Center identity	–.07		**–.18**	**.01**	.07	
Right-wing identity	–.08		–.06		–.08	
Environmentalist identity	**.24**	**.00**	**.25**	**.00**	.14	
Adult identity	**–.09**	**.10**	**–.19**	**.01**	–.02	
European identity	**.16**	**.00**	**.15**	**.04**	**.17**	**.05**
Adjusted R^2	**.13**		**.25**		**.12**	
F	5.5	***	6.1	***	2.6	*
N	352		181		157	

NOTE: Figures in bold indicate significant beta values.
a. Levels of significance are displayed only for the significant β.
*$p < 0.01$. **$p < 0.000$. ***$p < 0.0000$.

the equation. Once again, the explanatory power of the two models is low both for the total sample and for the noncoherent group, although not as low as for the Prudence factor.

For the group with coherent beliefs, however, variables in the second model are able to account for a larger proportion of the variance of the Confidence factor (35%). And, the pattern of the more significant predictors

TABLE 7
Results of Regression Analyses for the Confidence Factor

	Total Sample		*Coherent Participants*		*Noncoherent Participants*	
	Beta	*Significance*[a]	*Beta*	*Significance*[a]	*Beta*	*Significance*[a]
Model 1						
Age	.07		.11		–.04	
Sex	**–.21**	**.00**	**–.20**	**.00**	**–.18**	**.03**
Educational level	–.00		–.00		–.01	
Traditional values	**.39**	**.00**	**.51**	**.00**	**.25**	**.01**
Openness to change values	.01		–.08		.04	
Environmental values	**–.18**	**.00**	**–.30**	**.00**	**–.01**	
Adjusted R^2	**.15**		**.24**		**.06**	
F	12.1	***	10.4	***	2.7	*
N	376		181		157	
Model 2						
Age	.04		.04		–.01	
Sex	–.11		**–.25**	**.04**	**.12**	
Educational level	–.03		–.04		–.02	
Traditional values	**.30**	**.00**	**.40**	**.00**	**.21**	**.02**
Openness to change values	.02		–.10		.08	
Environmental values	**–.12**	**.04**	**–.15**	**.05**	–.09	
Masculine identity	.08		–.12		**.33**	**.04**
Center identity	**.21**	**.00**	**.21**	**.00**	**.15**	**.06**
Right-wing identity	**.11**	**.02**	**.14**	**.04**	.04	
Environmentalist identity	**–.11**	**.03**	**–.22**	**.00**	.03	
Adult identity	**.10**	**.08**	**.19**	**.01**	–.05	
European identity	.07		–.08		**.21**	**.01**
Adjusted R^2	**.22**		**.35**		**.14**	
F	9.3	***	9.0	***	3.1	**
N	352		181		157	

NOTE: Figures in bold indicate significant beta values.
a. Levels of significance are displayed only for the significant β.
*$p < 0.02$. **$p < 0.001$. ***$p < 0.0000$.

includes acceptance of traditional values and of center and right-wing identity and rejection of environmental values and environmental identity.

It is thus possible to say that it seems easier to explain both less consensual beliefs and the beliefs of those that are coherent, as predicted.

Finally, to test the ideas that social identities played a more important role both in the prediction of the responses of coherent participants and in the

TABLE 8
Predictive Power of the Social Identity Variables for Each of the Two Indexes (Adjusted R^2 Values)

	Total Sample	*Coherent Participants*	*Noncoherent Participants*
Prudence	.11	.19	.09
Confidence	.15	.24	.13

explanation of the less prevalent belief system (Confidence), we performed another set of regressions. This time, the independent variables were only the six identity variables entered in the previous analyses. The dependent variables were again the two belief factors.

Table 8 shows the adjusted R^2 obtained with these regressions for the whole sample, the coherent group, and the noncoherent group. As hypothesized, the predictive power of social identity variables is higher for the coherent participants than for the noncoherent ones. The explanatory power of these variables is also higher for the Confidence factor, the one that comprises a less accepted set of beliefs.

DISCUSSION

We seem to have found two belief systems linking beliefs about the environment with beliefs about science. One of these systems (Prudence) comprises the following ideas: The Earth has space and resource limitations; we too are subject to natural limits; we are abusing the environment and upsetting nature's delicate balance, and this may lead us to catastrophe; and science as a human enterprise is relative, dependent on context, and unable to provide definitive proof. This is the belief system that more closely resembles the new NEP ideas and the one that receives higher levels of agreement from our sample, as expected.

The second belief system (Confidence) incorporates the following notions: Human capabilities will put us in a position to overcome present limitations because we are meant to rule over nature, power and wealth are goals worth pursuing, and science is capable of providing explanations independent of scientists' intimate convictions. This is the belief system that receives lower levels of agreement from the public. It is also the one more similar to the old HEP world vision, in Dunlap et al. formulation.

One of our guiding ideas was that both the respondents' positions in social structure and the values they held would explain some of the variation in these belief systems (Stern et al., 1995); it would nevertheless be possible to achieve a better explanation for this variation if the respondents' social identities were also analyzed (Breakwell, 1993a, 1993b; Vala, 2000). The results seem to point in that direction. In every case, values were able to account for some of the variation of responses, and it was always possible to increase the total variation explained by including people's social identities in the analyses.

Another of our starting points was the idea that social identities would play a more important role in the explanation of the less accepted beliefs. Our results show that in fact, it is easier to explain Confidence ideas, which are the less consensual or more controversial ones. The ideas included in the Prudence factor, which are far more widely shared, must straddle different groups to achieve such a high level of agreement. It is consequently more difficult to account for their variation across participants.

In addition, following a suggestion by Breakwell (1993a, 1993b), we expected some participants to express coherent representations and others to express noncoherent or contradictory representations. For the coherent participants, social identities would be more important in the explanation of representations than in the case of noncoherent participants. Testing the predictive power of the identity variables in our two groups of coherent and noncoherent participants showed that these variables were able to account for a bigger percentage of the total variance in the coherent group, in accordance with Breakwell's (1993a, 1993b) suggestion.

The resulting picture was indeed a complex one, showing the different ways in which new ideas combine with the old ones.

This was an exploratory study, with its own inherent limitations: Quite a significant part of the variability in participants' answers was lost with the second-order factor analysis, and the explanatory power of our models is low, our R^2s being modest. Nevertheless, this first exploratory approach to this complex object seems to contain a few warnings to us as researchers.

The first and perhaps the most important warning points to some well-known facts: People are very creative, the material for thought circulating throughout the thinking society is very complex and allows for many different and creative combinations. The emergence of new ideas, their circulation in society, and the form they acquire in this circulation is a challenge to old ideas and transforms them and the way they are expressed.

The same happened with another complex issue—racism—when it became nonnormative to express clear racist ideas based on racial superiority

or inferiority (Pettigrew & Meertens, 1995). The blatant expression of crude racist ideas almost disappeared from public discourse and responses to questionnaires. Nevertheless, racism went on living a very healthy life and acquiring new forms—subtle racism (Pettigrew & Meertens, 1995), aversive racism (Dovidio & Gaertner, 1998), and racism in the form of cultural heritage discourse (Potter & Wetherell, 1998)—all of which are forms of racism that avoid the nonnormative expression of old-fashioned racism but express racism all the same.

There seems to be a parallel to what is happening today with the conceptualization of the environment and of human-nature relationships. The notions that the environment has to be preserved, is fragile, and is under threat from humankind seem to have become normative or are on the way to becoming normative. High or very high levels of agreement with these ideas, found all over the world, are pointing in that direction. In our sample, it is clear that none of the groups thoroughly rejects the new ecological and relativistic ideas, those summed up in the Prudence factor. What happens is two things. Some groups accept them more (or less) than others. And some groups also accept the older ideas while others reject them. That is, old ideas are accepted by some and rejected by some. New ideas, those acquiring normative force, are accepted by everyone to a lesser or a greater extent. The four groups we found can now be rethought as showing (a) a mild acceptance of the new and a clear rejection of the old (Disbelievers), (b) a strong acceptance of the new and a clear rejection of the old (Prudents), (c) a mild acceptance of the new and a clear acceptance of the old (Confidents), and (d) a strong acceptance of the new and a clear acceptance of the old (Paradoxicals).

These combinations should, then, be a warning to us: Let us not assume too hastily that the old paradigm, or HEP in the terminology of Dunlap et al., is already being replaced by the new paradigm, or NEP. The new ecological paradigm—whose ideas are of course very similar to the ideas contained in our Prudence factor—is achieving high levels of agreement today. Nevertheless, and at least for our sample, acceptance of the new ecological ideas does not in every case mean the abandonment of old ideas. This implies that when analyzing complex issues, such as the present one, we should see how new and old ideas are combined, because acceptance of the new does not necessarily mean rejection of the old. At a methodological level, this implies, for instance, using scales that tap both sides of a same question or, more generally, multidimensional measures. This can be a way to assure that representations of new objects—that is, new representations—are understood taking into account their relations to old representations.

Understanding the relations between new and old representations has always been a concern of social representations theory (Moscovici, 1976). It

is in connection with this preoccupation that we should now reconsider the designation of *incoherent* applied to some respondents and namely to those that agree both with the new and the old ideas—Paradoxicals. A tendency to conciliate new ecological demands with old anthropocentric values and preoccupations can hardly be said to be absent from many of the discourses made in current environmental discussions both in national and international forums. This is a position that could be named *reformist*, as opposed to *revolutionary*, because the latter implies clear rejection of the old. So perhaps our *Paradoxical* respondents could be renamed *reformists*.

Finally, the combinations of beliefs we analyzed can also be seen as a way to consider possible linkages between cultural theory and social representations theory. *Reformism* and *conciliation* of new and old ideas are also the key words for the view of nature endorsed by Hierarchicals: Nature is fragile but only up to a certain point, and experts are the ones who know where to draw the line (Dake, 1992). So, our reformist respondents could also be seen as Hierarchicals. And, an analysis of how Hierarchicals articulate new and old ideas could help clarify their positions with regard to environmental concern. At the same time, those endorsing exclusively new ecological ideas (Prudents) could be seen as Egalitarians. With these parallels in mind, a more detailed analysis of the consequences of a reformist position in environmental matters might help clarify some problematic areas such as the relationship between environmental beliefs and behaviors. It seems reasonable to suggest, for instance, that a reformist position that tries to keep both old and new ideas may have less clear linkages to behavior than a position that only endorses new ecological ideas.

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