

Pro-environmental Value Orientation Across Cultures. Development of a German and Russian scale

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Abstract: The present study develops and validates a German and Russian scale of pro-environmental value orientation. Pro-environmental value orientation is conceptualized as a four-dimensional construct, entailing egocentric, ecocentric and anthropocentric value orientations as well as environmental apathy. The first stage of the research is an expert test of indicator content validity. In a subsequent step, the authors provide evidence of internal consistency for a student sample ($N = 223$) and for the structural equivalence, and criterion validity for a representative sample ($N = 430$). The structure of pro-environmental value orientation appears to be equivalent in both cultures to a large degree. However, the behavioral relevance of the dimensions differs. In the Russian sample, pro-environmental behavioral intention correlates with any of the four dimensions, whereas in Germany, anthropocentric value orientation does not relate to behavioral intention.

Key words: pro-environmental value orientation, scale development, structural equivalence, environmental consciousness

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For decades, researchers have been pointing out that human interference with nature results in irreversible damage. However, it proved impossible to gain broad public attention until the most recent alarming reports (e.g., IPCC, 2007). Nowadays, even people who are skeptical on such matters seem to be aware that humans should protect the environment.

Despite this general agreement that nature has to be protected, the degree of environmental consciousness and patterns of pro-environmental behavior vary across cultures (e.g., Deng, Walker & Swinnerton, 2006). In many industrialized countries, a large part of the population is concerned about the protection of the environment, due to a change from materialistic to post-materialistic values (Inglehart & Welzel, 2005). Members of societies with postmaterialistic values are more likely to care about the environment. Thus, a more pro-environmental value orientation leads to pro-environmental attitudes which in turn foster sustainable behaviors (Stern, Dietz & Kalof, 1993).

This development is accompanied by a growing body of research on pro-environmental attitudes and conservation behaviors in different cultures (e.g., Kalafatis, Pollard, East & Tsogas, 1999). Recently, researchers have analyzed *pro-environmental value orientation* across cultures as the underlying drivers of environmental attitudes. Oreg and Katz-Gerro (2006) examined cultural variations in the relationship between values and pro-environmental attitudes. However, the researchers applied measures of general values, such as the Schwartz Value Survey (Schwartz, 1992) and the theory of postmaterialism (Inglehart, 1977), without adjusting the measurement instrument to pro-environmental value orientations. Other studies analyzed specific pro-environmental value orientations in English or Spanish-speaking areas (e.g., Schultz & Zelezny, 1999) or of Asian respondents living in English-speaking countries (e.g., Milfont, Duckitt & Cameron, 2006). To date, to the best of our knowledge, no study has analyzed pro-environmental value orientation in Eastern European cultures. Considering the enormous environmental impact (e.g., increasing CO²-emission) of these nations, research should focus on environmental consciousness in those cultural areas.

This disregard of important regions may be due to a lack of measurement instruments that can be applied to these cultures. The majority of pro-environmental value orientation scales were developed in English-speaking countries. Yet, they are often used in other cultural contexts without prior testing of their cross-cultural equivalence (e.g., Siegrist, 1996). In order to conduct valid research on pro-environmental value orientation, there is a need for scales that are validated across different cultures (van de Vjiver, 2003).

To overcome this gap, the present study aims at developing a scale of pro-environmental value orientation in German and Russian. These two languages were chosen, because they are both wide-spread in cultural areas which have seldom been the subject of investigation in value research. Moreover Germany and Russia belong to different cultural clusters (Germanic vs. Eastern Europe cluster; Gupta & Hanges, 2006 (p.193)).

The scale is based on a theoretical synopsis of three measurement approaches. The starting point for the scale development is Siegrist's (1996) German version of a scale originally introduced by Thompson and Barton (1994). This scale is discussed, modified and translated into Russian. The cross-cultural validity of the scale is examined in a multi-step procedure, using two German and two Russian samples.

Conceptualization of Environmental Consciousness

Starting with the ecological movement in the 1960s, research on environmental consciousness developed in four stages (Figure 1). Early research aimed at describing the *personal characteristics* of environmentally conscious individuals, such as socio-demographic variables and personality traits. Accordingly, socially responsible humans are most likely to be female, well-educated (Berkowitz & Lutterman, 1976) and have a relatively high income level (Webster, 1975). Dogmatic and conservative humans, on the contrary, appear to be more concerned about their personal well-being than of the protection of nature (Anderson & Cunningham, 1972).

In the 1970s and 1980s, social scientists tried to explain pro-environmental behavior in terms of pro-environmental *attitudes*. Maloney and Ward (1973) proposed a multi-item scale of pro-environmental attitudes. This paper raised general awareness of the topic in social sciences. The scale, however, has not often been used in subsequent studies. Most researchers draw on Ajzen's (1991) theory of planned behavior. This theory formed the basis of various attitude-behavior models aimed at explaining pro-environmental behavior (e.g., Bamberg, 1996; 1999; Kaiser & Gutscher, 2003; Kaiser, Schultz & Scheuthle, 2007).

A third stream of research deals with *personal value orientations* as antecedents of pro-environmental attitudes and sustainable behaviors (e.g., Schultz, 2001). According to Rokeach (1968 (p.161)), values are "centrally held, enduring beliefs which guide actions and judgments across specific situations and beyond immediate goals to more ultimate end-states of existence". Thus, values are less specific than attitudes and do not refer to a specific object. The Schwartz Value Survey (Schwartz, 1992; Schmidt, Bamberg, Davidov, Herrmann & Schwartz, 2007) is a well-established instrument which measures ten universal value-orientations. Although not adapted explicitly to pro-environmental value orientation, it has been applied in research on pro-environmental consciousness (e.g., Oreg & Katz-Gerro, 2006). There are two groups of researchers who explicitly investigated pro-environmental value orientations. Stern et al. (1993) proposed their value belief norm theory, an approach based on the norm activation theory (Schwartz, 1977) and the Schwartz Value Survey (Schwartz, 1992). Dunlap and van Liere (1978) offered a different approach of pro-environmental value orientation that is not rooted in a theory of general values. They suggested the "New Environmental Paradigm" (NEP) to describe a new type of world-view that emphasizes the environment.

A fourth research stream explicitly addresses *cultural values* as the cause of pro-environmental values, attitudes and behaviors. However, these studies either examine general value orientations (e.g., harmony), rather than specific pro-environmental value orientations (Oreg & Katz-Gerro, 2006), or use English measurement scales (or a simple translation of these scales) without testing the cross-cultural equivalence (e.g., Deng et al., 2006; Schultz & Zelezny, 1999). Only Milfont et al. (2006) explicitly analyzed the equivalence of a tripartite environmental value scale for two ethnical groups within one nation.

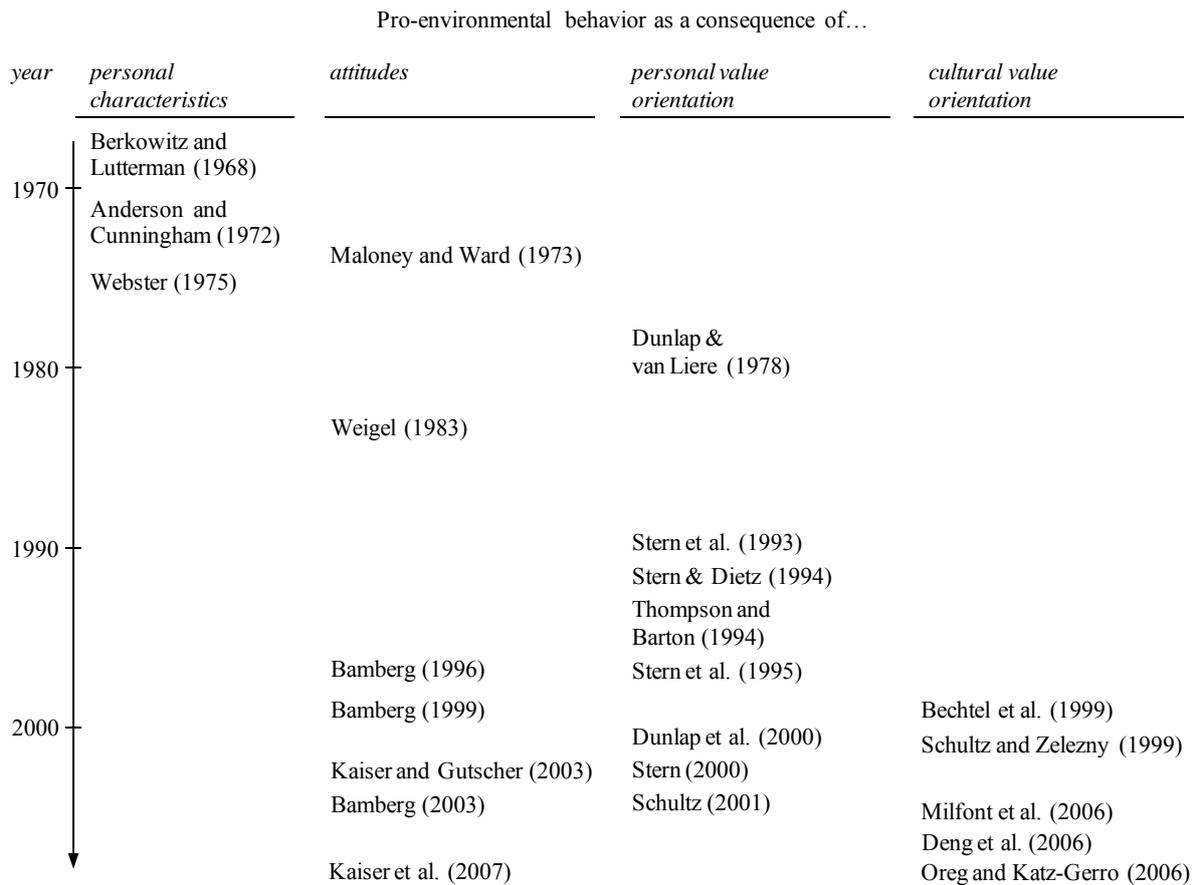


Figure 1. Research streams of environmental consciousness

Environmental Consciousness as a Value Orientation

Many researchers have conceptualized environmental consciousness as attitudes. Accordingly, individual differences in pro-environmental behavior can be explained by attitudes. However, the causes of these different attitudes cannot be identified. Stern et al. (1993) argue that a pro-environmental value orientation influences pro-environmental attitudes and thereby behavior. In the following discussion, three seminal approaches to measuring pro-environmental value orientation are described. The present paper provides a synopsis of these concepts which forms the basis for the development of an improved instrument for measuring pro-environmental value orientations.

The *approach of Thompson and Barton (1994)* is based on the typology of the philosopher Stokols (1990), who distinguished between two types of individuals, instrumentalists and spiritualists. These two types both appreciate nature, but for different reasons. For instrumentalists, nature is a means to an end, such as that of obtaining food. Spiritualists, by contrast, worship nature, because the natural environment enhances and enriches the human spirit. Thompson and Barton (1994) introduce a two-dimensional scale which covers these two drivers of environmental consciousness. Although they label these dimensions as pro-environmental attitudes, the wording of the indicators shows that the items actually reflect specific values related to the environment. For that reason, the present article classifies the scale as an instrument for measuring pro-environmental value orientations, rather than attitudes. The first dimension of the Thompson and Barton scale, anthropocentric value orientation, is based on the instrumental world view. Individuals who score highly in this

dimension, consider humans as dominators of nature. The ecocentric value orientation has its roots in the spiritualistic world view. Ecocentric individuals are deeply affected by the natural environment and strive to protect nature for its own sake. More recent studies (e.g., Kaltenborn & Bjerke, 2002) have suggested including environmental apathy as a third dimension. This construct was originally introduced by Thompson and Barton (1994) as an external validation criterion. Apathetic individuals negate the need to protect the environment and generally disapprove measures to protect the environment. Siegrist (1996) translated the Thomson and Barton scale into German and provided empirical evidence of internal consistency for each of the three subscales (Cronbach's $\alpha > .7$). To date, only a few studies have applied the Thompson and Barton scale or its German translation. The approaches of the research groups around Dunlap and Stern are more wide-spread.

Dunlap and van Liere (1978) conceptualize pro-environmental value orientation in their approach as a higher-order world view. Drawing on Inglehart's (1977) postmaterialism hypothesis, they argue that members of industrial societies undergo a value change from materialism to postmaterialism. Through this process, individuals develop an understanding of their dependence on the ecosystem. Moreover, they realize that mankind exerts a substantial influence on nature. The traditional materialistic world view, which denies the need to protect the environment, is replaced by an environmentally orientated world view. According to Dunlap and van Liere (1978), this so-called New Environmental Paradigm (NEP) consists of three dimensions: balance of nature, limits to growth, and human domination of nature. Subsequently, Dunlap, van Liere, Mertig, and Jones (2000) extended the NEP scale to the New Ecological Paradigm Scale by adding two more dimensions: human exceptionalism and the likelihood of ecological crises. The dimensional structure of the New Ecological Paradigm Scale, however, appeared to be unstable (e.g., Nooney, Woodrum, Hoban & Clifford, 2003). Due to its poor factorial validity, it is not advisable to use this scale for measuring pro-environmental value orientation.

The *approach of Stern et al.* (1993) is conceptually related to the work of Schwartz (1977; 1992). It distinguishes between three dimensions of pro-environmental value orientation. The socio-altruistic dimension is based on the norm activation theory (Schwartz, 1977), which states that people with a socio-altruistic value orientation are motivated to support and protect their fellow human beings. Stern et al. (1993) extended the norm-activation theory, by postulating that individuals not only consider the welfare of others, but also the perceived costs of specific behavior. Thus, egoistic individuals only protect nature if they expect the resulting individual benefit to exceed their costs. Moreover, they added the biospheric value orientation as a third dimension to their tripartite value belief norm theory. Biospherically-orientated individuals seek to protect nature for its own sake. This concept has already been discussed by Dunlap and van Liere (1978). With the "balance of nature" dimension, their NEP scale refers to the welfare of nonhuman species or the biosphere itself. The conceptualization of the Stern scale is rooted theoretically in the Schwartz Value Survey. Stern et al. (1995) demonstrated empirically that an egoistic value orientation corresponds with the self enhancement value category of the Schwartz Value Survey. The socio-altruistic and biospheric value orientations jointly reflect the self transcendence value category. The Stern scale, however, is more appropriate for measuring environmental consciousness, because, in contrast to the Schwartz Value Survey, it is adapted to pro-environmental value orientations. Furthermore, it assesses pro-environmental values in greater detail, by distinguishing between two different categories of self transcendence value orientations: altruism toward humans and altruism toward the biosphere itself. Due to its practicability and ease of use, the Stern scale has been used in numerous empirical studies (e.g., Milfont et al., 2006).

Synopsis

A comparison of the three measurement approaches reveals that all cover both ecocentric and anthropocentric value orientations (Figure 2). The *ecocentric value orientation* from the Thompson and Barton scale corresponds conceptually with the biospheric dimension introduced by Stern et al. (1993). The socio-altruistic value orientation is based on *anthropocentric values*. The NEP scale of Dunlap et al. (2000) covers the anthropocentric value orientation through the human domination of nature dimension and the ecocentric value orientations through the balance of nature dimension. Hence, the distinction between whether humans protect nature because of individual benefits or for nature's sake is well-established in the research on pro-environmental value orientation (Kortenkamp & Moore, 2001). Therefore, a measurement instrument of environmental value orientation must include these two dimensions.

The present study argues that two additional dimensions should be integrated in future research: The dimension of *environmental apathy* was introduced by Thompson and Barton (1994). Several studies have already shown that this construct explains variance in pro-environmental attitudes (Kaltenborn & Bjerke, 2002) and behaviors (Siegrist, 1996). Stern et al. (1993) introduced a dimension referred to as the egoistic value orientation. However, the term "egoistic" is misleading, because egoistic individuals pursue their own advantage, often at the expense of others and/or their natural environment. For this reason, the present article suggests rephrasing this dimension in a more positive manner. Examining the operationalization of the Stern scale, some of the indicators describe a "positive egoism" (e.g., "A clean environment provides me with better opportunities for recreation."). In a similar vein, some indicators of the Thompson and Barton subscale for the ecocentric value orientation also capture this issue (e.g., "I need time with nature to be happy."). Hence, the paper suggests a fourth value orientation which is defined as the *egocentric value orientation* (Figure 2). Egocentric orientated individuals seek to enjoy nature, to feel comfortable and to reduce stress in the nature.

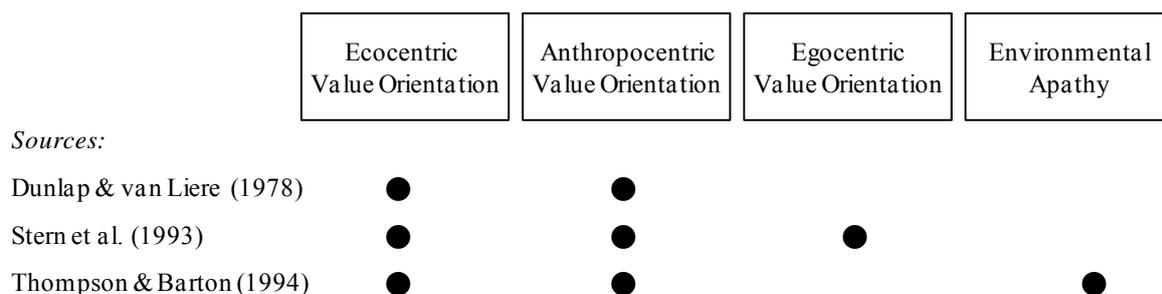


Figure 2. Structure of pro-environmental value orientation

Scale Development

Research Questions

The aim of the present study is to develop a cross-culturally equivalent scale of pro-environmental value orientation that is based on the theoretically derived synopsis. Therefore, the following research questions will be addressed. Firstly, is there empirical evidence of the

four-dimensional structure proposed in the synopsis? Secondly, is the four-dimensional value structure stable across different cultures? Thirdly, do the four dimensions of pro-environmental value orientation have explanatory power with respect to pro-environmental attitudes and behavioral intentions?

Cross-Cultural Equivalence of Measurement Instruments

According to Triandis (1994), cross-cultural research can follow a universalistic measurement approach. This type of research is based on the assumption that constructs can be applied in different cultures. These culture-free constructs are called etics. A competitive approach assumes that constructs are culture-bound and that their meaning is restricted to the specific culture for which they were developed. These constructs are called emics. Hence, the etic approach aims at identifying universally valid comparison standards, whereas the emic approach applies measurement instruments that need to be adapted to each culture. Many researchers use pseudo-etic constructs, meaning that they assume constructs to be etics, although they should be treated as emics. In particular, they apply measurement instruments developed and validated in Western societies to conduct studies in non-Western cultures, without carefully testing their cross-cultural equivalence. This research strategy harbors the danger of an ethnocentric bias.

Etic research requires equivalence of the data collected in different cultures. Equivalence can refer to methods, items, and constructs. Accordingly, three potential biases need to be avoided (van de Vijver, 2003):

- *Method bias* can be a consequence of different sampling procedures across cultures or a result of culture-specific interviewer effects. Researchers should avoid this bias by applying consistent sampling procedures and by training the interviewers.
- *Item bias* occurs when responses are influenced by a culture-specific response tendency. In particular, the semantic equivalence of indicators has to be analyzed in order to avoid item bias. The translation/back-translation procedure (Brislin, 1970) is a widely used method for ensuring semantic equivalence.
- *Construct bias* occurs when constructs are understood differently across cultures. By applying single-group and multi-group confirmatory factor analysis, the structural equivalence can be analyzed cross-nationally (Steenkamp & Baumgartner, 1998).

Scale Development Process

The aim of the present paper is to develop a cross-culturally valid scale of pro-environmental value orientation in German and Russian. A synopsis of three value-based measurement approaches is suggested. Starting point is the measurement scale of Thompson and Barton (1994), extended by the theoretical findings of Stern et al. (1993) and Dunlap et al. (2000).

A pre-test is conducted to develop a four-dimensional scale of pro-environmental value orientation with sufficient content validity. The internal consistency, structural equivalence, and criterion validity of the measurement instrument is tested in two cross-cultural studies (Figure 3).

	<i>Objective</i>	<i>Procedure</i>	<i>Basis</i>
Pre-test	Content validity	Modification of the scales based on expert interviews	Experts
	Semantic equivalence	Professional translation and back translation	

Study 1	Internal consistency	Explorative factor analysis	Student sample

Study 2	Structural equivalence	Single and multi-group confirmatory factor analysis	Representative sample
	Criterion validity	Correlation with external criteria	

Figure 3. Process of scale development

Pre-test

Method

The pre-test entails a modification of the German version of the Thompson and Barton scale, according to the theoretically derived synopsis. For this purpose, a group of experts was interviewed to ensure the content validity of the instrument. In the next step, the modified German version was professionally translated and then back-translated to ensure the semantic equivalence of the scales.

Results

Content Validity and Modification

In the pre-test, the content validity of the indicators used by Siegrist (1996) was examined. In order to ensure equivalence with the original scale, two items which did not appear in the original study were removed (items 25 and 27)¹. To ensure semantic equivalence with the original scale, the wording of the German items had to be revised.²

In order to exclude inappropriate indicators and to assign the remaining indicators to the four factors suggested in the synopsis, ten experts were surveyed. This group of experts consists of two professors and eight doctoral students with a sound knowledge of test theory and experience in cross-cultural research. They indicated, on seven-point rating scales, the appropriateness of each item for assessing pro-environmental value orientation in general and the respective dimension in particular.

Item 14 of the German scale was eliminated, because the experts did not associate it with pro-environmental values. They stated that this indicator measures the tendency to save money. Moreover, the experts suggested eliminating indicators that refer to animal protection, rather than the relationships of people to nature in general (item 24 and 26). Items that were ambiguous or had already displayed poor item-to-total correlations in Siegrist's (1996) study were

¹ The item numbers refer to Siegrist's (1996) ordering.

² A list of revised indicators is available from the authors on request.

removed (item 1, 4, 11, and 22). In addition, the experts suggested eliminating item 10, because it does not reflect a clear position on environmental protection. Other items were removed because they mixed two statements (item 5) or could be interpreted in two ways (item 7) and were thus ambivalent.

The experts assigned the remaining indicators to the four value dimensions identified in the synopsis (Table 1). All items could be classified clearly and distinctly. The pre-test reveals that the existing indicators not only reflect the three value orientations suggested by Thompson and Barton (1994), but also egocentric value orientation. In terms of the experts' evaluations, four indicators of ecocentric value orientation on the original scale (item 2, 8, 9, and 19) were assigned to egocentric value orientation.

Semantic Equivalence

Two Russian native speakers translated the scale into Russian. In order to ensure semantic and content equivalence of the scale, two German native speakers with excellent Russian language skills translated the statements back into German. The authors of this paper thoroughly compared the results and suggested a revision of five Russian indicators.

Study 1

Method

Objective

The aim of study 1 is to improve the operationalization of the four dimensions statistically. Internal consistency is analyzed and consequently, items with low discriminatory power are eliminated.

Sample

The revised questionnaire was administered to 223 students in urban areas (Russian sample: $n = 117$, German sample: $n = 106$). All students are enrolled as undergraduates and thus younger than 25. There is a slight age difference between the German sample (mean age = 22.1, $SD = 2.52$) and the Russian sample (mean age = 21.0, $SD = 2.03$), due to the lower age of entry into Russian universities. Participants in student samples from different countries usually belong to the same age cohort and stratum of education. Therefore, these samples are useful for testing early versions of the measure in the scale-development process.

Results

Single exploratory factor analyses confirm the one-dimensional structure of each of the four value orientations. All items load higher than .40 on the respective factor. Furthermore, most items display a sufficient item-to-total correlation. However, one indicator of both, anthropocentric value orientation (survival) and environmental apathy (worry) had to be removed, due to a low item-to-total correlation. Cronbach's alpha provided evidence of a satisfactory internal consistency of the German and Russian subscales³.

³ Results of the exploratory factor analysis are available on request.

Table 1. Result of item selection

Measure Variables	German items	Russian items	English items	No. ^a
<i>Egocentric value orientation</i>				
Pleasure	Die Zeit im Freien kann ich allein schon deshalb genießen, weil ich draußen in der Natur bin.	Я часто провожу свободное время на открытом воздухе, чтобы насладиться природой.	I can enjoy spending time in natural settings just for the sake of being out in nature.	2
Comfort	Manchmal, wenn ich unglücklich bin, finde ich Trost in der Natur.	Иногда, когда мне грустно, я нахожу утешение в природе.	Sometimes when I am unhappy I find comfort in nature.	9
Happiness	Ich brauche Zeit in der Natur, um glücklich zu sein.	Чтобы быть счастливым, мне нужно уметь проводить время на природе.	I need time in nature to be happy.	8
Relaxation	Draußen in der Natur kann ich sehr gut Stress abbauen.	От пребывания на свежем воздухе у меня снижается стресс.	Being out in nature is a great stress reducer for me.	19
<i>Ecocentric value orientation</i>				
Destruction	Es macht mich traurig, dass die natürliche Umwelt zerstört wird.	Печально видеть, как разрушают окружающую среду.	It makes me sad to see natural environments destroyed.	12
Value	Die Natur ist um ihrer selbst Willen wertvoll.	Природа сама по себе богатство.	Nature is valuable for its own sake.	17
Preservation	Eines der wichtigsten Motive für den Umweltschutz ist der Erhalt von Naturschutzgebieten.	Одна из основных задач охраны природы – это сохранение дикой природы.	One of the most important reasons to conserve is to preserve wild areas.	21
<i>Anthropocentric value orientation</i>				
Well-being	Die Natur ist deshalb wichtig, weil sie viel zum Vergnügen und Wohlergehen der Menschen beitragen kann.	Природа играет большую роль, т.к. она обогащает наш досуг и благоприятно действует на наше самочувствие.	Nature is important because of what it can contribute to the pleasure and welfare of humans.	15
Quality of life	Wir müssen die natürlichen Ressourcen bewahren, um eine hohe Lebensqualität aufrecht erhalten zu können.	Мы обязаны беречь природные ресурсы, чтобы сохранить высокий уровень жизни.	We need to preserve resources to maintain a high quality of life.	18
Standard of living	Einer der wichtigsten Beweggründe für den Umweltschutz ist es, einen hohen Lebensstandard zu sichern.	Одна из основных задач охраны природы – это обеспечение высокого стандарта жизни.	One of the most important reasons to conserve is to ensure a continued high standard of living.	20
Medicine	Das Schlimmste am Sterben des Regenwaldes ist, dass dadurch die natürliche Entwicklung von Heilstoffen eingeschränkt wird.	Разрушение важнейших ресурсов - самое ужасное последствие вырубки тропического леса.	The worst thing about the loss of the rainforest is that it will restrict the development of new medicines.	23
Survival ^b	Eines der wichtigsten Motive für den Schutz der Umwelt ist das Überleben der Menschheit.	Одна из важнейших задач защиты природы – выживание человечества.	The most important reason for conservation is human survival.	13
<i>Environmental apathy</i>				
Exaggeration	Umweltrisiken, wie die Abholzung von Wäldern und der Rückgang der Ozonschicht werden übertrieben dargestellt.	Опасности окружающей среды, как например, вырубка леса и исчезновение озонового слоя, в общественности преподносятся преувеличенно.	Environmental threats such as deforestation and ozone depletion have been exaggerated.	3
Disbelief	Ich glaube nicht, dass der Raubbau an natürlichen Ressourcen so schlimm ist, wie viele behaupten.	Я не верю, что сокращение природных ресурсов находится в таком ужасном состоянии, как его зачастую изображают.	I do not think the problem of depletion of natural resources is as bad as many people make it out to be.	6
Over-estimation	Dem Schutz der Natur wird zuviel Bedeutung beigemessen.	Защите природы придаётся слишком много значения.	Too much emphasis has been placed on conservation.	16
Worry ^b	Ich kann nicht nachvollziehen, wie man sich zu sehr um Umweltthemen sorgen kann.	Мне сложно заниматься вопросами окружающей среды.	I find it hard to get too concerned about environmental issues.	7

Note. ^aNumber of items according to Siegrist (1996). ^bIndicator eliminated in Study 1 (low item-to-total correlation).

Study 2

Method

Objective

Study 2 was intended to confirm the structural equivalence of pro-environmental value orientation in a representative sample (inhabitants of urban areas). After assessing the discriminant validity of the four value dimensions, the procedure of Byrne, Shavelson, and Muthén (1989) is applied. First, structural equivalence is tested by applying a single- and multi-group confirmatory factor analysis. Finally, criterion validity is tested by examining the correlation of the four value orientations with pro-environmental attitudes and behavioral intentions.

Sample

A questionnaire was administered to 430 subjects from different age groups and both genders. Using a quota sampling (sex and age) two trained interviewers surveyed 226 consumers in Germany (50.4% female, mean age = 42.1, $SD = 10.79$) and 204 consumers in Russia (54.9% female, mean age = 46.2, $SD = 11.60$) respectively. In order to minimize the influence of confounding variables, the interviews in both countries took place at the same time and in comparable urban areas. The Russian and German interviewers received their instructions from the same bilingual instructor, in order to avoid method bias.

Results

Single-group Confirmatory Factor Analysis

Structural equivalence of the four-factorial construct was tested by comparing the results of a single-group confirmatory factor analysis for each sample. Various global fit measures indicate a sound solution (Table 2). The ratio of chi-square values and corresponding degrees of freedom is far below 2.5. The Non-Normed Fit Index (NNFI) and the Comparative Fit Index (CFI) exceed the threshold of .90 (Bentler, 1992), and the Root Mean Square Error of Approximation (RMSEA) falls below the threshold of .08 in both samples (McDonald & Ho, 2002). All indicators demonstrate that the fit of model in the German sample is slightly better than the fit of the model in the Russian sample.

Table 2. Global fit

	χ^2	<i>df</i>	χ^2/df	GFI	NNFI	CFI	RMSEA
German Sample	114.98**	71	1.62	.94	.95	.96	.05
Russian Sample	143.89**	71	2.03	.91	.90	.92	.07

Note. Germany: $n = 226$; Russia: $n = 204$. ** $p < .01$.

Since the four measures correlate significantly with each other, their discriminant validity is examined by applying the chi-square difference test (Byrne et al., 1989). It could be shown that all four constructs reflect a distinct pro-environmental value orientation in the Russian and German sample.

Table 3 displays the estimated factor loadings. The four-dimensional structure identified in the student sample could be confirmed in a representative sample. The same number of dimensions is confirmed and each indicator loads significantly on the corresponding factor in both samples. Hence, equality of form is achieved (Caprara, Barbaranelli, Bermudez, Maslach, and Ruch 2000). However, the magnitude of several factor loadings differs between the two groups. These differences will be analyzed further in a multi-group procedure.

Table 3. Factor loadings

<i>Measures</i> Variables	Factor loading		<i>Measures</i> Variables	Factor loading	
	GER ^a	RU ^b		GER ^a	RU ^b
<i>Egocentric value orientation</i>			<i>Anthropocentric value orientation</i>		
Pleasure	.76	.52	Well-Being	.70	.86
Comfort	.82	.69	Quality of life	.72	.68
Happiness	.78	.42	Standard of living	.74	.49
Relaxation	.80	.79	Medicine	.60	.47
<i>Ecocentric value orientation</i>			<i>Environmental apathy</i>		
Destruction	.64	.83	Exaggeration	.78	.75
Value	.68	.63	Disbelief	.81	.76
Preservation	.57	.69	Overestimation	.63	.71

Note. All factor loadings are statistically significant ($p < .001$).

^a representative German sample ($n = 226$). ^b representative Russian sample ($n = 204$).

Multi-group Confirmatory Factor Analysis

Following the stepwise procedure of Byrne et al. (1989), an unconstrained (baseline) model is first estimated. Then, constraints are imposed with increasing restrictions. The models are compared on the basis of global fit indices (chi-square statistic, GFI, NNFI, CFI, and RMSEA) and incremental fit statistics (chi-difference-test for nested models). The unconstrained model yields the best global fit (Table 4). This leads to the conclusion that equality of forms (i.e. structural equivalence) can be assumed in both samples. However, with each

additional constraint, which means setting parameters equal in the Russian and the German sample, the global fit decreases. Setting all measurement weights equal in both samples leads to a significant decrease in the chi-square-statistics of $\chi^2_{diff} (10) = 32.05$. Constraining the structural covariances/variances in addition, the model fit decreases by $\chi^2_{diff} (10) = 92.27$. Finally, constraining the measurement residuals leads to a decreasing chi-square statistic of $\chi^2_{diff} (14) = 257.76$. In a similar vein, the global fit indices decrease (e.g., change in CFI from .92 to .83). This means, on a global level, neither the measurement weights nor structural variances/covariances and measurement residuals can be considered as equal in the two samples.

Table 4. Goodness of fit of multi-group CFA

	Global fit							Incremental fit	
	χ^2	<i>df</i>	χ^2/df	GFI	NNFI	CFI	RMSEA	χ^2_{diff}	<i>df</i> _{diff}
<i>Baseline model</i>									
1. Equality of forms (unconstrained)	258.88**	142	1.82	.92	.93	.94	.04		
<i>Additional constrains</i>									
2. Measurement weights	291.83**	152	1.92	.91	.92	.93	.05	32.95**	10
3. Structural covariances/variances	384.11**	162	2.37	.89	.88	.89	.06	92.27**	10
4. Measurement residuals	641.87**	176	3.65	.83	.77	.77	.05	257.76**	14

Note. GFI = Goodness of Fit Index, NNFI = Non-Normed Fit Index, CFI = Comparative Goodness of Fit Index, and RMSEA = Root Mean Square Error of Approximation. χ^2_{diff} = difference of χ^2 . *df*_{diff} = difference of degrees of freedom. ***p* < .01. Germany: *n* = 226; Russia: *n* = 204.

In addition to the global analysis of constrained parameters, Byrne et al. (1989) recommend checking for invariance with respect to each measurement weight, structural covariance/variance and measurement residual. Therefore, in a partial analysis, each measurement weight is constrained individually within the two samples. Accordingly, 6 of 10 factor loadings are tenable. When variances and covariances are constrained within the two samples, 4 of 10 parameters are equal. Finally, 7 of 14 constrained measurement residuals are tenable.

To summarize, the multi-group analysis provides empirical evidence of the equality of forms of pro-environmental value orientation across cultures. All indicators load significantly on the assigned dimensions. A global analysis of equivalence for measurement weights, structural variances/covariances and measurement residuals, however, shows that these parameters vary across the samples. An additional partial analysis reveals that 50% of the parameters is cross-culturally invariant. Thus, equivalence of forms could be proven, but equivalence of single parameters is only partly supported by the empirical data.

Criterion Validity

The criterion validity of the scale is analyzed in order to provide empirical evidence that the four dimensions of pro-environmental value orientation are related to pro-environmental attitudes and behavioral intentions. The indicators of attitudes towards and purchase intention of organic food were translated into Russian, with semantic equivalence being ensured by a

translation/back-translation procedure. Both the “attitude toward organic food scale” (3 items) as well as the “purchase intention scale for organic food” (2 items) achieved excellent levels of internal consistency in both the German (Cronbach’s alpha: $\alpha_{Att} = .90$, $\alpha_{Int} = .92$) and the Russian samples ($\alpha_{Att} = .80$, $\alpha_{Int} = .85$).

Table 5 shows the correlations between the external criteria and the four value orientations. For both the German and Russian samples, environmental apathy is negatively correlated with the attitude toward and the intention to buy organic food. Egocentric and ecocentric value orientation correlate positively with the external criteria in both samples. In the Russian sample, anthropocentric value orientation is also significantly related to the attitude toward and the purchase intention of organic food. This relationship is not significant in the German sample.

Table 5. Criterion validity

Measure	German sample ($n = 226$)		Russian sample ($n = 204$)	
	Attitude	Purchase intention	Attitude	Purchase intention
Egocentric value orientation	.41 ***	.29 ***	.39 ***	.18 *
Ecocentric value orientation	.46 ***	.35 ***	.50 ***	.22 **
Anthropocentric value orientation	-.02	-.04	.54 ***	.23 **
Environmental apathy	-.39 ***	-.39 ***	-.33 ***	-.16 *

Note. Pearson product-moment correlation. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Discussion

The present paper develops a scale of pro-environmental value orientation in German and Russian. Three research questions were addressed. The first aimed at providing evidence of the *four-dimensional structure* of a pro-environmental value orientation. A confirmatory factor analysis supports the four-dimensional structure. A chi-square difference test proved the discriminant validity of the constructs.

The second research question addressed the *cross-cultural equivalence* of the pro-environmental value scale. Following the multi-step procedure of Byrne et al. (1989), the investigation confirms the equality of forms, by detecting the same dimensional structure in both samples. Equality of measurement weights and covariances/variances is proven partly. Some differences in the magnitudes of measurement weights and in the magnitudes of variances/covariances between the two samples could be demonstrated. However, the relevance of these deviations should not be overrated. As van de Vijver and Leung (2000) point out, cross-cultural equivalence is not a neither/nor decision. To summarize, a structural equivalence of the pro-environmental value-orientation could be demonstrated to a large extent.

The third research question dealt with the *criterion validity* of the scale. The study reveals substantial correlations between the four value orientations and both pro-environmental attitudes and behavioral intentions to buy organic food. Thus, the study provides empirical evidence of the criterion validity of the scale.

Although the paper did not aim explicitly at analyzing the influence of culture on pro-environmental value orientation, the empirical study provides some interesting findings in

this respect. In the Russian sample, all latent variables yield relatively high correlations, while in the German sample only the egocentric and ecocentric value orientation are strongly correlated. This difference may be due to the fact that the protection of the environment became a topic of public interest in Germany as early as the 1970s. In Russian society, however, a debate about environmental problems has developed only recently. Presumably, Russian respondents do not yet distinguish clearly between the different concepts of pro-environmental value orientations. According to the postmaterialism hypothesis, increasing economic prosperity leads to a shift from materialistic to postmaterialistic values. Thus, the meaning of environmental consciousness should increase in Russia and it can be assumed that both awareness and knowledge of environmental issues are on the rise.

In both cultures, the four value orientations correlate more strongly with attitudes than with behavioral intentions. This result is reasonable, because purchase intentions are stronger influenced by situational variables (e.g., financial resources) than attitudes. In the Russian sample, the relationship between the value orientations and behavioral intention are weaker than in the German sample. This finding can be explained by the lower purchasing power of Russian consumers, as well as the relatively high prices of organic food in Russia. Moreover, organic food is only available at some retail outlets in Russia (e.g., Perekrestok). In Germany, on the other hand, the market share of organic food has risen considerably over the last few years. In order to control for confounding variables (e.g., availability), it is necessary to examine the criterion validity of the pro-environmental value scale with different external criteria, such as recycling or energy-saving behavior.

In the German sample, the anthropocentric value orientation was not correlated to any external criteria, whereas in the Russian sample, a strong correlation between anthropocentric value orientation and pro-environmental attitude and behavioral intentions could be demonstrated. Thus, pro-environmental attitude and behavioral intention of Germans have their origins in concerns about nature itself (ecocentric value orientation), whereas Russians care about the environment because of their concern for other people (anthropocentric value orientation). Presumably, this finding can be traced back to the different cultural profiles. Russians tend to be more collectivistic, whereas Germans are rather individualistic. Members of collectivistic societies strive for a fair allocation of (natural) resources and the welfare of their social group. Since the anthropocentric value orientation emphasizes benefit for mankind, its influence on pro-environmental behavior is assumed to be stronger in collectivistic cultures than in individualistic ones.

Some *limitations* of the present study should be stressed. The samples for both nations were collected in urban areas. Previous research on environmental concern revealed that respondents from urban areas care more about the environment than respondents from rural areas. Thus, the external validity of the scale should be confirmed by using a sample from rural areas. Presumably, the level of education and economic situation of the respondents, which are usually higher in urban areas, also influence the pro-environmental value orientation. Therefore, the influence of these two factors should be controlled.

The present paper examines the structure of pro-environmental value orientation in Germany, which is an economically developed society and in Russia, which is still developing. Longitudinal studies are necessary, in order to capture the impact of rapid change towards a postmaterialistic value orientation in transforming economies. As protection of the environment becomes more important, individuals develop a more elaborate knowledge structure. Individuals start to distinguish between different reasons for protecting the environment. Thus, the correlations between the four value orientations might become weaker.

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