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## ENVIRONMENTAL PERCEPTION OF SWISS AND BAVARIAN PUPILS: AN EMPIRICAL EVALUATION

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### 1. Introduction

Environmental perception has been subjected to fundamental change since the strong emergence of a new paradigm about a generation ago, often entitled the “New Environmental Paradigm” (Catton and Dunlap, 1978; Cotgrove and Duff, 1981; Blaikie, 1992). This “new” world view is associated with environmentalism and strong nature conservation values and represents a new way of thinking as compared to the traditional belief system which highlights ego-/anthropocentric positions. Dunlap and Van Liere (1984) have indeed argued that this new paradigm is an emerging attitudinal paradigm conflicting with our traditional dominant belief system. Therefore, currently two environmental world views exist in parallel, a more anthropocentric and a more ecocentric one (e. g., Dunlap, 1980; Disinger and Tomsen, 1995).

The traditional world view first mentioned supports values which favour utilizing and exploiting natural resources, pay homage to human exemptionalism and readily accept environmental degradation. This value system conceives nature as an exploitable resource for the use of humankind, to be controlled (and subdued) for human ends (White, 1965) and existing solely to provide comfort for human beings, and builds on the belief in human dominion over nature. These traditional beliefs are important sources of opposition to environmental protection (Dunlap and Van Liere, 1984) and the roots of the ecological crisis (Swan, 1971); conservation agendas within this value framework only deal, for instance, with avoidance of disasters to human beings (Catton and Dunlap, 1978).

The world view second mentioned incorporates a set of beliefs and values acknowledging nature as a value in itself and rejects anthropocentric notions: it is conscious of the fragility of nature, emphasizes balance of nature and harmony with it, favours stewardship of nature, it credits the integrity of ecosystems and refuses to accept environmentally destructive lifestyles (see “New Environmental Paradigm”; Catton and Dunlap, 1978; Dunlap and Van

Liere, 1978). Such an ecocentric ethic favours altruistic principles such as, for instance, limits of growth or steady-state economy in highlighting a spaceship-earth metaphor (Merchant, 1990) and uses natural resources in a sustainable way assuring generally the balance of ecosystem networks.

Few studies have examined the ethnic background of the differences in the environmental value system or the basis for valuation of nature (e. g., Pierce et al., 1987; Rosenzweig, 1961; Russel and Jenkins, 1959). Such studies deal mostly with minority or racial perspectives within the U. S. (e. g., Sheppard, 1995; Floyd and Gramman, 1993). For studies surveying subjective culture or cross-cultural characteristics, Triandis (1980) had endorsed construct-validation procedures since different cultures or subcultures could substantially differ in their concepts, and common bases are not given automatically. Therefore, researchers were recommended to apply two-step processes: Firstly, to earmark attributes of the investigated concepts in both cultures; secondly, to select the attributes that are common. Under those circumstances only, differences could be accepted as meaningful (Thurstone, 1947; Triandis, 1980).

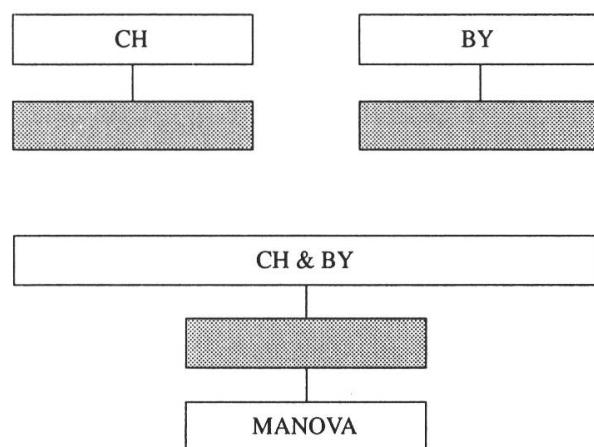
Both world views undoubtedly influence the individual pattern of environmental behaviour or the willingness to make adjustments to safeguard the environment, as was demonstrated in the case of the "Dominant Social Paradigm" by Dunlap and Liere (1984). However, both world views are thought to reflect opposite ends of a continuum (Milbrath, 1984) rather than separate belief systems (as projected by Dunlap and Liere 1978). Hence, in spite of the inherent dissension between the two extremes, it is possible for individuals to ascribe in varying degrees to elements of both: for example, depending on their individual attitudinal system, individuals can hold essentially ecocentric views while yet behaving in an anthropocentric way. This suggests not a continuum, but two – probably orthogonal – factors. Environmental attitudes begin to develop at an early stage (e. g., Chawla, 1988) and during the process of adolescence young people acquire and stabilize their own views. The younger ones tend to have a more environmental world view (see Blaikie, 1992; Bogner and Wilhelm, 1996) which, for instance, Szagun and Mesenholl (1993) explain by strong emotional bondings. Other studies explain such results by the shorter exposition of young people to the competing traditional belief system which in its consequence favours environmental degradation (see above) as well as by the scepticism regarding society's value system (e. g., Van Liere and Dunlap, 1980, 1981; Mohai and Twilight, 1987). Others interpret juvenile environmental support and emotional attachment to nature with the argument that solutions of environmental problems would be linked with a threat to the existing social orders and, therefore, be less acceptable for the "established" older generation.

The outcome of a related pilot survey in Ireland (Bogner, 1998a) supports the interpretation that attitudes in favour of exploiting nature are linked both with a less positive environmental behaviour and with less support for conservation. If such a consistent correlation is given and if differing support for both world views results in differing scores in environmental behaviour, other European regions with similar cultural background should be surveyed. Different regions are often thought to nurture different attitudes and behaviour multifariously rooted, for instance, in societal processes or early socialisation. However, the general core of the cultural heritage of European regions may still tend towards an anthropocentric view. Choice fell on Switzerland (and Bavaria) to draw attention to the support of the two contrary world views as well as to individual environmental behaviour across two regions with comparable levels of economic structure.

The general guiding objective of the study was, first, to monitor potential correlations between attitudes in favour of "utilizing nature", support for "conservation" and "environmental behaviour". Specifically, the purpose was to identify the attitudinal/behavioural patterns of the pupils by using factor analysis. Therefore, special care was taken to obtain a common basis by excluding items with different meaning (i. e. different patterns of factor loading scores). Taking advantage of a shared mother tongue, our interest was in a set of items common to both subsamples. Items with loading patterns that differed in the two regions and, therefore, had different meanings, are of some fascination in themselves and certainly warrant further attention: but such questions are beyond the concern of the present study that requires a measuring instrument valid for both regions and must, therefore, reject items specific to either. The measurement instrument of the present study was established in a previous study (Bogner and Wilhelm, 1996), where a scale especially adjusted to the age group of this present study was developed. A further purpose of this present study was to provide a statistical base and a framework for forthcoming studies in Switzerland. The complete design of the present study is displayed in Figure 1. First, a separate factor analysis with the Swiss sample was performed and subsequently those items were retained that showed similar loading patterns to the Bavarian analysis. Second, this sample of common items provided the basis for the confirmatory principal component analysis of the combined Swiss/Bavarian data to confirm the common factor structure. Third, given the common structure, the factor scores provided the basis for statistical analyses.

Figure 1

Design of the potential environmental gap analysis between Swiss (CH) and Bavarian (BY) secondary school pupils: (CH, BY)-boxes indicate data basis; dotted boxes indicate application of factor analysis.



## 2. Materials and Methods

## 2.1 *The Pupil Sample*

The data of the present study were collected by means of two separate surveys, conducted in rural residencies of both regions (c. f., Bogner and Wiseman, 1997). The surveys monitored secondary school pupils of both genders aged roughly between 11 and 16 years. Since educational attainment has been shown to be a reliable predictor of environmental attitudes (e. g., Dunlap, 1980; Bogner and Wilhelm, 1996), the surveys were administered to pupils of secondary schools only. In the survey of the German-speaking Switzerland, a total of 723 pupils of the selected age range participated in the questionnaire (48% girls, 52% boys). In both samples care was taken to ensure that the schools were in different regions. All schools approached agreed to participate and the cooperation of the pupils was generally excellent. The data for the Bavarian sample were taken from the study of Bogner and Wilhelm (1996).

To facilitate comparison within this framework, it is helpful to record some basics of both countries/ regions: Bavaria (BY) with an area of about 70'000 km<sup>2</sup> has 11,8 million inhabitants while Switzerland (CH) with about 41'300 km<sup>2</sup> has 6,9 million. Both regions enjoy sovereignty in their educational systems and this is reflected in major differences (see also, Elvin, 1981): firstly, Bavarian pupils enter secondary school as 5<sup>th</sup> graders (at age 10) while the Swiss do so as 7<sup>th</sup> graders; secondly, Swiss schools have nearly full-day schedules (i. e. 6

Table 1  
Item examples, the 8 highest loading per subscale selected.

			I agree strongly	I agree	I am not sure	I disagree	I disagree strongly
(REPORTED)		48 I often try to persuade others that the environment is an important thing.					
ENVIRONMENTAL		38 If I ever get extra pocket money I will donate some money to an environmental organisation.					
BEHAVIOUR		73 I would be willing to clean up a creek where people had dumped rubbish.					
	40 Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.						
	78 When I am older I am going to join and actively participate in an environmentalist group should I already not be a member.						
	35 I would be interested to know what kind of little creatures live in ponds.						
	68 I would be prepared to help an environmentalist, to erect a toad protecting fence, alongside a road which has heavy traffic.						
	24 I would really enjoy sitting at the edge of a pond watching dragonflies in flight.						
UTILIZATION		83 Weeds may be destroyed because they inhibit the full development of useful and ornamental plants.					
of NATURE		46 I prefer if trees in a forest stand in neat rows.					
	44 People should keep open air swimming ponds free from creepers and climbing plants.						
	50 So far, society has always dealt well with environmental issues. We will cope with the present problems as well.						
	31 I prefer a well-cared-for lawn to a wild meadow where flowers grow in an unordered way.						
CONSIDERATION		79 In order to feed human beings, nature must be cleared, so that, for example, grain can be grown.					
for CONSERVATION		53 Since mosquitoes develop in ponds it would be better to drain these and reclaim them for agriculture.					
	27 Grass and weeds growing between pavement stones really looks untidy.						
	59 If the number of people in the world rises further we will no longer be able to maintain our environment.						
	66 It is not only children, but also adults who should respond to the problem of environmental pollution.						
	67 There should be a special nature reserves into which nobody be allowed enter.						
	63 In order to keep environment clean, it is necessary to spend considerably more money.						
	80 Even if hawks sometimes take chickens, they still have a right to live without being disturbed by us.						
	82 Fur coats should not be bought because animals died to produce them.						
	25 We must spare no effort to save the tropical rain forests.						
	85 We should let trees stand where they grow even near roads where they may be a potential problem.						

Note that low scores correspond with high levels of agreement!

hours) while Bavarian schools normally close shortly after noon. Both regions have three separate stratified types of secondary school (Gymnasium, Realschule, Hauptschule) and both apply centrally enforced final exams at the end of secondary schooling.

## 2.2 *The Procedure*

The design of the study is displayed in Figure 1. Pupils of various schools generally responded to all multiple-choice items on the bipolar 5-point Likert-scale within 45 to 60 minutes (item examples, Table 1). The response scale ranged from "strongly agree" to "strongly disagree" in combination with an "undecided" category. This method of scoring and selection of the items is outlined in Bogner and Wilhelm (1996), who also provide relevant psychometric guidelines. A list of all administered items is published in Bogner and Wiseman (1997). The only basis for validation of the instrument consists of the responses of the pupils rather than of the usual (adult) expert judgement.

The responses, automatically read via an OMR-procedure (for details, see Bogner and Wilhelm, 1996), were subjected to factor analysis revealing three principal dimensions covering both contrasting world views (see above) and individual behaviour. The search for satisfactory items was based upon factor loading scores: in general, an item is accepted if it loads clearly upon one and only one factor. Nonetheless, a low loading of an item on a single appropriate factor did not result in discarding that item, since factor scores were subsequently computed by the regression method. In addition, a few items were discarded by failure to fit the criteria of meaning or of item-total score correlation or of inadequate values on Cronbach's alpha (Table 2, see p. 8-9).

The second purpose of the study was to compare the pupils' world views between the two regions. Therefore, a factor structure common (within acceptable tolerance levels) to both populations has to be specified in order to ensure that the semantic meaning of individual items is the same in the two samples. Only a similar pattern of loading scores implies similar *substantive* meanings of the items: to achieve this, separate factor analyses were performed on the basis of each sample, and items with similar loading patterns in both regions determined. It is important to note that different loading patterns for an item would indicate that the item was understood differently by the two samples. After identifying suitable items, the combined sample provided the basis for a single confirmatory factor analysis yielding directly comparable factor scores for all pupils regardless of the region of origin. Additionally a factor similarity test was undertaken computing coefficients between the factor solutions for the two regions (Wiseman, 1993) in order to underpin the comparison of the two samples.

### 2.3 *Statistical procedure*

Questionnaire items, such as those used in this paper, are typically intercorrelated in such a complex manner that even a moderately large bivariate correlation is difficult if not impossible to interpret; each variable correlating in varying degrees not only directly in bivariate fashion with every other one, but also indirectly in multivariate fashion via intermediate variables. Consequently, since its introduction by Hotelling (1933) the standard procedure for data of this kind has been the application of principal component analysis to reduce such correlation matrices to a few underlying factors.

The rationale behind the model is the idea that correlated items measure something in common: the central purpose of factor analytic models is to reveal such common factors, and hence help both to understand the substantive structure of the variables analysed, and to reduce the large number of items necessary for representative data sampling to a more manageable few variables for subsequent statistical analysis. Once a satisfactory factor structure has been found, scores on each factor can be computed for each pupil, a few factor scores replacing the original larger number of individual item scores. Apart from these advantages, application to questionnaires such as those applied here is a matter of standard procedure that avoids the considerable dangers involved in interpreting responses to individual raw items, and permits the development of questionnaires as valid and reliable measuring instruments.

Technically, factors are weighted, linear combinations of the original variables, the weight ("loading") of each item on each factor reflecting the contribution of that item to that factor: the higher the loading, the more the item contributes to the factor. It is via these loadings that the factor is related to substantive reality: since all items loading high on a factor share a common underlying "meaning", an ideal factor structure is one in which each item loads strongly on one and only one factor, so that the interpretation of the factors is clear and uncomplicated. One may choose to permit the factors extracted to be correlated ("oblique"), which can make for more readily interpretable factors, or force them to be uncorrelated ("orthogonal"), which leads to simpler analyses of the resultant factor scores. For substantive reasons correlated factors were used in the present study; and further analyses were based upon the multivariate analysis of variance model which explicitly takes intercorrelated independent variables into account.

Analysis of mean differences of the factor scores between groups was thus conducted using the multivariate analysis of variance (Manova) procedure with subsequent step-down analysis, permitting tests of mean differences for factor score explicitly "uncontaminated" by correlations with the other scores.

Table 2

Principal component factor analyses with subsequent oblimin rotation revealing a 3-factor solution for the Swiss sample (CH; left) as well as for the combined Swiss/Bavarian sample (CH/BY; right): entries are factor loadings. Cronbach's alpha is presented (I) if item is deleted (right); (II) for all items of a subscale (below). Items which have been removed as a result of the factor analysis (incorrect loading on a factor) are printed in italics.

CH	environmental behaviour	utilization of nature	con-servation	CH /BY	environ-mental behaviour	utili-zation of nature	con-servation	Cronbach's Alpha* (I)
item	item	item	item	item	item	item	item	item
48	0.71	0.71	0.71	48	0.75	0.75	0.73	0.89
38	0.70	0.70	0.70	38	0.73	0.73	0.70	0.89
73	0.69	0.69	0.69	73	0.70	0.70	0.65	0.89
78	0.65	0.65	0.65	40	0.65	0.65	0.64	0.89
68	0.64	0.64	0.64	78	0.64	0.64	0.64	0.89
35	0.63	0.63	0.63	35	0.64	0.64	0.64	0.89
24	0.62	0.62	0.62	68	0.63	0.63	0.63	0.89
40	0.61	0.61	0.61	24	0.56	0.56	0.56	0.89
86	0.59	0.59	0.59	42	0.55	0.55	0.55	0.90
22	0.57	0.57	0.57	22	0.55	0.55	0.55	0.89
77	0.56	0.56	0.56	77	0.55	0.55	0.55	0.89
45	0.54	0.54	0.54	86	0.52	0.52	0.52	0.89
42	0.53	0.53	0.53	62	0.51	0.51	0.51	0.89
88	0.52	0.52	0.52	39	0.51	0.51	0.51	0.90
64	0.51	0.51	0.51	34	0.50	0.50	0.50	0.89
36	0.51	0.51	0.51	45	0.47	0.47	0.47	0.90
33	0.50	0.50	0.50	61	0.45	0.45	0.45	0.89
62	0.49	0.49	0.49	88	0.44	0.44	0.44	0.90
39	0.49	0.49	0.49	36	0.44	0.44	0.44	0.90
52	0.48	0.48	0.48	33	0.42	0.42	0.42	0.90
57	0.48	0.48	0.48	52	0.41	0.41	0.41	0.90
65	0.48	0.48	0.48	26	0.39	0.39	0.39	0.90
34	0.46	0.46	0.46	57	0.38	0.38	0.38	0.90
61	0.44	0.44	0.44	64	0.38	0.38	0.38	0.90
70	0.43	0.43	0.43	65	0.38	0.38	0.38	0.90
76	0.43	0.43	0.43	76	0.33	0.33	0.33	0.90
21	0.41	0.41	0.41	21	0.32	0.32	0.32	0.90
26	0.39	0.39	0.39	71	0.29	0.29	0.29	0.29

\* Values of Cronbach's coefficient Alpha (item reliability). Coefficient alpha quantifies the internal reliability of individual items. The smaller the difference between the communality and the reliability of an item, the lower the specificity of that item.

The possible (linear) influence of individual differences in age (reported in Bogner and Wilhelm, 1996) was removed by treating the age variable as a covariate. (Age was defined as age in days on January 1 of the year in which the survey was conducted, substituting June for any missing month and 15 for any missing day in the raw date of birth).

All computations were performed using the statistical package SPSS for Windows (see Norusis, 1993a, b). Factor similarities were computed by the algorithm proposed by Wiseman (1993).

### 3. Results

#### 3.1 *Structure of the Swiss sample*

All responses of the Swiss sample to the questionnaire were separately analysed and subjected to a principal component analysis with subsequent oblimin rotation revealing the factor structure yielding in Table 2 (left). The three factors resulting may be labelled “(Reported) Environmental Behaviour”, “Consideration for Conservation” and “Utilisation of Nature” (5 item examples of each factor are displayed in Table 1). Table 2 contains the factor loadings ranging up to 0,71 while cross-loadings were effectively non-existent. The factors, therefore, represent a high degree of independence. Items inversed in Table 2 were discarded due to loading on a “wrong” factor or existence of cross-loading; however, this occurred with 6 items only with consistently low loadings (detailed in Table 3). One of the discarded items had already failed to depict the appropriate factor in the Bavarian study as well (“Your friends are throwing stones at frogs in a pond. They ask you to do the same. Even if you think it is wrong, you eventually give in.”).

The three primary factors are intercorrelated (see Table 4): favouring conservational attitudes was positively (0,21) correlated to the willingness to do both, to take action and to plan to take action and negatively (-0,41) to favouring exploitation or better utilisation of nature (Table 4A). Both attitudinal (“world view”) subscales were practically independent from each other (-0,08).

Swiss pupils apparently enjoy attending school: they grade it with  $4,01 \pm 1,28$  SD (1 = worst, 6 = best). The achievement in the subject Biology was rated with  $4,94 \pm 0,86$  [SD]. Both values are not affected by gender ( $p < 0,72$  and  $p < 0,68$  respectively). The enjoyment of the school experience influences the performance in the subject Biology, when the two extreme groups were compared (Mann-Whitney U-Test:  $z = -3,93$ ;  $p < 0,0001$ ). Additionally, as expected, a

Table 3  
Discarded items by reason of separate factor analysis for the Swiss and Bavarian sample (I),  
as well as of common factor analyses to each separate sample (II).

(I)	CH	70 More people should leave their car at home and so reduce exhaust fumes by using public transport.
		58 Every individual must make a noticeable contribution towards preserving the environment.
		55 I really like to be able to go on trips into the countryside – for example to forests or fields.
		47 We should protect all kinds of plants and animals, not only the ones that are useful.
		41 Your friends are throwing stones at frogs in a pond. They ask you to do the same. Even if you think it is wrong, you eventually give in.
BY		87 I normally leave the water running when I brush my teeth.
		41 Your friends are throwing stones at frogs in a pond. They ask you to do the same. Even if you think it is wrong, you eventually give in.
		29 I am not interested in learning about the reasons behind the disappearance of our forests.
(II)	CH & BY	71 It really annoys me that the penalties against environmental offences are so minor.
		37 Threatened nature areas should be bought by the state even if it means that the state then has less money for other purposes.
		84 We must set aside more land to support animals and plants which are endangered or threatened with extinction, as such sanctuaries must be kept untrdden.

Table 4

Correlation matrix of the three factors Environmental Behaviour (1), Utilization of Nature (2) and Consideration for Conservation (3) (A).

Gender differences in mean factor scores

( $t = -4,71$ ; resp.  $2,60$ ,  $p < 0,01$ ): Girls significantly score better in the behavioural subscale and lower in the utilitarian one (B).

A	CH				
		1	2	3	
	1	1.00			
	2	-0.41	1.00		
	3	0.21	-0.08	1.00	
B	CH	1	2	3	
		girls	0.02	0.25	0.11
		boys	0.46	-0.09	-0.11

significant gender effect ( $p < 0,01$ ) occurred, since girls, in general, were more in favour of environmental behaviour and less in utilising the nature (Table 4/B).

### 3.2 Comparison of both samples

The data set of both approaches was combined (the Bavarian sample was obtained from Bogner and Wilhelm, 1996) after excluding items with inappropriate loadings either in the Swiss or the Bavarian sample (displayed in Table 4). The remaining item set, thus common to both surveys, was in turn subjected to a confirmatory factor analysis revealing the final structure presented in Table 2 (right); only two further items had to be discarded due to a inappropriate loading on two factors simultaneously. However, the same factor solution evolved as in the Swiss sample when separately analysed while again three primary factors were extracted: “(Reported) Environmental Behaviour”, “Utilisation of Nature” and “Consideration for Conservation”. Except for the last mentioned conservational factor, all Cronbach’s alpha values as a measure of factor reliability reached high values (Table 2, right).

The correlation matrix displays the expected pattern: "Environmental Behaviour" is highly negatively linked with the attitude subscale "Utilisation of Nature" but positively with "Consideration for Conservation". Differences between the two samples were shown to reach significance in one subscale only that is in "Environmental Behaviour": the Bavarian sample showed slightly "better" values (Table 5) (see Discussion).

Table 5

Mean differences between Swiss and Bavarian factor scores (Environmental Behaviour (1), Utilization of Nature (2), Consideration for Conservation (3)) tested by multivariate and univariate analysis of variance: significant differences were observed only for the behavioural subscale scores ( $p < 0,001$ ).

Factor score		1	2	3		
BY		-0.053	-0.005	-0.011		
CH		0.249	0.054	0.015		
Analysis of Variance (Effect: Region)						
Multivariate Tests of Significance ( $S = 1$ , $M = 1/2$ , $N = 1127$ )						
Test Name	Value	Exact F	Hypoth. DF	Error DF		
Hotellings	0.022	16.00	3.00	2206.00		
Univariate F-tests with (1; 2208) D. F.						
Variable	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	Sig. of F
Factor 1	28.65	2103	28.65	0.95	30.07	0.000
Factor 2	1.44	2168	1.44	0.98	1.47	0.225
Factor 3	0.27	2212	0.27	1.01	0.27	0.602

The Swiss pupils rated parental influence more or less similarly ( $p > 0,05$ ) to that of the school (2,96) compared to the response score of the Bavarian sample (3,07: which equals 2,93 within the Swiss grading system). Similarly, the comparison of grades such as in the subject Biology or in a more "soft" variable, the "Pleasure of Being a Pupil" did not unveil any significant differences ( $p > 0,05$ ).

#### 4. Discussion

It is common sense (either by prejudice or in reality) that people of certain countries/ regions follow certain attitudes. Nevertheless, the response pattern to the questionnaire revealed an almost identical structure to the hypothetical framework, a very encouraging finding of the present study: to explain the Swiss structure, three basic subscales with the headings "Environmental Behaviour", "Utilization of Nature" and "Consideration for Conservation" are sufficient, as for to the Bavarian sample. Therefore, in the present case, a high degree of consistency can be seen in the responses of both regions, i. e. the vast majority of the items apparently loaded on identical factors, which is tentatively conclusive by itself.

It should be stated that six items out of 69 total had to be discarded due to low loading scores on the corresponding factor. Although removed by reason of failure to reside within the delineated subscales, these items also provide substantial information (Table 4). Four of the six discarded items were not identified as "behaviour" items, the two remaining ones were rejected because they loaded inappropriately as "attitudinal" items (Table 4). One of the discarded items was identical to the one of the Bavarian study, dealing with coping with peer behaviour not accepted but nonetheless followed.

Any scale introduced for comparison of population samples must be consistent across the corresponding populations: scales based on different item sets across different populations would both provide an entirely unjustifiable and methodologically dubious basis for comparison and have inadequate generalizability. Evaluation of differences require assurances of identical meaning of items. Therefore, within any comparison between samples, the question arises whether a method is culture/region-bound and, therefore, sample-bound. If something is characteristic for one culture but not necessarily for another, then results would not have generality. This is an empirical question requiring not merely skills of linguists for solution (both samples in the present study use identical mother tongues). Therefore, a necessary first step in cross-cultural studies such as ours is the separate factor analyses of the two subsamples' responses: this enables the identification of common items measuring a common factor structure – the semantic meaning of these items is then common to both samples. Such separate analyses are, however, not sufficient: a joint confirmatory analysis of the data from both regions is required both to confirm the common structure and to provide factor scores comparable between both samples. (Formally – though inaccurately – confirmatory factor analysis is often associated with the maximum likelihood formulation associated with Jöreskog (1969).

We have taken the simpler approach based on principal component analysis as described.)

Two previous studies based on the same item battery as the one of the present study had revealed a consistent pattern of perception (Bogner, 1998a; Bogner and Wilhelm, 1996): high scores in the "Utilization" subscale are linked with low scores in "Environmental Behaviour" as well as in the nature conservation subscale. Such a pattern of attitudes and behaviour would also support frequent prejudices that some society groups are more likely to express awareness, concern or irritation about certain pollution or environmental impacts than others; commonly such differences are associated with variables such as, for instance, socio-economic status, educational level or racial background (e. g., Floyd and Gramman, 1993; Sheppard, 1995). However, such a simplistic model was not completely verified in a further study drawn from a Danish sample based on the same item battery (Bogner and Wiseman, 1996) where the nature conservation subscale only did not follow the proposed consistency. At that time we drew the conclusion that environmental behaviour is not explained by the simple dichotomy proposed only. Although both world views undoubtedly influence the individual pattern of environmental behaviour or the willingness to make adjustments to safeguard the environment, as was demonstrated in the case of "Dominant Social Paradigm" by Dunlap and Van Liere (1984), it is possible for individuals to ascribe in varying degrees to elements of both: for example, depending on their attitudinal system, individuals could hold essentially ecocentric views while yet behaving in an anthropocentric way (see above).

In the light of the study in Denmark (see above), our present finding, that attitudes do not differ but behaviour does, is even more challenging but quite in line with the explanation already suggested. Hence, the inherent dissension between the two extremes remains either that both world views are thought to reflect opposite ends of a continuum (Milbrath, 1984) or that they reflect separate belief systems (as projected by Dunlap and Van Liere, 1978). In other words, although both attitudes could consistently explain environmental behaviour in the surveyed samples of Bavaria and Ireland (Bogner, 1998a) and, in part, of Denmark (Bogner and Wiseman, 1996), such a simple causality is not given in the sample chosen for this present study. Furthermore, there is no reason to suppose that adolescents form an exception to the tendency for individuals to undergo a transition process of holding positions of both world views (e. g., Dunlap, 1980), an attitude that is impacted from various sources such as, for instance, parents, peers, educational system, personal cognitive knowledge or, also, experience of or being threatened by environmental problems. If the continuum model (see Introduction) holds, then everywhere but at the two extremes different degrees of both views determine everyone's position.

Therefore, our results demonstrate the need to recall the multidimensional quality of environmental behaviour (Hines [et al.], 1987; Klee and Todt, 1993; Klee [et al.], 1993). Consequently a follow-up study (already initiated) must include other variables quantifying environmental perception as well as other relevant variables such as, for instance, personality, in order to provide a broader basis for explaining and understanding motives of environmental behaviour.

The nature conservation factor turned out to be somewhat weakly supported by low factor loadings as well as of Cronbach' alpha. Although this subscale has received substantial support in the literature (see Introduction, for instance, Dunlap, 1980, Bogner and Wilhelm, 1996), the selected items are potentially unable to tap the underlying construct. In essence, we seek to measure both positive environmental attitudes and the change of attitude from regarding the environment as an enemy to be tamed to regarding it as a friend to be helped. Our data suggest that this may be no easy task, particularly in an age-related context. Such scepticism towards our hypothesised subscale would further be supported by the studies hitherto undertaken with the same item battery in different samples of European pupils where the nature conservation factor proposed was always fairly "weak" with low loadings (Bogner, 1998a; Bogner and Wiseman, 1996). Whether our item battery did not properly cover conservation issues in an appropriate manner for adolescents or whether relevant perceptions were not represented at all (such as preventing resource destruction or regarding nature not as a commodity for human benefits), has yet to be determined; further analyses either on a much broader data basis and/ or possibly a more extensive factor evaluation will be examined in future studies.

A further main objective of this study was to provide a reliable basis for monitoring effects and efficacies of relevant educational approaches that in the field of ecology and environmental education aim explicitly to increase levels of knowledge and to change attitudes and behaviour. This is of particular importance in approaching the challenge of, for instance, changing personal lifestyles, stressing maladaptive behaviour and trying to alter human behaviour; educational approaches must and will be complex – and as a result many argue that educational approaches of the last decades have failed to meet that goal at all. However, a wide range of studies suggest that there may be some commonality in the models that pupils construct to interpret events in the natural world, a claim which has been supported by international and cross-cultural studies (Shipstone [et al.], 1988). However, it seems that children develop different styles of thinking and dealing with their world due to various influences such as for instance the parental one. Therefore, the imposed

institutional umbrella of school education must certainly cope with this challenge especially when "new" goals of conservation and of overriding the traditional dealing with nature are set.

## 5. Conclusion

Current environmental dilemmas are essentially conflicts of values (e. g., Borden and Schettino, 1979) especially because satisfying a variety of human needs might end in a dualism between humans and nature. Environmental attitudes develop at an early stage (e. g., Chawla, 1988; Klee et al., 1993) before they stabilise after the process of adolescence. As already depicted in the Introduction, younger people tend to have a more environmental world view (see Blaikie, 1992; Bogner and Wilhelm, 1996), which Szagun and Mesenholl (1993), for instance, explain by strong emotional bondings. Other studies explain such results by the shorter exposition of young people to the competing traditional belief system which in its consequence favours environmental degradation (see above) and leads to scepticism about the traditional society value system (e. g. Van Liere and Dunlap, 1980, 1981; Mohai and Twight, 1987). Therefore, world views of individuals are not static but in most cases exposed to incremental changes, due either to subjective maturation, or learning, or persuasion, to mention only three potential reasons. Since world views were originally defined as the way in which an individual perceives his/her relationships to the world (Sue, 1978), they function as filters through which perceptions and perspectives are obtained and objects and events are perceived (Disinger and Tomsen, 1995). Of course, it is difficult enough to construct an ideal educational approach reaching all learners, but (sub-)cultural socialisation as a filter of environmental perception seems to be a promising avenue for the institutionalised framework of environmental education to explore. However, familiarity with the "baselines", i. e. which attitudes concerning our nature are individually supported to which degree or how environmental issues are evaluated and rated individually, can provide pedagogical access to influencing such attitudes. The heterogeneous character of those who come under the umbrella of environmental education deserves special emphasis that teachers will be enabled to reach all learners adequately (see Bogner, 1998b). Therefore, environmental education must look beyond the traditions of a single region in ascertaining individual levels of environmental world views and approaching fundamental changes in values and for higher priority of conservation. Consequently, our next research step will be the introduction of a questionnaire to monitor effects of a nature conservation education programme offered in the majority of secondary schools in Switzerland.

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