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# Attitudes of School Children in Germany, Costa Rica and Ukraine Towards Invertebrates - A Comparison

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### Abstract

Negative feelings towards and an insufficient awareness of invertebrates seem to be culturally universal and can be found in different countries and continents. To better understand the underlying mechanisms we want to compare the attitudes of school children in Germany, Costa Rica and Ukraine towards invertebrates. The sample of the study comprised a total of 228 school children (grade 6); 50 Costa Rican, 91 German and 87 Ukrainian students. Attitudes towards small animals such as beetles, wood lice, centipedes or spiders were assessed with the help of a semantic differential. Altogether students marked their choices between 13 bipolar adjective pairs that focused on the perceived value of animals and the emotions towards them. Only 2 of the 13 bipolar adjective pairs showed significant differences. German and Costa Rican students rated the invertebrates generally less weird in comparison with the Ukrainian school children. Furthermore Costa Rican students rated the invertebrates most precious.

## 1. Introduction

Research indicates that children may be more and more separated from nature and have a low level of taxonomic literacy (Froebel and Schlumprecht, 2014 [1]; Louv, 2005 [2]; Nützel, 2009 [3]). Furthermore, several studies have clearly shown that when asking children to list the animal-species they know, these children primarily talk about exotic animals, respectively animals that are not found in their own environment (Lock, 1995 [4]). In addition they mainly mention remarkable and extraordinary vertebrates, especially mammals, whereas small animals (invertebrates and insects) are hardly ever listed (Drissner et al., 2013 [5]; Kellert, 1993 [6]; Patrick et al., 2013 [7]; Snaddon et al., 2008 [8]). Reasons for the frequent mentioning of mammals could be that: mammals are usually larger and more often mentioned in the media, whereas the behaviour and the appearance of invertebrates seem to be strange and not typical for human beings (Lindemann-Matthies, 2006 [9]; Patrick et al. 2013 [7]; Piper, 2014 [10]). Two facts are disturbing: Children sometimes are not even sure if invertebrates are animals (Patrick et al., 2013 [7]) and secondly only every third student in a German study has ever touched and handled a beetle or a butterfly (Nützel, 2009 [3]). Worse still, the small animals are often associated with negative emotions. Feelings of disgust and abhorrence towards small animals pose a genuine obstacle for an effective ecological education (Bixler et al.,

1999 [11]; Winkel, 1995 [12]). Internationally, animal-species could be categorised as fear-irrelevant, fear-relevant and disgust-relevant species (Davey *et al.*, 1998 [13]).

One should keep in mind that the majority of these invertebrates are harmless and essential for our ecological system. Moreover, many of them are rare and classified as endangered species (Bixler *et al.*, 1999 [11]; Wagler and Wagler, 2011 [14]; Wilson, 1987 [15]). The extinction of species has been dramatically accelerating, and it is difficult to predict the outcome (Rockström *et al.*, 2007 [16]). If children are not familiar with the animals they encounter in their own natural environment, they will find it difficult to address issues of biodiversity for example (Heywood, 1995 [17]; Weilbacher, 1993 [18]). Because all children are aware of them, animals have a special importance in creating a consciousness for the value and importance of the environment (Patrick *et al.*, 2013 [7]). Furthermore we can only miss a species if we have had some kind of attachment to it (Fawcett, 2002 [19]; Lindemann-Matthies, 2002 [20]; Weilbacher, 1993 [18]). Scientists point to the danger that certain animal-species could disappear from people's consciousness before they are actually physically endangered (Fawcett, 2002 [19]). Therefore, one should take every opportunity to make school children aware of invertebrates and further to raise their interest in them.

The lack of awareness and dislike of invertebrates seem to be culturally universal, being evident in different countries and continents (Davey *et al.*, 1998 [13]; Patrick *et al.*, 2013 [7]). We therefore investigated reasons for this phenomenon by comparing the attitudes towards invertebrates among school children in Germany, Costa Rica and Ukraine.

## 2. Methods

The sample comprised 228 school children (grade 6); 50 Costa Rican students, 91 German students and 87 Ukrainian students.

Attitudes towards small animals such as beetles, wood lice, centipedes or spiders were assessed applying a semantic differential. Students were asked to mark a scale between two bipolar adjectives (for example: "Boring - Fascinating", "Useless - Valuable" or "Disgusting - Cute"). Altogether students indicated their choice between 13 bipolar adjective pairs that focused on the perceived value of the animals and the emotions towards them (e.g. fear and disgust). See questionnaire Table 1.

**Table 1.** Semantic differential to assess the attitudes towards small animals such as beetles, wood lice, centipedes or spiders.

	1	2	3	4	5	6	7	
boring								fascinating
dangerous								safe
useless								valuable
disgusting								cute
uninteresting								interesting
unnecessary								necessary
bad								good

	1	2	3	4	5	6	7	
morbid								natural
repulsive								appealing
uncool								cool
dull								funny
weird								harmless
worthless								precious

## 3. Results

Country-specific differences were analysed. Only 2 of the 13 bipolar adjective pairs showed significant differences: weird - harmless and worthless – precious. German and Costa Rican students rated the invertebrates generally more harmless in comparison with the Ukrainian school children. Furthermore Costa Rican students rated the invertebrates more precious in comparison with German and Ukrainian students. The results are presented in Table 2 and 3.

**Table 2.** Means and p-values for adjective pair weird – harmless; countries considered separately.

		Bonferroni Test; adjective pair: weird - harmless		
		1	2	3
		<b>5,31</b>	<b>4,95</b>	<b>4,16</b>
1	Costa Rica (N = 50)		0,948	0,006
2	Germany (N = 91)	0,948		0,033
3	Ukraine (N = 87)	0,006	0,033	

**Table 3.** Means and p-values for adjective pair worthless - precious; countries considered separately.

		Bonferroni Test; adjective pair: worthless - precious		
		1	2	3
		<b>6,02</b>	<b>4,85</b>	<b>4,87</b>
1	Costa Rica (N = 50)		0,002	0,003
2	Germany (N = 91)	0,002		1,000
3	Ukraine (N = 87)	0,003	1,000	

## 4. Discussion and Conclusion

Costa Rican, German and Ukrainian students differ in their attitudes towards invertebrates in only 2 of 13 bipolar adjective pairs. This seems to be surprising considering that the students grew up in different cultures and on different continents. More differences could have been expected.

Although such invertebrates like scorpions or tarantulas are species of the natural environment in Costa Rica, Costa Rican school students view invertebrates generally as less weird and more precious in comparison with their German and Ukrainian peers. But why have the German and the Ukrainian students such low attitudes regarding these adjectives? If most invertebrates pose no danger in Germany and Ukraine, why are they even less appreciated than in countries like Costa Rica where they really could be dangerous? This lack of appreciation for invertebrates is a phenomenon found in many other countries where most invertebrates in nature are not only harmless but also very important for our ecological systems (Davey *et al.*, 1998 [13]; Patrick *et al.*, 2013 [7]). Normally, experiential learning such as excursions, learning outside of the classroom in

natural habitats, the involvement of emotions and the direct contact with animals in their environment can help children develop a healthy attitude towards small animals (Barker et al., 2002 [21]; Chawla, 1998 [22]; Fawcett, 2002 [19]; Haan, 2005 [23]; Haase, 2003 [24]; Lindemann-Matthies, 2006 [9]; Lock, 1998 [25]; Yore and Boyer, 1997 [26]).

Studies of Drissner et al. (2008 [27]; 2010 [28]; 2011 [29]) indicated that it is indeed possible to change students' awareness, attitude and emotions towards invertebrates. Furthermore the studies by Drissner et al. (2008 [27]; 2010 [28]; 2011 [29]) also illustrate the importance of learning outside of school. The students who encountered small animals in their natural habitat demonstrated better knowledge of and more positive emotions towards the animals. For some of the students, this was true still five years after the visit of the outside learning forum. Furthermore, students showed a significant improvement on nine out of 13 bipolar adjective pairs (same questionnaire as in the present study).

It could be valuable and worthwhile to compare the different curricula from Costa Rica, Germany and the Ukraine in order to explain the different attitudes towards invertebrates which were found in this study. On the one hand the Costa Rican curriculum mentions explicitly that invertebrates are carriers of diseases and gives instructions on how to handle so-called dangerous species. On the other hand the same curriculum places immense importance on the value of the Costa Rican nature and its biodiversity and explains clearly that human beings are a part of nature. Excursions are explicitly postulated. In contrast, German and Ukrainian curricula do not much emphasize biodiversity and invertebrates. The students of these two countries do not have many opportunities for learning outside the classroom, for example on excursions. These different curricula might well support scientific studies on the importance of excursions and encounters with invertebrates in natural habitats. They also help to explain the different attitudes of the Costa Rican, German and Ukrainian students.

Measuring attitudes towards invertebrates with special regard to cross-cultural aspects is very important in light of the increasingly smaller number of children valuing the animals in their environment, despite the fact that they are ecologically extremely important. Against this background e.g. Snaddon and Turner (2007) [30] call for efforts to emphasize small animals and their significance for the environment. As pedagogical approaches and curricula are created the just mentioned ideas should be considered.

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