

## Along the Rio Negro: Brazilian Children's Environmental Views and Values

Daniel C. Howe  
Colby College

Peter H. Kahn, Jr., and Batya Friedman  
Colby College and The Mina Institute

Children in urban and rural parts of the Brazilian Amazon were interviewed in Portuguese on how they understand and value their relationship with the natural environment. Forty-four 5th-grade children (mean age = 13 years, 8 months) participated. Children in both locations were aware of environmental problems, believed that throwing garbage in the Rio Negro harmed various parts of the environment (i.e., birds, insects, the view of the river, and people who live along the river), and cared that such harm might occur. Moreover, children believed that throwing garbage in the Rio Negro constituted a violation of a moral obligation. Children supported the conservation of the Amazon rain forest. Additional analyses showed striking similarities between this Brazilian population and a population of African American urban children in the United States (P. H. Kahn & B. Friedman, 1995).

To date, developmental psychologists have remained largely silent in seeking to understand ontogenetically the human relationship with nature. This lack of interest is surprising given the increasing importance of environmental issues, locally and globally, and the increasing attention the issues are receiving in other disciplines (Nelson, 1983; Orr, 1992; Rolston, 1989; Wilson, 1992). Moreover, it may be that deep and abiding environmental sensitivities and commitments are formed during childhood (Kellert, 1985, 1996; Nabhan & Trimble, 1994; Tanner, 1979; Ulrich, 1993), and, if so, developmental psychology has an important place in such an account. Thus, in the current study, we investigated how urban and rural children who live along a major river in the center of the Amazon region in Brazil understand and value their relationship with the natural environment.

This study builds on recent research we conducted with African American children from an urban elementary school in Houston, Texas, on their environmental views and values (Kahn & Friedman, 1995). Contrary to a common stereotype

held by some African Americans and Whites alike, the results showed—from what we shall refer to as the *Houston study*—that the African American children had an awareness of, interests in, and moral commitments toward the natural environment. Such perspectives were held along side of, and often coordinated with, other types of social and moral judgments. One third-grade girl, for example, said that it was wrong to throw garbage in the local bayou (waterway); at the same time she described a bayou in the following terms: “[A bayou is] where turtles live and the water is green because it is polluted. Some people go down there and pee in the water. Like boys, they don’t have no where to pee, and drunkers, they’ll go do that, too. And sometimes they’ll take people down and rape them, and when they finished, they might throw ’em in the water or something.” Thus this child, like others, interwove views of nature with the harsh realities of living in the inner city of Houston.

In the Houston study, two overarching forms of reasoning emerged for why the environment should be protected. One approach grounded environmental considerations in homocentric (human-oriented) terms. From this approach, for example, children often reasoned that the local bayou should not be polluted because of considerations based on human welfare (e.g., that polluting nature will result in people getting sick), aesthetics (e.g., that people enjoy the beauty of nature), and personal interests (e.g., that animals are fun to play with, and they would be hurt or killed by polluting a bayou). Such findings are consistent with Kellert’s (1985, 1993) research on children’s attitudes toward nature, which yielded a topology of nine attitudes, including those that are utilitarian (that nature has utility to humans), negativistic (that one needs to protect oneself from the harm nature can bring), and aesthetic (that nature offers beauty to humans).

With much less frequency, children in the Houston study drew on a biocentric form of reasoning wherein nature itself is granted moral standing. For example, children reasoned that nature has intrinsic value that does not derive solely from human interest, or that nature has rights and deserves respect. Fur-

---

Daniel C. Howe, Department of Education and Human Development, Colby College; Peter H. Kahn, Jr., Department of Education and Human Development, Colby College, and The Mina Institute, Covelo, California; Batya Friedman, Department of Mathematics and Computer Science, Colby College, and The Mina Institute, Covelo, California.

An earlier version of this article was presented at the April 1995 biennial meeting of the Society for Research in Child Development, Indianapolis, Indiana. This research was supported, in part, by the Clare Boothe Luce Foundation.

We thank Carlos Miller and the staff of the Fundacao Vitoria Amazonas and Miguel Rocha da Silva of Amazon Nut Safaris. Thanks also to Marilena Gouvea for translating and transcribing the interviews, Sue Nackoney for reliability coding, and Sara Brose for statistical assistance.

Correspondence concerning this article should be addressed to Peter H. Kahn, Jr., Department of Education and Human Development, Colby College, Waterville, Maine 04901. Electronic mail may be sent via Internet to [phkahn@colby.edu](mailto:phkahn@colby.edu).

ther analyses suggested that, in children's development, biocentric reasoning may hierarchically integrate homocentric reasoning. For example, when the older children accorded rights to animals, such reasoning often was not in contradiction to accorded rights to humans but enlarged the scope of what has moral standing (e.g., "bears are like humans, they want to live freely"). Such a developmental progression is consistent with research by Beringer (1992), who often found forms of biocentric reasoning within an environmentally oriented population of late adolescents.

The results from the Houston study suggest that the serious constraints of living in an inner-city community cannot easily squelch these children's diverse and rich appreciation for nature, and moral responsiveness to its preservation. Yet an important question remains unanswered. To what extent are the analyses and results from the Houston study marked by culture and context, and to what extent might they suggest universal features of children's development?

The current study directly examined this question by using many of the same methods used in the Houston study with fifth-grade children in an urban (Manaus) and rural (Novo Ayrão) location in the Amazon region of Brazil. Both the urban and rural locations were particularly appropriate because they each bordered a river (the Rio Negro) and, thus, in this regard, matched the Houston location, which bordered a bayou.

Some of the issues under investigation focused on children's awareness of environmental problems, beliefs about whether certain acts of environmental degradation harmed various parts of nature, and whether the children cared if such harm occurred. Other issues focused on children's environmental actions, such as whether they discussed environmental issues with their family or did anything to help the environment. In addition, we used a hypothetical scenario that involved throwing garbage in the Rio Negro, and we assessed whether children believed such an act violated a moral obligation (Kahn, 1992; cf. Kohlberg, 1971; Turiel, 1983). Children's environmental moral reasoning was also systematically elicited. Because the Brazilian children lived closer to nature than the Houston children, we expected that a greater amount and range of biocentric reasoning would emerge and lend itself to analysis. Finally, we investigated children's views and values toward the Amazon rain forest. Taken together, we expected that the results would reveal Brazilian children's environmental moral sensitivities and commitments and contribute to forming a cross-cultural framework for understanding the ontogenesis of children's relationship with nature.

## Method

### *Participants and Research Sites*

Forty-four fifth-grade Brazilian children were interviewed (mean age = 13 years, 8 months). Thirty children (16 girls and 14 boys) came from Manaus (mean age = 13 years, 8 months), the capital of the State of Amazonas, and 14 children (7 girls and 7 boys) came from Novo Ayrão (mean age = 13 years, 7 months), a small remote village. Both locations border the Rio Negro and are located roughly in the center of the Amazon region.

With nearly 1 million inhabitants, Manaus is the largest Brazilian city within the vast Amazon rain forest. The city is located about 13 miles

(21 km) above the junction of the Rio Negro and the Amazon River, and it is at this junction that the Amazon River is said to begin. Manaus services a growing eco-tourist trade from North America and Europe. The city is also considered the center of the region's electronics industry, and it enjoys tax-free imports because of the government's efforts to spur international development in the region. Yet even given this economic development, for many Brazilians, Manaus remains an emblem of the economic disillusionment that plagues Brazilian society (Nyop, 1983; Potter, 1989). At the turn of the century, approximately 90% of the world's rubber supply passed through the city, resulting in rapid economic and cultural growth. When the market crashed in 1925, this growth came to an abrupt and debilitating halt (Beresky, 1991). A great deal of poverty currently exists in Manaus, as do poor educational opportunities, jobs, and medical care. In some sections of the city, refuse and litter are readily apparent, and sickness manifests (e.g., cholera, malaria, and yellow fever). The urban children who were interviewed attended a school in São Raimundo, a neighborhood of only modest economic means in comparison to the city as a whole. Some of these children, for example, lived near creeks that some people used as their primary means for garbage and sewage removal.

In contrast, Novo Ayrão is a small, remote village with approximately 4,000 inhabitants. The village could only be reached by means of an 8-hr boat ride up the Rio Negro from Manaus. The villagers' primary economic activities include fishing and the extraction of forest products, most notably lumber. The landscape is largely pristine, with only small areas cleared for housing, commerce, and dirt roads. There is little visible litter or garbage, and, according to some inhabitants, neither crime nor drugs are present in the community. The children who were interviewed attended one of the village's two schools.

### *Procedures and Measures*

Each child was individually administered a semistructured interview (cf. Colby & Damon, 1992; Damon, 1977; Nucci & Turiel, 1993; Ogbu, 1977; Piaget, 1929/1960; Saxe, 1990). The interviews were conducted in Portuguese by Daniel C. Howe and tape-recorded. It should be noted that the probing in the interview was at times limited because the interviewer's primary language was English. The interviews were later translated and transcribed for analysis. The translator and transcriber was a native Brazilian who currently lives in the United States and is fluent in both Portuguese and English; she was otherwise unconnected to this research project.

The interview proceeded in the following manner. First, children were asked about their views and values toward animals (e.g., "Are animals an important part of your life? If so, how?" "Do you ever think about animals or ever get a chance to play with animals?" "Why are animals important or not important?"). Similar questions followed about children's views and values toward plants. Second, the interviewer asked the children whether they were aware of any environmental problems in general, and whether any environmental problems affected them directly. Third, children were asked about possible conversations they might have with family members about environmental issues (e.g., "Does your family talk about the environment much? If so, what kinds of things do you talk about?" "Have you ever started a conversation about nature or the environment? If so, what about?"). Fourth, the interviewer asked the children about any current practices they or their family engaged in to help the environment ("Do you or your family currently do anything to help the environment? If so, what?").

At this point in the interview, questions shifted to a hypothetical scenario of polluting a river: "The Case of the Polluted Waterway." To assess the presence or absence of moral obligation, three conditions were presented. First, children were asked to judge whether it was all right or not all right for a person to throw his or her garbage in the local river. The child's own gender was used to refer to the hypothetical protagonist. Second, children's initial judgments about throwing garbage in the river

were pitted against local social conventions that legitimated the practice under discussion ("Let's say that in your neighborhood everyone throws their garbage in the river; would that be all right or not all right?"). Third, children were asked to judge the validity of such routine conventional practices when they occurred in a different, far off geographical location ("Let's say that in X [named by the child as a place far away that he or she knew of], a whole neighborhood throws its garbage in the river. That's one of the ways that they handle their garbage. In this case, do you think it is all right or not all right for the whole neighborhood to throw its garbage in the river?"). For these evaluative questions, the interviewer asked the children to explain their reasons. Multiple reasons were encouraged.

Next, a series of questions focused on ways children believe that throwing garbage in the local river (the Rio Negro) would harm other parts of the natural environment. Questions directly pertained to birds ("Do you think that throwing garbage in the river is harmful or not harmful to the birds that live around the river?"), insects, aesthetics (on the view of the river), and the people who live along the river. Moreover, after each of these questions in which harm was identified, the interviewer asked the children whether it mattered to them if such harm occurred.

Finally, the interviewer asked questions that pertained to children's views toward the Amazon rain forest. Questions focused on children's previous experience in the forest ("Have you ever been into the forest?"); knowledge of the forest's use for humans ("What does the forest provide for people?" "Do you think we need the forest? Why?"); awareness and judgments of current logging practices ("Do you think that people are cutting down the forest now?" If yes, "Is that all right or not all right? Why?" "Do you think it is possible for humans to use the forest without destroying it? How?" "Do you think the forest will exist forever?"); and judgments about possible personal and governmental interventions ("Should you try to stop the people who are cutting the forest?" "Should the government try to stop the people who are cutting the forest?").

### *Coding and Reliability*

A coding manual was first developed from the responses of 50% of the children, divided across (a) urban and rural children and (b) girls and boys. The coding manual was then applied to the responses from all (100%) of the children. Three types of responses were coded. Dichotomous evaluation responses (e.g., all right or not all right; aware or not aware of environmental problems; matters or does not matter that insects would be harmed), content responses (e.g., animals, plants, garbage, water pollution, and air pollution), and justifications for the evaluative responses (e.g., an appeal that animals have rights). The justification coding system largely replicated the coding system used in the Houston study, which, in turn, drew on coding systems developed elsewhere (Davidson, Turiel, & Black, 1983; Friedman, 1988; Kahn, 1992; Kahn & Turiel, 1988). Summary descriptions on the most general level of the justification coding system are presented in Table 1.

An independent coder trained in the use of the coding manual recoded 12 interviews (27%), divided across (a) urban and rural children and (b) girls and boys. In total, 312 evaluations, 68 content responses, and 92 justifications were recoded. Intercoder reliability was assessed through testing Cohen's kappa for statistical significance at the .05 level. All tests were statistically significant. For evaluations, intercoder agreement was 96% ( $K = .91$ ;  $Z = 16.27$ ). For content responses, intercoder agreement was 91% (for the four separate questions analyzed,  $K$ 's = .81, .82, .79, and .90;  $Z$ 's = 5.79, 5.47, 4.39, and 11.84). For justifications on the level reported in Table 1, intercoder agreement was 81% ( $K = .70$ ;  $Z = 8.75$ ).

### *Comparison to the Houston Study's Methods*

As noted in the beginning of the article, many of the above procedures and measures we used were taken from a recent study (Kahn & Friedman, 1995) with children in Grades 1, 3, and 5 conducted in Houston, Texas. It was our intention to perform direct comparisons between the Brazilian children (all of whom were in fifth grade) and the fifth-grade children in the Houston study. Thus, we provide here other pertinent information on the Houston study's methods.

In the Houston study, 72 children were interviewed, 24 children (12 boys and 12 girls) in each of three grade levels: first, third, and fifth (mean ages = 7 years 5 months, 9 years 6 months, and 11 years 4 months, respectively). Children came from an economically impoverished urban elementary school in Houston, Texas. Virtually all of the students attending the school were African American (>99%), and most received the free lunch program (91%). On the basis of TEAMS assessment, more than 60% of the students were considered low-performing.

The interview stimuli largely paralleled that used with the Brazilian children. One difference involved the wording of certain questions to allow for comparable meanings. For example, although the Brazilian children were asked about polluting the Rio Negro (the major waterway in their locale), the Houston children were asked about polluting a local bayou (a major waterway about half a mile from the children's school). Another difference was that, in the Brazilian study, we asked a series of additional questions that pertained to children's views toward the Amazon rain forest. It can be assumed that, when direct comparisons are made between the Brazilian and Houston data, the comparisons are based on comparably framed questions and analyses.

### **Results**

We used nonparametric tests to test the statistical significance of some of the categorical data (see Marascuilo & McSweeney, 1977; cf. Helwig, 1995). When appropriate, categorical data was converted to score data and then analyzed by  $t$  tests. Justification data were analyzed by first submitting them to arcsine transformations, and then performing multivariate analyses of variance (MANOVAs) and analyses of variance (ANOVAs). No gender differences were found, and thus gender data were collapsed.

### *Children's Environmental Profile*

As shown in Table 2, the results profile ways in which these children were aware of environmental problems, discussed environmental issues with their family, believed certain acts are harmful to the environment, and cared that such harm might occur. Virtually all of the children in Manaus and Novo Ayrão said that animals and plants played an important part in their lives. The majority of children from both locations were generally aware of environmental problems that affected themselves or their community. Of children in this latter category, children spoke of concerns that focused on plants and forests, such as the large-scale burning of the Amazon jungle (53% and 56% in Manaus and Novo Ayrão, respectively), air pollution (24% and 33%, respectively), harm to animals (12% and 11%, respectively), and garbage or litter (12% and 0%, respectively). The majority of children discussed environmental issues with their family. Of children in this latter category, children said they talked about plants and forests (46% and 47%, respectively), animals (29% and 27%, respectively), air pollu-

Table 1  
*Summary of Environmental Justification Categories*

Category	Summary
Homocentric	An appeal to how effects to the environment affect human beings. In other words, the environment is given consideration, but this consideration occurs only because harm to the environment causes harm to people.
Personal interests	An appeal to personal interests and projects of self and others, including those that involve recreation or provide fun, enjoyment, or satisfaction (e.g., "animals are important; for instance, in the zoo there are a lot of people who like to see the animals, like myself"; "I think the jungle offers fun; for example, go camping during the weekend").
Aesthetic	An appeal to preservation of the environment for the viewing or experiencing pleasure of humans (e.g., "plants are important because they give up a good smell, they are beautiful, very pretty"; "because sometimes we are mesmerized with the beauty of the jungle"; "rivers that are polluted, full of trash, are very ugly").
Welfare	An appeal to the physical, material, and psychological welfare of human beings (e.g., "we should preserve the plants and not destroy them because it brings us oxygen and we can survive through it"; "because it causes pollution that is dangerous for us, because now we have cholera, a very dangerous disease, and there are others attacking us like malaria").
Punishment avoidance <sup>a</sup> Unelaborated <sup>b</sup>	An appeal to punishment or its avoidance (e.g., "because the police might catch her").
Biocentric	An appeal to a larger ecological community of which humans may be a part.
Intrinsic value	An appeal that nature has value, and the validity of that values is not derived solely from human interests, including is-to-ought appeals (e.g., "because the river was not made to have trash thrown in it, because the river belongs to Nature"; "because the jungle, God made it to live and not to be cut").
Rights	An appeal that nature has rights or deserves respect, including appeals wherein humans and nature are viewed as essentially similar (e.g., "because the animals think like us"; "because birds have a life as we do, they have a mother, they are like us"; "plants are born, reproduce, and die as we human beings do").
Relational	An appeal to a relationship between humans and nature, including those based on psychological rapport (e.g., "because the animals are our friends") and stewardship (e.g., "plants are important to me because we should take care of them, but a lot of people don't do it, they cut them down, so we have to preserve nature"; "because the jungle can't defend itself, somebody has to defend her").
Unelaborated harm to nature	An appeal to the welfare of nature (e.g., "because the birds need the water of the rivers to drink, and if it gets polluted it kills many birds and animals"; "because it is going to kill the fish, the river is going to be polluted"; "because they are destroying the Amazon jungle"). No reference is made to whether that concern derives from a homocentric or biocentric orientation.

<sup>a</sup> Although virtually none of the Brazilian children used this justification category of punishment avoidance, we included it in the coding manual in order to be particularly sensitive to any moral or environmental orientations that were based on punishment. The example comes from the Houston study (Kahn & Friedman, 1995). <sup>b</sup> No examples are available.

tion (14% and 7%, respectively), water pollution (0% and 7%, respectively), and garbage and litter (0% and 7%, respectively). Children in Novo Ayrão more often said that they acted to help solve environmental problems than did children in Manaus,  $\chi^2(1, N = 43) = 5.25, p < .02$ . Children's reported environmental actions included planting trees or in some way caring for plants and trees (50% and 85% in Manaus and Novo Ayrão, respectively), caring for animals (21% and 15%, respectively), and influencing other people to be environmentally responsible (21% and 0%, respectively).

In another series of questions, children were asked to imagine that their entire community threw garbage in the Rio Negro. As shown in Table 2, the majority of children believed that harmful effects would result for birds, insects, the view, and the people living along the river. In addition, of those children who believed that such harm would occur, the majority said that it would matter to them if such harm occurred.

To provide an overall assessment of these children's environmental profile and to test in one place for effects of location (Manaus vs. Novo Ayrão), we summed 10 of these questions as a single score, reflecting the degree of each child's pro-environmental views and values. The questions included those that pertained to whether children said that animals and plants were

an important part of their lives, were aware of environmental problems generally, discussed environmental issues with their family, initiated a conversation about nature, acted to help the environment, and cared about aspects of nature (birds, insects, the view, and people along the river). For each question, an affirmative response received a score of 1 and a negative response a score of 0; then the scores were summed across the 10 questions. Results showed that, out of a possible score of 10 (the most pro-environmental score), the Manaus children as a group scored 7.03, and the Novo Ayrão children as a group scored 7.50. A *t* test showed no significant difference between the two groups.

### *Children's Views and Values Toward the Amazon Rain Forest*

The results showed that children in both locations had understandings of and sympathies toward the Amazon rain forest. All of the children (100%) in both the Manaus and Novo Ayrão locations believed that humans need the forest, and virtually all of the children (93% and 100% in Manaus and Novo Ayrão, respectively) could name at least one thing the forest provided. Of those in this latter category, children said that the forest pro-

Table 2  
*Percentage of Children's Environmental Values, Knowledge, and Practices*

Environmental criterion	Manaus (n = 30)	Novo Ayrão (n = 14)	Houston (n = 24)
Animals an important part of your life.	100	100	91
Plants an important part of your life. <sup>a</sup>	97	100	79
Aware of environmental problems in general.	69	57	—
Aware of environmental problems affecting self and community.	81	86	80
Discuss environmental issues with family.	62	64	71
Initiate discussions on environmental issues.	31	43	—
Act to help solve environmental problems. <sup>b</sup>	41	79	—
Thinks that throwing garbage in a river harms birds.	97	86	96
Cares that birds would be harmed.	96	100	95
Thinks that throwing garbage in a river harms insects.	57	64	68
Cares that insects would be harmed. <sup>a</sup>	61	58	89
Thinks that throwing garbage in a river harms the view.	97	100	91
Cares that the view would be harmed.	93	92	95
Thinks that throwing garbage in a river harms people along the river.	93	100	95
Cares that people would be harmed.	89	85	81

*Note.* Children were first asked if they thought harm occurred (to birds, insects, the view, or people). Only those children who thought harm did occur were then asked if they cared about the harm. The dash indicates that a comparable question was not asked of the Houston children.

<sup>a</sup> There was a statistical difference between the population in Brazil (Manaus and Novo Ayrão) and the United States (Houston),  $p < .05$ . <sup>b</sup> There was a statistical difference between the populations in Manaus and Novo Ayrão ( $p < .05$ ).

vided food (33% and 32%, respectively), clean air or oxygen (17% and 19%, respectively), lumber (7% and 16%, respectively), medicine (17% and 7%, respectively), animals (10% and 10%, respectively), shade (2% and 10%, respectively), and beauty (5% and 0%, respectively). In turn, the majority of children in both locations believed that people are currently cutting down the rain forest (83% and 100% in Manaus and Novo Ayrão, respectively), that such actions are wrong (83% and 79%, respectively), that the government should stop the people who are cutting down the rain forest (96% and 92%, respectively), that they themselves should take some action to help stop the cutting of the rain forest (88% and 85%, respectively), that there is a way to use the forest without destroying it (72% and 86%, respectively), and that the rain forest will exist forever (64% and 64%, respectively). Fewer children in Manaus than Novo Ayrão had been into the rain forest at some point in their lives (34% to 71%, respectively),  $\chi^2(1, N = 43) = 5.18, p < .03$ .

To provide an overall assessment of these children's conservation views and values and to test for effects of location (Manaus vs. Novo Ayrão), all five of the above questions that pertained to conservation were summed as a single score. One question focused on whether humans need the forest, two questions on children's awareness of judgments of current logging practices, and two questions on children's judgments about personal and governmental interventions. This process was similar to that used in computing the environmental profile. For each question, an affirmative response received a score of one, and a negative response received a score of zero. The scores were then summed across the five questions. Results showed that, out of a possible score of 5 (the most pro-conservation score), the Ma-

naus children as a group scored 4.0, and the Novo Ayrão children as a group scored 4.2. A *t* test showed no significant difference between the two groups.

#### *Children's Moral Judgments About Nature: The Case of the Polluted Waterway*

Virtually all of the children interviewed in both Manaus (97%) and Novo Ayrão (93%) judged the individual act of throwing garbage in the Rio Negro as not all right. Children maintained their judgments not to throw garbage in the river even in conditions where local conventions legitimated the practice for their entire community (97% and 93% in Manaus and Novo Ayrão, respectively) and for a community in a different geographical location (93% and 86%, respectively). In assessing conceptions of moral obligation, we found that 93% of the children in Manaus viewed polluting the river as not all right in all three conditions, compared to 86% of the children in Novo Ayrão. Using Fischer's exact test, no significant differences were found between the two locations.

#### *Children's Environmental Justifications*

Children were systematically probed for their reasons on six of their evaluations. Two evaluations involved whether animals and plants played an important part in their life, three involved "The Case of the Polluted Waterway," and one involved whether it was all right or not all right to cut down the Amazon forests. Children's justifications were coded with the categories reported in Table 1. The resulting justification percentages for each of the six questions, separated by location (including the

Table 3  
*Percentages of Environmental Justifications by Categories*

Justification category	Important part in your life						Case of the polluted waterway									Rain forest		
	Animals			Plants			Individual			Local community <sup>a</sup>			Distant community <sup>a</sup>			Deforestation		
	M	N	H	M	N	H	M	N	H	M	N	H	M	N	H	M	N	H
<b>Homocentric</b>																		
Personal interest	21	7	35	3	5	8	8	6	8	0	0	6	4	7	3	0	0	—
Aesthetic	17	0	4	27	29	33	0	0	31	7	0	19	7	0	19	26	6	—
Welfare	38	64	26	70	52	42	64	75	18	64	81	25	59	79	19	45	56	—
Punishment avoidance	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	—
Unelaborated	0	0	0	0	0	0	0	0	0	4	6	3	0	0	11	0	0	—
<b>Biocentric</b>																		
Intrinsic value	0	7	0	0	0	0	3	0	3	0	0	3	0	0	0	3	0	—
Rights	14	14	9	0	10	0	0	0	3	0	0	3	0	0	0	0	6	—
Relational	3	7	9	0	5	0	0	0	0	0	0	0	0	0	6	0	0	—
Unelaborated harm to nature	7	0	17	0	0	17	25	19	40	25	13	39	30	14	42	26	33	—

Note. M = Manaus ( $n = 30$ ); N = Novo Ayrão ( $n = 14$ ); and H = Houston ( $n = 24$ ). Percentages may not equal 100 because of rounding. A dash indicates that this issue was not investigated in the Houston study.

<sup>a</sup> Given the common practice to pollute.

Houston location, which is discussed later), are reported in Table 3. Averaging across all six questions, we found that the majority of Brazilian children's justifications were homocentric (77% and 79% for Manaus and Novo Ayrão, respectively), followed by unelaborated harm to nature (19% and 13%, respectively), and Biocentric (4% and 8%, respectively). MANOVAs were conducted on the basis of these three overarching categories. Results showed no statistical difference in justification use between urban and rural groups. However, a subsequent analysis split the general homocentric category into two subcategories: welfare and other. A MANOVA showed a significant effect for group ( $p < .003$ ), and the following ANOVA revealed that, in comparison to the urban children (57%), the rural children (67%) used a greater proportion of welfare justifications,  $F(1, 42) = 9.40, p < .004$ .

To assess conceptions of moral obligation in the aforementioned analyses of "The Case of the Polluted Waterway," we used three measures: prescriptivity, noncontingency on conventional practices, and generalizability. The moral quality of such obligatory judgments were underscored by those justifications that appealed to welfare, to intrinsic value of nature, to rights, and to relational and unelaborated harm to nature. These justifications (spanning both homocentric and biocentric considerations) turn on issues of harm, justice, and virtue—issues that in moral philosophy traditionally come under the purview of morality. Accordingly, for children who evaluated polluting the river as not all right in all three conditions, we conducted an analysis that examined the percentage of children who provided moral justifications for their negative evaluations. Results showed that all of the children (100%) provided a moral justification for a least one of their three evaluations (90% for two of the three, 58% for three of the three).

#### *Comparison to the Houston Study's Results*

Table 2 includes a quantitative comparison of the results between the Brazilian study and the comparable parts of the study

conducted with fifth graders in the United States (Kahn & Friedman, 1995). Statistical tests showed only a few differences between groups. More Brazilian children than U.S. children said that plants played an important part in their lives,  $\chi^2(1, N = 67) = 6.47, p < .01$ . Fewer Brazilian children than U.S. children said that they would care if insects were harmed by water pollution,  $\chi^2(1, N = 57) = 5.07, p < .02$ .

In terms of children's justifications (Table 3), we tested four categories for group effect: homocentric welfare, homocentric other, biocentric, and harm to nature. A MANOVA showed a significant effect for group ( $p < .001$ ). Subsequent ANOVAs performed on each of the four categories revealed that Brazilian children (63%) used a greater percentage of homocentric welfare justifications than the Houston children (23%),  $F(1, 66) = 34.96, p < .001$ . In turn, Houston children used a greater percentage of reasoning that was based on the categories homocentric other,  $F(1, 66) = 20.08, p < .001$ , and harm to nature,  $F(1, 66) = 11.75, p < .002$ .

Otherwise, there were neither further statistical differences across each of the 12 questions that pertained to children's environmental values, knowledge, and practices (Table 2) nor a statistical difference across children's environmental profile: the Houston children scored 7.8, compared to 7.0 and 7.5 for the Manaus and Novo Ayrão children, respectively. In terms of the "Case of the Polluted Waterway," again there were no statistical differences. In brief, on the basis of the three measures that pertained to moral obligation, 100% of the Houston children judged throwing garbage in a waterway as not all right in the three conditions, compared to 93% and 86% of the children in Manaus and Novo Ayrão, respectively.

Moreover, it is important to recognize that the coding system developed from the Houston study was robust enough to account for the Brazilian data. Indeed, the very wording of children's reasoning across cultures was often strikingly similar. For illustrative purposes, consider but the following four pairs of matched examples:

[It is not all right to throw garbage in the river] because it causes pollution that is dangerous for us. Because now we have cholera, a very dangerous disease and there are others attacking us like the malaria. (Brazilian child)

Because some people that don't have homes, they go and drink out of the rivers and stuff and they could die because they get all of that dirt and stuff inside of their bodies. (Houston child)

Both of these children reasoned that it is wrong to throw garbage in the local waterway because people might drink from polluted water and get sick ("now we have cholera, a very dangerous disease"; "they could die").

Because the river was not made to have trash thrown in it, because the river belongs to nature. (Brazilian child)

Because water is what nature made; nature didn't make water to be purple and stuff like that, just one color. When you're dealing with what nature made, you need not destroy it. (Houston child)

Both of these children based their environmental judgments on the view that nature has its own purposes ("the river was not made to have trash thrown in it"; "nature didn't make water to be purple and stuff").

Because animals have to have their chance. They also must have to live. We should not mistreat them, because if it happens to us, we don't like it. (Brazilian child)

Some people don't like to be dirty. And when they throw trash on the animals, they probably don't like it. So why should the water be dirty and they don't want to be dirty. (Houston child)

Both of these children judged the mistreatment of animals as wrong based on considering whether humans would like to be treated in a similar way ("because if it happens to us, we don't like it"; "some people don't like to be dirty . . . [so the animals] probably don't like it").

Even if the animals are not human beings, for them they are the same as we are, they think like we do. (Brazilian child)

Fish don't have the same things we have. But they do the same things. They don't have noses, but they have scales to breathe, and they have mouths like we have mouths. And they have eyes like we have eyes. (Houston child)

Both of these children recognized that, although animals are not identical to human beings ("animals are not human beings"; "fish don't have the same things we have"), both animals and people have significant functional equivalences (animals "think like we do"; fish "don't have noses, but they have scales to breathe").

### Discussion

The majority of the fifth-grade urban and rural Brazilian children we interviewed demonstrated environmental sensitivities and commitments based on a wide range of measures. The children were aware of various environmental problems (such as air and water pollution and the *quemada*—the large-scale burning the Amazon jungle), and they discussed environmental issues with their family. They believed that throwing garbage in the Rio Negro hurt various parts of the environment (namely,

birds, insects, the view, and people who lived alongside the river), and they cared that such harm occurred. The children also demonstrated understandings of and sympathies toward the Amazon rain forest.

At the same time, it is unclear the extent to which these children's environmental sensitivities and commitments do (and, as the children mature, will) withstand various economic and cultural pressures. Among many people worldwide, earning a livelihood can conflict with environmental commitments. Understanding how children and adolescents resolve such conflicts involves analyses of complex relations between judgment and action and the coordination of multiple kinds of judgments (Blasi, 1980; Smetana, 1983, 1995; Turiel, Hildebrandt, & Wainryb, 1991). Still, our results show that children's environmental moral reasoning can override conventional practices (cf. Helwig, 1995; Killen, 1990; Laupa, 1991; Nucci & Nucci, 1982; Turiel, 1983). In Novo Ayrao, for example, many of the village members derived their livelihood by logging in the Amazon forest. Yet most of the children interviewed in Novo Ayrao judged such actions as wrong. In a similar manner, people in certain neighborhoods of Manaus routinely throw their garbage in the Rio Negro as their means for its disposal. Yet most of the children interviewed in Manaus judged such actions not only as wrong, but as a violation of a moral obligation. In future studies, questions that stress the importance of the economic benefits if not the necessity of otherwise environmentally destructive behavior (e.g., "One person I've talked with said that the *quemada* is necessary, for otherwise they and their family will starve. What do you think about what that person said?") might better uncover how children coordinate such conflicts.

By design, many of the data from the Brazilian study were collected so that they could be directly compared to parts of the study recently completed in the United States with fifth-grade African American children in an urban community in Houston, Texas. The results from this cross-cultural comparison showed one particularly surprising difference. We expected that, because Brazilian children (particularly in Novo Ayrao) lived closer to nature than their Houston cohorts, more biocentric reasoning—which embeds humans in a larger ecological moral community—would emerge. In contrast, Brazilian children used a greater percentage of homocentric welfare reasoning and a lesser percentage of unelaborated harm to nature reasoning than did the Houston children.

The comparatively heavy use of the homocentric welfare reasoning may have arisen because rural and urban children in the Amazon region depend more directly on nature for their physical survival than urban children in the United States. This explanation is further supported by the findings that more Brazilian than U.S. children said that plants played an important part in their lives, and that they would not care if insects (some of which carry deadly diseases in the Amazon region) were harmed by water pollution. It is possible that biocentric reasoning has a cultural basis and does not emerge in every culture that lives close to the land. It is also possible that a developmental movement to biocentric reasoning could be found in older Brazilian adolescents and adults. Further studies with older indigenous populations would prove fruitful in addressing this issue.

Perhaps most surprising is not that such differences occurred, but that so few occurred. This is especially so because of the

wide range of issues investigated, and because the Brazilian children (although matched for grade) were on average 2 years older than the U.S. children. There were only two statistical differences between the groups across 26 separate questions (which formed a large body of both studies), and there were no statistical differences across the summed scored analysis that comprised the environmental profile. In addition, the coding system we used to code the Brazilian children's environmental moral reasoning virtually replicated the system developed in the Houston study, and this system proved robust enough for the task. Indeed, as we highlighted in the *Results* section, the structure of children's reasoning sometimes almost echoed one another.

Taking these differences and similarities together, the results extend recent research in the moral developmental literature that suggests that, in important ways, individuals' moral reasoning across cultures is similarly structured by concerns for human welfare, fairness, and rights. This research includes studies conducted in India (Madden, 1992), Nigeria (Hollos, Leis, & Turiel, 1986), Brazil (Biaggio, 1994), the Virgin Islands (Nucci, Turiel, & Encarnacion-Gawrych, 1983), and Korea (Song, Smetana, & Kim, 1987), to name but a few. This is not to say that moral differences between cultures do not exist; rather, one needs to be careful in understanding such differences, for often they are not differences in morality, per se, but in personal interests, conventional practices, and factual and metaphysical beliefs (Kahn, 1991, 1995; Smetana, 1995; Turiel, Hildebrandt, & Wainryb, 1991; Turiel, Killen, & Helwig, 1987; Wainryb, 1991, 1993, 1995).

To better understand this idea and its relation to environmental reasoning, consider Huebner and Garrod's (1991) claim that Tibetan Buddhism "presents profound challenges to those who argue for general applicability of moral reasoning theories originating in Western culture" (p. 341). They illustrated their point by providing a passage from one of their interviews with a Tibetan monk, which we quote in its entirety:

He [the bug] went under my feet, but he did not die. Now he was suffering, wasn't he? Suffering. I figured that if I left him like that, he would suffer forever, because there was no medicine for him as there is for a human being. So I prayed . . . And then I killed him with my hand, the suffering one. Why did I kill him? He was suffering. If I left him, he would suffer. So it was better for him not to suffer any longer. That's why I killed him. And I prayed . . . that one day in the next life, he would become a man like me, who can understand Buddhism and who will be a great philosopher in Tibet. (p. 345)

Huebner and Garrod said that "such sensitivity to the nonhuman world leads to moral dilemmas not likely considered in Western culture" (p. 345). Granted, unlike most Westerners, the Buddhist monk interviewed by Huebner and Garrod advanced metaphysical assumptions about karma. However, differences in metaphysical assumptions should not blind us to common moral experiences. Have not many of us experienced moral qualms very similar to this Buddhist monk—stepping by mistake on ants or caterpillars and feeling remorse? More formally, such sensitivity to the nonhuman world receives attention from Western political activists (the animal rights movement) and philosophers (Regan, 1983; Spiegel, 1988; Stone, 1972). Such sensitivity was also clearly evident in the children we interviewed in both Brazil and the United States.

Thus, our study suggests that some potentially universal features of children's moral reasoning may extend to the larger biotic community. If we are correct, the developmental mechanisms remain to be understood. It may be, for example, that there are inherent aspects of nature itself that help give rise to children's environmental constructions. If so, nature is not a mere cultural convention or artifact, but part of a reality that bounds children's cognition (Soule & Lease, 1995). There is also increasing evidence, based on evolutionary theory, that humans have a complex range of genetic predispositions toward nature, ranging from aversion to deep emotional affiliations (Kellert & Wilson, 1993; Wilson, 1984). Future work might profit by seeking to dovetail constructivism with a nonreductionistic form of evolutionary biology.

## References

- Beresky, A. E. (Ed.) (1991). *Fodor's Brazil*. New York: Fodor's Travel.
- Beringer, A. (1992). *The moral ideals of care and respect: A hermeneutic inquiry into adolescents' environmental ethics and moral functioning*. Unpublished doctoral dissertation, University of Michigan.
- Biaggio, A. M. B. (1994, August). *Moral development and attitudes toward ecology*. Paper presented at the conference on Eco-Ethical Thinking in a Cross Cultural Perspective, Saarbrücken, Germany.
- Blasi, A. (1980). Bridging moral cognition and moral action: A critical review of the literature. *Psychological Bulletin*, *1*, 1–45.
- Colby, A., & Damon, W. (1992). *Some do care: Contemporary lives of moral commitment*. New York: Free Press.
- Damon, W. (1977). *The social world of the child*. San Francisco: Jossey-Bass.
- Davidson, P., Turiel, E., & Black, A. (1983). The effect of stimulus familiarity on the use of criteria and justifications in children's social reasoning. *British Journal of Developmental Psychology*, *1*, 49–65.
- Friedman, B. (1988). *Social judgments and technological innovation: Adolescents' conceptions of computer piracy and privacy*. Unpublished doctoral dissertation, University of California, Berkeley.
- Helwig, C. C. (1995). Adolescents' and young adults' conceptions of civil liberties: Freedom of speech and religion. *Child Development*, *66*, 152–166.
- Hollos, M., Leis, P. E., & Turiel, E. (1986). Social reasoning in Ijo children and adolescents in Nigerian communities. *Journal of Cross Cultural Psychology*, *17*, 352–374.
- Huebner, A., & Garrod, A. (1991). Moral reasoning in a karmic world. *Human Development*, *34*, 341–352.
- Kahn, P. H., Jr. (1991). Bounding the controversies: Foundational issues in the study of moral development. *Human Development*, *34*, 325–340.
- Kahn, P. H., Jr. (1992). Children's obligatory and discretionary moral judgments. *Child Development*, *63*, 416–430.
- Kahn, P. H., Jr. (1995). Commentary on D. Moshman's "The construction of moral rationality." *Human Development*, *38*, 282–288.
- Kahn, P. H., Jr., & Friedman, B. (1995). Environmental views and values of children in an inner-city Black community. *Child Development*, *66*, 1403–1417.
- Kahn, P. H., Jr., & Turiel, E. (1988). Children's conceptions of trust in the context of social expectations. *Merrill-Palmer Quarterly*, *34*, 403–419.
- Kellert, S. R. (1985). Attitudes toward animals: Age related development among children. *Journal of Environmental Education*, *16*, 29–39.
- Kellert, S. R. (1993). The biological basis for human values of nature. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 42–69). Washington, DC: Island Press.

- Kellert, S. R. (1996). *The value of life*. Washington, DC: Island Press.
- Kellert, S. R., & Wilson, E. O. (Eds.). (1993). *The biophilia hypothesis*. Washington, DC: Island Press.
- Killen, M. (1990). Children's evaluations of morality in the context of peer, teacher-child, and familial relations. *Journal of Genetic Psychology*, 151, 395-410.
- Kohlberg, L. (1971). From is to ought: How to commit the naturalistic fallacy and get away with it in the study of moral development. In T. Mischel (Ed.), *Psychology and genetic epistemology* (pp. 151-235). New York: Academic Press.
- Laupa, M. (1991). Children's reasoning about three authority attributes: Adult status, knowledge, and social position. *Developmental Psychology*, 27, 321-329.
- Madden T. (1992). *Cultural factors and assumptions in social reasoning in India*. Unpublished doctoral dissertation, University of California, Berkeley.
- Marascuilo, L. A., & McSweeney, M. (1977). *Nonparametric and distribution-free methods for the social sciences*. Monterey, CA: Brooks/Cole.
- Nabhan, G. P., & Trimble, S. (1994). *The geography of childhood: Why children need wild places*. Boston: Beacon Press.
- Nelson, R. K. (1983). *Make prayers to the raven: A Koyukon view of the northern forest*. Chicago: University of Chicago Press.
- Nucci, L. P., & Nucci, M. S. (1982). Children's responses to moral and social conventional transgressions in free-play settings. *Child Development*, 53, 1337-1342.
- Nucci, L., & Turiel, E. (1993). God's word, religious rules, and their relation to Christian and Jewish children's concepts of morality. *Child Development*, 64, 1475-1491.
- Nucci, L. P., Turiel, E., & Encarnacion-Gawrych, G. (1983). Children's social interactions and social concepts: Analyses of morality and convention in the Virgin Islands. *Journal of Cross-Cultural Psychology*, 14, 469-487.
- Nyop, R. F. (Ed.). (1983). *Brazil: A country study*. Washington, DC: American University Press.
- Ogbu, J. U. (1977). Racial stratification and education: The case of Stockton, California. *IRCD Bulletin*, 12, 1-26.
- Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. Albany, New York: State University of New York Press.
- Piaget, J. (1960). *The child's conception of the world*. Totowa, NJ: Littlefield, Adams & Co. (Original work published 1929)
- Potter, E. (1989). *The best of Brazil*. New York: Crown.
- Regan, T. (1983). *The case for animal rights*. Berkeley: University of California Press.
- Rolston, H., III. (1989). *Philosophy gone wild*. Buffalo, NY: Prometheus Books.
- Saxe, G. B. (1990). *Culture and cognitive development: Studies in mathematical understanding*. Hillsdale, NJ: Erlbaum.
- Smetana, J. G. (1983). Social-cognitive development: Domain distinctions and coordinations. *Developmental Review*, 3, 131-147.
- Smetana, J. G. (1995). Morality in context: Abstractions, ambiguities and applications. In R. Vasta (Ed.), *Annals of Child Development*, (Vol. 10, pp. 83-130). London: Jessica Kingsley.
- Song, M.-J., Smetana, J. G., & Kim, S. J. (1987). Korean children's conceptions of moral and conventional transgressions. *Developmental Psychology*, 23, 577-582.
- Soule, M. E., & Lease, G. (Eds.). (1995). *Reinventing nature?: Responses to postmodern deconstruction*. Washington, DC: Island Press.
- Spiegel, M. (1988). *The dreaded comparison: Human and animal slavery*. New York: Mirror Books.
- Stone, C. (1972). *Should trees have standing?* Los Altos, CA: William Kaufman.
- Tanner, T. (1979). Formative influences in the lives of citizen conservationists. In A. B. Sacks & C. B. Davis (Eds.), *Current issues: V. The yearbook of environmental education and environmental studies* (pp. 189-202). Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.
- Turiel, E. (1983). *The development of social knowledge*. Cambridge, England: Cambridge University Press.
- Turiel, E., Hildebrandt, C., & Wainryb, C. (1991). Judging social issues: Difficulties, inconsistencies, and consistencies. *Monographs of the Society for Research in Child Development*, 56 (2, Serial No. 224).
- Turiel, E., Killen, M., & Helwig, C. C. (1987). Morality: Its structure, functions and vagaries. In J. Kagan and S. Lamb (Eds.), *The emergence of morality in young children* (pp. 155-244). Chicago: University of Chicago Press.
- Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 73-137). Washington, DC: Island Press.
- Wainryb, C. (1991). Understanding differences in moral judgments: The role of informational assumptions. *Child Development*, 62, 840-851.
- Wainryb, C. (1993). The application of moral judgments to other cultures: Relativism and universality. *Child Development*, 64, 924-933.
- Wainryb, C. (1995). Reasoning about social conflicts in different cultures: Druze and Jewish children in Israel. *Child Development*, 66, 390-401.
- Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.
- Wilson, E. O. (1992). *The diversity of life*. Cambridge, MA: Harvard University Press.

Received June 2, 1995

Revision received November 18, 1995

Accepted November 18, 1995 ■