

WATER, AIR, FIRE, AND EARTH

A Developmental Study in Portugal of Environmental Moral Reasoning

PETER H. KAHN JR. is a research associate professor in the Department of Psychology, University of Washington. He is also a research affiliate with the University of Washington's Center for Mind, Brain, and Learning. He received his Ph.D. from the University of California, Berkeley, in 1988. Some of his current research is focusing on the psychological effects when technology mediates the human experience of the natural world. His 1999 book is titled *The Human Relationship With Nature: Development and Culture* (MIT Press). His most recent book, edited with Stephen Kellert, is titled *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations* (MIT Press).

ORLANDO LOURENÇO is a professor in the Department of Psychology and Education, University of Lisbon, Portugal. He has published widely in areas of cognitive development, moral development, genetic epistemology, and philosophy of science. In recent research, he has been investigating the aretaic domain and its relation to the deontic domain in moral reasoning. He has recently served on the board of the Jean Piaget Society and currently directs the Masters Program in Developmental Psychology at the University of Lisbon.

ABSTRACT: This study contributes to our understanding of the origins and development of the human relationship with nature. The authors interviewed 120 participants (aged approximately 10 years, 5 months; 13 years, 6 months; 16 years, 7 months; and 19 years, 4 months) in Lisbon, Portugal, about environmental moral issues that involved water pollution, air pollution, forest fires, and logging. Results showed that

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participants conceived of polluting their local waterway as a violation of a moral obligation. Participants' justifications for these and other evaluations included both anthropocentric appeals (e.g., to personal interests, human welfare, and aesthetics) and biocentric appeals (e.g., that nature has intrinsic value or rights). Participants' conceptions of living in harmony with nature showed a developmental trend. Finally, cross-cultural comparisons with studies conducted in the United States and the Brazilian Amazon support the proposition that there are substantial similarities in the environmental moral reasoning of young people across diverse cultures.

It is well known that children have complex moral judgments and values about acts that involve people (Eisenberg & Fabes, 1998; Kohlberg, 1984; Turiel, 1998). But is it also possible that children reason morally about their relationships with nature? For example, do children apply concepts of moral obligation in reasoning about human acts that pollute the air and water? Do children care if animals die due to such pollution? Do children think that animals have intrinsic value or rights? How do children coordinate potentially conflicting environmental moral judgments, for example, that on one hand it may be wrong to harm the natural world and on the other hand many human activities (such as driving a car) can contribute to such harm? What does it mean to children for them to live in harmony with nature or for something to be "natural"? Finally, what are the effects of culture on the development of environmental moral reasoning? In this study, we addressed these questions through structured interviews about morally implicated environmental issues, conducted with children, adolescents, and young adults in Lisbon, Portugal.

This current study builds on two studies in particular. In the first study, Kahn and Friedman (1995) interviewed children in an inner-city African American community in Houston, Texas, on their environmental views and values. In a cross-cultural follow-up study, Howe, Kahn, and Friedman (1996) employed a similar interview with children in the Brazilian Amazon. Many similarities appeared across locations. Children in both locations, for example, were aware of various environmental problems, discussed environmental issues with their families, believed that throwing garbage in their local waterway (in Houston, a bayou; in Brazil, the Rio Negro) hurt various parts of the environment (namely, birds, insects, the view, and people who lived alongside the waterway), and cared that such harm occurred. Children in both locations also employed anthropocentric reasoning much more often than biocentric reasoning. Anthropocentric reasoning appeals to how affecting the environment affects human beings. Biocentric reasoning appeals to how nature itself has moral standing (e.g., intrinsic value or rights).

There were, however, some limitations in what we will refer to as the Houston study and the Amazonia study, respectively. For one thing, neither study included participants beyond Grade 5. This limitation has caused difficulties in interpreting some of the findings. Notably, in the Amazonia study it was expected that because the participants lived closer to nature than their Houston counterparts that more biocentric reasoning would emerge. This expectation was not supported. One explanation is that across cultures, biocentric reasoning emerges more fully in older adolescents and adults. Thus, in this current study we interviewed students in four grade levels: 5, 8, 11, and college. The youngest level (Grade 5) provided a comparative baseline to the oldest level (Grade 5) in the Houston study and the Amazonia study. The three older grade levels positioned us for further developmental investigations. In addition, we chose a geographical location—Lisbon, Portugal—that provided an ideal setting, for we were able to control for language (interviewing in Portuguese) within the very country that had colonized much of Brazil. We expected that biocentric forms of reasoning would increase with age across our Portuguese population and thereby support a developmental explanation.

Another limitation of the Houston study and the Amazonia study is that they largely focused on only one type of environmental scenario (water pollution), wherein a protagonist throws a small amount of trash in a waterway for no overtly compelling reason. As noted above, children judged such an act as violating a moral obligation. Yet clearly many environmental judgments involve trade-offs between human goods and environmental harms. Thus, in this study, we established compelling reasons for engaging in a small amount of environmentally harmful behavior. We expected that even when participants advocated such harmful behavior, they would be mindful of moral considerations.

In total, we employed four scenarios. The Case of the Polluted Waterway repeated the scenario from the Houston study and Amazonia study. Our goal here was to provide a comparative baseline to the other studies. In addition, we included scenarios that involved three other fundamental categories of nature: air, fire, and earth. In the Case of the Driven Automobile (air), we first established that there is air pollution in Lisbon and then ascertained whether the participant believed that such air pollution was a problem and whether driving a car increases air pollution. In this context, we asked questions regarding whether driving to work constituted a violation of a moral obligation and how the problem of air pollution should be solved. Toward assessing moral obligation, we used standard criteria from the moral-developmental literature (Helwig, 1997; Kahn, 1992; Nucci, 1996; Turiel, 1983, 1998;

Smetana, 1995): whether it is all right to perform the act (permissibility criterion) and whether that judgment overrides contrary conventional practices (conventionality criterion) and generalizes to a different culture with different cultural practices (generalizability criterion). In the Case of the Fire in the Forests (fire), we built on recent events: that during the summer that preceded the time of interviewing many forest fires had erupted in Portugal. This situation provided the context by which we could investigate how participants conceived of the natural and of whether human activity (such as accidentally starting a forest fire) counted as natural. Finally, in the Case of the Cut-Down Trees (earth), we first established that in several regions of Portugal, trees are being cut in the forests. In this context, we asked whether the act was permissible and then systematically counterprobed with a significant cost to the participant's response. We also asked questions regarding whether the cutting of trees is a natural activity and what it means to live in harmony with nature.

We also sought to use the environmental content as a unique means to address a long-standing controversy in the field of moral development. The controversy involves whether the moral life is more nearly similar or different across cultures. Part of this controversy (and sometimes confusion) stems from researchers employing different levels of analyses in their comparisons. Shweder, Mahapatra, and Miller (1987), for example, uncovered hundreds of practices and beliefs of devout Hindus that would appear to differ dramatically from the practices and beliefs of people in Western cultures. For example, according to Shweder et al., devout Hindus believe that it is immoral for a widow to eat fish or for a menstruating woman to sleep in the same bed with her husband. Yet when Turiel, Killen, and Helwig (1987) reanalyzed aspects of Shweder et al.'s data set, they found that on a deeper structural level many differences disappeared. In their reanalysis, for example, they found that devout Hindus believed harmful consequences would follow from a widow who ate fish (the act would offend her husband's spirit and cause the widow to suffer greatly) and from a menstruating woman who sleeps in the same bed with her husband (the menstrual blood is believed to be poisonous and hurtful to the husband). Such beliefs differ from those in our culture, but the underlying concern for the welfare of others is congruent with our own. Generally, conceptualizations of morality that entail abstract characterizations of justice and welfare tend to highlight moral universals, whereas conceptualizations that entail specific content or rigid moral rules tend to highlight moral cross-cultural variation (Kahn, 1991, 1999).

In the current study, we sought to extend this analysis into the environmental moral domain. We expected that substantial cross-cultural similarities would be found in the more abstract structural analyses of children's environmental moral reasoning. For example, because pollution harms

human health (regardless of culture), we expected anthropocentric (human-oriented) welfare reasoning to emerge cross-culturally. Correspondingly, when cross-cultural differences were found, we expected that they would emerge in the more content-bound analyses. For example, in the Houston study, it was found that 30% of the children did not find parks important in their lives. But in Kahn's (1997a) analysis of the qualitative data, there is more here than meets the eye. For often children dismissed parks not because they disliked parks per se but because of fear for their personal safety. As one child said, "I used to go [to parks], now the people go in there and they be throwing glass and they have guns and stuff and they might shoot me." Thus, by enlarging the scope of traditional moral-developmental inquiry to include children's environmental moral reasoning, we sought to contribute to a long-standing debate on what is culturally specific and potentially universal in the moral life (Dunker, 1939; Hatch, 1983; Kohlberg, 1984; Shweder et al., 1987; Snarey, 1985; Turiel, 1998; Wainryb, 1995, 2000).

Finally, some environmental survey research has found that compared to men, women tend to have a greater humanistic and moral orientation to the natural world and more emotional attachments to domesticated animals (Chawla, 1988; Kellert, 1996). Moreover, some of these gender differences have been found to emerge in childhood (Bunting & Cousins, 1985; Chawla, 1988). However, no gender differences appeared in either the Houston study or the Amazonia study. One explanation is that because both studies could be characterized as exploratory, they may have failed to uncover important gender differences. Thus, in this current study, by refining and extending the earlier coding systems, we expected to obtain greater precision and breadth in characterizing forms of environmental moral reasoning and thereby be able to speak with more confidence about the role of gender.

METHOD

PARTICIPANTS

The sample consisted of 120 participants, evenly divided into four grade levels: 5th (*M* age was approximately 10 years, 5 months; 15 females, 15 males), 8th (*M* age was approximately 13 years, 6 months; 15 females, 15 males), 11th (*M* age was approximately 16 years, 7 months; 15 females, 15 males), and college (*M* age was approximately 19 years, 4 months; 16 females, 14 males). Participants were recruited from several public and private schools in the area of Lisbon, the capital of Portugal. Fifth graders

predominantly came from middle- to upper-class backgrounds. The rest of the participants came from predominantly middle-class backgrounds.

PROCEDURES AND MEASURES

Each participant was individually administered a semistructured interview that lasted approximately 40 minutes. The semistructured interview was pioneered by Piaget (1929/1960) and has been extended by many social-cognitive researchers to date (Helwig, 1997; Killen & Turiel, 1998; Laupa, 1991; Lourenço, 1990, 1993; Miller, 1994; Nucci, 1996; Smetana, 1995; Tisak, 1995; for a chapter-length overview of this methodology, see Kahn, 1999). In recent years, this approach has been applied successfully to understanding children's and adults' conceptions of environmental moral issues (Howe et al., 1996; Kahn, 1997a, 1997b; Kahn & Friedman, 1995, 1998; cf. Kahn & Kellert, in press).

The interviews were conducted in Portuguese and tape-recorded. For purposes of analysis, the interviews were later transcribed into Portuguese and then translated into English.

The interview consisted of five sections: a prologue and then four cases that focused on water pollution (the Case of the Polluted Waterway), air pollution (the Case of the Driven Automobile), forest fires (the Case of the Fire in the Forests), and logging (the Case of the Cut-Down Trees).

The prologue provided an initial profile of participants' environmental reasoning and values. We focused on each participant's relationship to domestic animals ("Are pets important or not important to you?"), wild animals ("Are wild animals important or not important to you? What's the difference in your relationship to pets and wild animals?"), plants ("Are plants important or not important to you?"), parks¹ ("Are the parks that exist around town important or not important to you?"), and environmental problems ("Do you know of any problems that affect the environment? If so, which ones? Do you talk about the problems with your friends or with your family? Do you do anything to protect the environment or to help solve some of the problems?").

The Case of the Polluted Waterway set up a scenario in which an individual throws his trash into the river (the Rio Tejo) that runs through Lisbon. In this context, we asked three questions to help establish whether a participant conceptualizes an act in terms of moral obligation. First, we asked whether the act was permissible ("Is it all right or not all right for that person to throw his trash in the Rio Tejo?"); second, whether that judgment overrides conventional practices ("Let's say that in Lisbon everyone throws their garbage in the river, would that be all right or not all right?"); and third, whether that

latter judgment generalized to a different culture with different conventional practices (“Let’s suppose that in Brazil everyone who lives near the Amazon River throws their garbage in the river because that’s one of the ways they dispose of their trash. Is that all right or not all right for them?”). Next, a series of questions focused on ways participants believed that throwing garbage in the Rio Tejo would harm fish, birds, the water, the view of the landscape, and the people who lived alongside the river. For each stimulus, questions focused on whether harmful effects occurred (e.g., “Do you think throwing garbage in the Rio Tejo would affect the fish? How? Is that effect good, bad, both, or none of the above?”). Because it is possible to recognize that a harm occurs but not care that it occurs, we also asked participants whether each effect mattered personally (e.g., “Does it matter to you that the fish would be affected in this way?”).

The Case of the Driven Automobile first established that there is air pollution in Lisbon and then ascertained whether the participant believed that such air pollution was a problem and whether driving a car increases air pollution. In this context, we asked whether it was permissible (“all right or not all right”) for a person to drive to work every day. Then, to obtain data on the coordination of potentially conflicting environmental moral judgments, we systematically offered a counterprobe for either an affirmative or negative evaluation (if yes: “But how is it all right to drive the car if, as you said before, that increases air pollution?”; if no: “But how could this person arrive at his or her place of work? Would that be practical?”). Next, we assessed the morally obligatory status of the permissibility evaluation by asking whether that judgment could override conventional practices (“Let’s suppose that the majority of people in Lisbon drive their cars to work. Is that all right or not all right?”) and would be generalized to a different culture (“Let’s suppose that in New York City in the United States the majority of people drive their cars to work. Is that all right or not all right for people in New York City?”). Moreover, because an act can be morally virtuous without being morally obligatory, for both issues (regarding conventional practices and generalizability), we also examined whether the act of not driving would be considered morally good even if not required (e.g., “Do you think it would be better if nobody drove his or her car to work in New York City?”). Finally, we examined how participants would solve the problem of air pollution (“In Lisbon, do you think that there should be a law that would regulate pollution? If yes, what would this law say? If you were the ruler of the world, what would you do to solve this problem of air pollution?”).

The Case of the Fire in the Forests first established that during the summer that preceded the time of interviewing, many forest fires had erupted in Portugal. We then asked five questions. The first examined whether the fires were

natural ("Do you think the fires in the forests were natural?"). The second allowed for an open-ended examination of the natural ("What does it mean to say that something is natural?"). The remaining three questions pushed further by distinguishing between three possible causes for a forest fire: nonhuman nature ("If a fire in the forest is caused by lightning, would you say that the fire is natural?"), human activity by accident ("If a fire in the forest is caused accidentally by a person, would you say that the fire is natural?"), and human activity on purpose ("If a fire in the forest is set on purpose by a person, would you say that the fire is natural?").

The Case of the Cut-Down Trees first established that in several regions of Portugal, trees are being cut down in the forests. In this context, we asked whether that act was permissible. Then, again toward assessing coordination judgments, we offered two counterprobes. One counterprobe provided a justification for cutting the trees ("One classmate of yours I talked with said that cutting down the trees in the forest is all right because people need wood to build houses and to make paper and other things that come from the trees. What do you think about what this classmate said?"). The alternative counterprobe provided a justification for not cutting the trees ("One classmate of yours I talked with said that this cutting down of trees is wrong because it causes soil erosion. That is, the roots from trees hold the dirt and soil in place around them; after the trees are cut down and when it rains, the rain washes the top soil away. What do you think about what this classmate said?"). Next, we asked whether the participant was aware of any (other) problems caused by cutting down the trees in the forests, how he or she would solve such problems ("If you were the ruler of the world, what would you do about the cutting down of the trees in the forests?"), and whether it is natural for people to cut down the trees in the forests. Finally, we examined the participant's conception of harmony with nature ("Is it possible to live in harmony with nature and to cut down the trees in the forests? How? For you, what does it mean to live in harmony with nature?").

For many of the above questions (including the 11 questions specified in Table 1), participants were probed for their justifications and sometimes asked to reconcile their justifications with other potentially contradictory positions they may have taken.

To be clear, our four scenarios—which involve water, air, fire, and earth—were not meant to be variables within an experimental design, and thus identical questions were not asked across each scenario. Nor were the scenarios meant to capture the entire domain of each environmental category. Instead, drawing on a Piagetian methodology (Piaget, 1929/1960, 1932/1969, 1983; cf. Damon, 1977; Ginsburg, 1997; Kahn, 1999, chap. 5)—which seeks narrative coherence in a "clinical interview"—we chose specific issues and

TABLE 1
Percentages of Environmental Justifications by Question and Category

Justification Category	Pets Important	Wild Animals Important	Plants Important	Parks Important	Act Evaluation (Water)	Contingent Evaluation (Water)	Care About Fish	Care About Birds	Care About Water	Care About the View	Care About People
Anthropocentric											
Personal	12	2	1	29	5	7	5	8	10	11	2
Relational	69	1	1	0	0	0	2	2	0	1	0
Welfare	15	17	49	35	18	14	43	18	57	11	46
Justice	0	1	0	1	6	6	1	1	1	0	29
Aesthetics	1	4	29	31	13	11	15	25	19	73	18
Biocentric											
Intrinsic value	2	59	16	2	1	1	4	17	4	1	2
Harmony	0	5	1	0	2	1	2	0	0	0	0
Justice	1	9	1	0	2	2	15	17	1	0	1
Harm to nature	0	2	1	3	53	59	14	12	8	3	1

NOTE: Percentages may not equal 100 because of rounding. Multiple responses were coded.

questions that would (a) build on one another coherently, (b) potentially replicate previous research, and (c) extend our empirical and theoretical investigations in new areas.

CODING AND RELIABILITY

A coding manual was first developed from the responses of 50% of the participants, evenly divided across the grade levels. The coding manual was then applied to all of the data. Five types of responses were coded: evaluations (e.g., all right/not all right, matters/does not matter), content responses (e.g., a statement that air pollution can be remedied by creating new technologies), justifications for evaluations (e.g., an appeal that animals have rights), coordination judgments (e.g., overriding/contextual/contradictory), and conceptions of the natural and of living in harmony with nature (e.g., being in balance with nature by means of moderating human activity). Parts of the coding system drew on coding systems developed by Davidson, Turiel, and Black (1983); Howe et al. (1996); Kahn (1997b); and Kahn and Friedman (1995). Summary descriptions for the harmony conceptions coding system are presented in Appendix A, and those of the justification coding system are presented in Appendix B.

An independent coder trained in the use of the coding manual coded all of the data. The first author recoded 20 interviews (17% of the data), randomly chosen from the entire data set. For evaluations, justifications, and coordination judgments, intercoder reliability was assessed through testing Cohen's kappa for statistical significance at the .05 level. All tests were statistically significant. Intercoder agreement was the following: for evaluations, 96% ($\kappa = .92$, $Z = 27.94$); for justifications on the level reported in Appendix B, 77% ($\kappa = .73$, $Z = 28.08$); and for coordination judgments, 77% ($\kappa = .65$, $Z = 9.03$). Because the remaining responses were coded with individualized categories (to match each question), Cohen's kappa was not employed. For content responses, percentage agreement ranged from 71% to 96%. For conceptions of the natural and harmony, percentage agreements were 85% and 84%, respectively.

RESULTS

For some of the categorical data, we used nonparametric tests to test statistical significance (see Marascuilo & McSweeney, 1977). When appropriate, categorical data were converted to score data and then analyzed by *t* tests.

Justification data were analyzed by first submitting them to arcsin transformations and then performing MANOVAs and ANOVAs.

Of the hundreds of tests for gender conducted on the results for evaluations, content responses, conceptions of the natural, and conceptions of living in harmony with nature, only a few tests were statistically significant—no more than one would expect by chance. In addition, no gender differences were found for justification use. Thus, results for males and females were collapsed for analysis.

AN INITIAL ENVIRONMENTAL PROFILE

Participants said that domestic animals (96%), wild animals (96%), plants (97%), and parks (100%) were important to them. Virtually all of the participants (96%) were aware of environmental problems. Out of the total number of environmental problems mentioned (270), participants most frequently mentioned problems of pollution (47%), including pollution to the air and water, garbage, and too much noise. Then, in decreasing order, participants mentioned problems concerning harm to animals (15%), the ozone (14%), urban development (5%), and nuclear energy/weapons (4%). Only 1 participant mentioned overpopulation as an environmental problem. Participants said that they discussed environmental issues with family or friends (79%) and acted to solve environmental problems (90%).

THE CASE OF THE POLLUTED WATERWAY

All of the participants (100%) judged the individual act of throwing garbage in the Rio Tejo as not all right. Participants maintained their judgments not to throw garbage in the river even in conditions where local conventions legitimated the practice for their entire community (100%), and for a community in a different geographical location along the Amazon River in Brazil (95%). Basing an assessment of moral obligation on negative evaluations across all three evaluations, results showed that 95% of the participants viewed polluting the Rio Tejo as a violation of a moral obligation. A more stringent assessment of moral obligation couples these judgments (what Turiel, 1983, called criterion judgments) with moral justifications. Accordingly, results showed that 99% of participants used moral justifications in supporting either their prescriptive judgments or their judgments that common practice does not legitimate the act. These justifications included the following categories, which we discuss shortly: anthropocentric welfare, anthropocentric justice, biocentric reasoning, and harm to nature.

Participants believed that throwing garbage in the Rio Tejo would have harmful effects on fish (100%), birds (91%), water (100%), the view (98%), and people who live close to the river (100%). Of participants who believed harmful effects occurred, further results showed that it mattered to the participants if such harm occurred to fish (96%), birds (95%), water (99%), the view (97%), and people who live close to the river (96%).

THE CASE OF THE DRIVEN AUTOMOBILE

In some form or another, 81% of the participants believed it was all right for a person to drive his or her car to work. But the reason we say "in some form or another" is that particularly in response to the counterprobes, participants often qualified their evaluations and sought to coordinate their judgments about pollution with other personal and moral considerations of import. Specifically, we were able to ascertain three overarching forms by which participants coordinated their judgments concerning the air pollution caused by driving a car with the permissibility of driving: overriding, contradictory, and contextual. In an overriding coordination, one consideration simply overrides other considerations ("I think that is totally not all right. Because I think that in Lisbon there is good public transportation . . . that comes at reasonable frequency and that is not expensive"). In a contradictory coordination, contradictory positions are upheld ("It's right because there are a lot of people who don't have public transportation to go to their jobs. . . . Well, it's a contradiction [because this participant just established the opposite evaluation], but it is that way"). In a contextual coordination, the judgment is dependent on the specific context ("It depends. If the place of work is very far away and there is no other way of transportation, then one has to take [one's car]. But if there are other ways of transportation that cause less pollution, I think that people should go [that way]"). Results showed that 32% of the participants provided overriding coordinations, 33% contradictory coordinations, and 35% contextual coordinations. Developmentally, there was an effect for age, $F(3, 110) = 2.80, p = .04$. Post hoc pairwise comparisons (based on Scheffe's test, with critical value set at $p < .05$) showed that the participants in Grade 5 more often employed an overriding coordination than did the participants in Grade 11. Of the overriding coordinations, 14% comprised permissibility evaluations, and it is that percentage taken with the percentages of contradictory and contextual coordinations that composed the 81% of the participants (noted above) who believed that it was all right for a person to drive his or her car to work.

Almost tautologically, little amounts of pollution do little harm, and if many people create little amounts of pollution, those little amounts can add

up to large amounts that cause significant harm. Accordingly, we asked participants whether driving to work is permissible not only for an individual but (a) for their entire community and (b) for a community in a different geographical location, New York City. Based on the same type of coordination analyses described above, about half of the participants said it was not all right for the majority of people to drive their cars to work in Lisbon (54%) and New York City (54%). In addition, we asked participants whether they thought it would be better if people did not drive their cars to work. Results showed that 89% of the participants said it would be better if a single person in Lisbon did not drive his or her car to work, 86% of the participants said it would be better if everybody in Lisbon did not drive their cars to work, and 89% of the participants said it would be better if everybody in New York City did not drive their cars to work.

THE CASE OF THE FIRE IN THE FORESTS

Ninety-seven percent of the participants said that a forest fire is natural if caused by lightning. In contrast, only 10% said that a forest fire is natural if caused by a person accidentally, and only 1% said a forest fire is natural if caused by a person on purpose. We pursued this issue of whether human activity can count as part of the natural by asking, "What does it mean to say that something is natural?" Results showed that in their conceptions, 94% of the participants viewed humans as apart from nature. In their reasoning, participants often employed either a negation (35%) or an affirmation (59%). In a negation, the natural was understood as that which remains after one has factored out the human component ("Something is natural when it is not made [by a person] . . . without us having to do anything"). In an affirmation, participants affirmed the spontaneous qualities of nature ("[Natural] means that it comes from Nature . . . came up spontaneously because of excessive heat, or because the wind blew some dust, a spark").

THE CASE OF THE CUT-DOWN TREES

Ninety-seven percent of the participants thought that cutting of the trees in the forests of Portugal caused problems, including problems to ecosystems (37%), people (30%), animals (16%), vegetation (7%), species (6%), and nonliving parts of nature (3%). Sixty-four percent of the participants said it was not all right for people to cut the forests. In response to the first counterprobe that established the importance of cutting the trees ("because people need wood to build houses and to make paper and other things"), 7% of the participants agreed and 28% disagreed. The remaining participants

(64%) only partly agreed, offering arguments based on mitigating influences (27%) (“I think that he is only a bit right because today there are alternative materials to lumber”), compensatory reasoning (21%) (“Cutting down some trees and leaving others in a way that it won’t cause harm to the forest itself”), and nonintegrative reasoning (13%) (“I agree with both”). In response to the second counterprobe that established a problem with cutting the trees (“it causes soil erosion”), 68% of the participants agreed and 3% disagreed. The remaining participants (28%) only partly agreed, offering arguments based on mitigating influences (10%), compensatory reasoning (6%), and nonintegrative reasoning (11%). Forty-one percent of the participants said it was not natural for people to cut down the trees in the forest, and 49% of the participants said that it was not possible to live in harmony with nature and to cut down the trees.

Participants’ conceptions of living in harmony with nature were coded with the categories reported in Appendix A. Results showed the following pattern of usage: physical (27%), sensorial (3%), experiential (5%), relational (24%), and compositional (41%). Developmentally, a linear trend was found in compositional reasoning, $F(3, 108) = 8.65, p < .0001$. The use of compositional reasoning increased with age: 5th grade (3%), 8th grade (31%), 11th grade (52%), and college (71%).

SOLUTIONS TO ENVIRONMENTAL PROBLEMS

When questioned directly, virtually all of the participants said that air pollution (98%) and logging (97%) constituted environmental problems within their country. For both categories of problems, we then asked, “If you were the ruler of the world, what would you do to solve this problem?” In this way, we sought to understand how participants would approach solving environmental problems if they were empowered politically.

In our analyses of their proposed solutions, five types of measures emerged: prohibitive, affirmative, technological, compensatory, and transformative. Prohibitive measures sought to curtail or prohibit certain actions (“I would say that each family could have just one car”). Affirmative measures sought to implement proactive policies (“Subsidize the farmers who many times are peasants with very little to live by [so that] their pine trees [have a] longer time and let them grow”). Technological measures sought to promote the creation of new technologies or to promote the distribution of existing technologies (“They should have treatment centers like in France, where they treat the trash before it goes into the rivers”). Compensatory measures sought to balance harmful activity with helpful activity (“I would impose certain criteria of rationality—that is, each tree that is cut down, one

has to plant a new tree so nobody would cut too many and it would compensate”). Finally, transformative measures sought to change people’s beliefs, attitudes, and values (“Everything comes from the fact that you have to change people’s personality—to prohibit or to impose fines is not the way that is going to cause people to change their ways of thinking”). Participants offered such measures with the following frequency (for solving problems related to air pollution and logging): prohibitive (39% and 42%, respectively), affirmative (22% and 16%, respectively), technological (26% and 42%, respectively), compensatory (0% and 26%, respectively), and transformative (13% and 12%, respectively).

ENVIRONMENTAL MORAL JUSTIFICATIONS

Children’s justifications were coded with the categories reported in Appendix B. The quantitative results are reported in Table 1, broken down by each of the 11 questions. Results showed that only two questions elicited more than 30% of biocentric justifications: for why wild animals are important, in which 73% of the justifications were biocentric, and for why participants would care if the birds were harmed, in which 34% were biocentric.

The results across questions were then united in a single analysis to test for main effects of gender and grade. The analysis proceeded as follows: First, the individual justification categories were collapsed into three—anthropocentric, biocentric, and harm to nature. Then, the mean proportionate use of each category was calculated across all 11 questions. These results were subjected to an arcsin transformation. Then a MANOVA was performed. A marginally significant grade effect was found for anthropocentric reasoning, $F(3, 112) = 2.21, p < .10$. Subsequent t tests showed that 5th graders used more anthropocentric reasoning than 8th graders ($t = 2.33, df = 58, p < .05$), 11th graders ($t = 1.74, df = 58, p < .10$), and college students ($t = 2.20, df = 58, p < .05$). Although a main effect was not found for grade (or sex) for biocentric reasoning, pairwise comparisons showed that 8th graders used less biocentric reasoning than college students ($t = 2.04, df = 58, p = .05$). In addition, for the question about why wild animals are important, 73% of the justifications were biocentric, with a modest visual (but not statistical) trend for age (60%, 5th grade; 70%, 8th grade; 83%, 11th grade; 82%, college).

GENDER AND THE HUMAN RELATIONSHIP WITH NATURE

As already noted, quantitatively, no gender differences were found (beyond what would be expected by chance). In addition, we found no evidence qualitatively for gender differences. To provide the reader with a sense

of what we have been looking at, consider five matched pairs of reasoning within justification categories that, based on some of the literature about gender (Gilligan, 1982; Noddings, 1984), one might be inclined to view in gender-specific terms: psychological welfare, relational, aesthetics, anthropocentric justice, and biocentric justice. In each pair, we will withhold briefly the participant's gender until the subsequent characterization so as to allow the reader a fresh look at each example.

- 1A. [Gardens are important] because the city is a place that causes great stress and it gives a chance to someone to go to a place that is near, and to be in contact with nature, to stay calm.
- 1B. [Gardens] are important because in the middle of so much pollution and so many cars and so much stress, they are a way for people to relax.

Both the male (first example) and female (second example) recognize that the city causes stress ("the city is a place that causes great stress"; "in the middle of . . . so much stress") and that the public gardens help a person to relax ("to stay calm," "to relax").

- 2A. [Domestic animals are important because] for the adult who feels lonely it helps to keep him or her company. They are very important to old people.
- 2B. [Domestic animals] are important because when people are lonely, without anybody else, animals can be companions.

Both the female (first example) and male (second example) focus on the benefits of companionship that domestic animals provide people who are lonely ("for the adult who feels lonely it helps to keep him or her company"; "because when people are lonely . . . animals can be companions").

- 3A. [It would matter to me if the water was harmed] because . . . dirty water is unpleasant; there is no comparison to see a river with clean water, to see the fish swimming, to see the pebbles, and to see that brown, grayish, thick, disgusting water.
- 3B. [I would worry about how the landscape was affected] because I think that we all like to see pretty things, things that are pleasant, and the trash in the Tejo is not that at all, things that are pleasant to everybody. I would like to know one person that would say, "Look, I like to watch the trash going by?"

Both the male (first example) and female (second example) appeal to the viewing pleasure of humans ("there is no comparison to see a river with clean water"; "we all like to see pretty things"). Indeed, if anything, the female here

casts her appeal in a more generalized form (“I would like to know one person that would say, ‘Look, I like to watch the trash going by?’”)—a trait sometimes attributed more to males than females in the feminist literature.

- 4A. [It’s not all right if everyone in Lisbon threw trash in the Rio Tejo] because it is polluting the water, and nobody has the right to make it dirty, it belongs to the public. Nobody, nobody, not even a group, not even by oneself.
- 4B. It is wrong [for a person to throw trash in the Rio Tejo] because one has no right to make dirty what belongs to everybody.

Both the female (first example) and male (second example) view the act of polluting the river as not within a human’s rights (“nobody has the right”; “one has no right”) because the river is understood to belong to everybody (“it belongs to the public”; “what belongs to everybody”).

- 5A. [Wild animals are important] because I think that they [wild animals] also have the right to live in the jungle. It is not just us that have to live. Because I think that in the same way that we procreate, they also have the right to live, to be happy.
- 5B. [It’s not all right that the community in Lisbon threw garbage in the Rio Tejo because] it would destroy the environment, and we don’t have the right to do that, because we are living beings the same as the others.

Both the female (first example) and male (second example) appeal to rights (“they also have the right to live”; “we don’t have the right to do that”) by establishing an isomorphism between animals and humans (“in the same way that we procreate”; “we are living beings the same as the others”).

CROSS-CULTURAL COMPARISONS TO THE HOUSTON STUDY AND THE AMAZONIA STUDY

Some of the questions in this study paralleled the questions asked in the Houston study and the Amazonia study. As shown in Table 2, by and large, participants across all three studies shared similar environmental values and knowledge. In addition, the Portuguese participants’ moral obligatory reasoning about the pollution of their local waterway (reported above) replicated the findings from the Houston study and the Amazonia study.

Based on visual inspection, differences appeared in the use of biocentric reasoning. Collapsing across questions, biocentric reasoning was used by participants 16% of the time in the current study compared to 4% and 6% of the time in the Houston Study and Amazonia study, respectively.

TABLE 2
Percentage of Participants' Environmental Values and Knowledge

<i>Environmental Criterion</i>	<i>Lisbon Study</i> (<i>n</i> = 120)	<i>Amazonia Study</i> (<i>n</i> = 44)	<i>Houston Study</i> (<i>n</i> = 72)
Animals important ^a	96	100	84
Plants important	97	98	87
Parks, gardens, and open spaces important	100	—	70
Aware of environmental problems affecting self or community	96	83	78
Discusses environmental issues with others	79	63	72
Acts to help solve environmental problems	90	54	86
Thinks that throwing garbage in a river harms birds ^b	91	93	94
Cares that birds would be harmed	95	98	89
Thinks that throwing garbage in a river harms the water	100	—	95
Cares that the water would be harmed	99	—	91
Thinks that throwing garbage in a river harms the view	98	98	92
Cares that the view would be harmed	97	93	93
Thinks that throwing garbage in a river harms the people along the river	100	95	91
Cares that the people would be harmed	96	88	83

NOTE: The dash indicates that a comparable question was not asked of that group.

a. In assessing whether animals were important in the Portugal population, questions were asked in terms of domestic and wild animals; in turn, we required an affirmative response to both categories to count as an affirmative response to this more general question that animals were important.

b. Participants were first asked if they thought harm occurred (to the birds, river, water, view, or people). Only those participants who thought harm did occur were then asked if they cared about the harm.

DISCUSSION

The results from this study help reveal this population's environmental moral reasoning and contribute to our understanding of the origins and development of the human relationship with nature.

Our Lisbon participants—spanning fifth grade through college—valued pets, wild animals, plants, and parks. Participants were aware of environmental problems, discussed environmental issues with family or friends, and acted to solve environmental problems. Participants believed that throwing garbage in the Rio Tejo would harm fish, birds, water, the view, and people, and they cared that such harm would occur to each of these aspects of nature. The results also extend earlier studies from the inner city of Houston and the Brazilian Amazon by showing that moral obligation (based on the criteria of

permissibility, conventionality, and generalizability) can underlie not only children's but adolescents' and young adults' environmental judgments. Although these results did not show developmental effects, they appear to us as meaningful initial criteria by which to assess children's environmental moral reasoning.

Developmentally, one major finding occurred in children's conceptions of what it means to live in harmony with nature. Our results revealed five categories: physical, sensorial, experiential, relational, and compositional. The use of compositional reasoning increased with age: 5th grade (3%), 8th grade (31%), 11th grade (52%), and college (71%). Thus, only by adolescence does it appear likely that children can engage (analytically, at least) in ecological discussions that depend on compositional conceptions—that is, by conceiving of an overarching ecological integrity, beauty, sense of balance, and the ways in which the pieces support the whole.

In the Biblical Genesis, it is written that our original ancestors ate from the Tree of Knowledge and thereby lost their innocence and were cast out from the Garden, separated from the natural world. Such creation myths seem to capture fundamental questions: Are humans natural? If not, is it because we have certain types of knowledge? Self-reflective capacities? Moral sensibilities? In this study, we pursued such questions. We found that participants sometimes separated humans from the natural world. In the Case of the Fire in the Forests, for example, participants conceived of the natural by either affirming spontaneous (nonhuman) causes and/or negating human causes ("something that happens spontaneously, without man's intervention"). Moreover, such conceptions held even when we factored out human intentionality, by countering with a situation where a human starts a forest fire by accident. But in other contexts, participants' conceptions of the natural embraced not only human activity but human activity of a sort that causes, at least to some degree, environmental harm. In the Case of the Cut-Down Trees, for example, roughly half of the participants viewed the cutting of trees as natural, even while recognizing that the activity causes soil erosion and other environmental problems. These findings suggest that people throughout Lisbon—perhaps people in all modern cultures—equivocate on whether humans exist as a part of or apart from the natural world.

Often people in economically impoverished nations have little choice but to engage in environmentally destructive behavior if they are to survive. Some researchers believe that such behavior thereby shows a lack of environmental moral sensibilities in individual people if not within an entire society (Hertsgaard, 1998; Inglehart, 1995). The idea follows in line with Maslow's hierarchy of needs: that people cannot be concerned with higher order values until more basic human needs are fulfilled. Yet the results from the Houston

study clearly offered contradictory data. Namely, those results provided evidence that the serious constraints of living in an inner-city community could not easily squelch these children's diverse and rich appreciation for nature and moral responsiveness to its preservation. Moreover, the current coordination analyses add to this analysis by showing that even when people support behavior that they know harms the environment (driving a car that causes air pollution), such support is often qualified by recognizing the contradiction in their reasoning or by making a contextual moral argument. In other words, regardless of economic standing, people can engage in environmentally harmful behavior and yet still bring a wide range of environmental moral sensitivities and commitments to the problem (cf. Brechin 1999; Brechin & Kempton, 1994).

We had expected that biocentric reasoning would increase with age and thus (when taken in conjunction with the Amazonia study) would lend support to the proposition that biocentric reasoning is more dependent on development than culture. But the results were not straightforward. For the one question that elicited a high level of biocentric reasoning (73% for why wild animals are important), and thus where the number of responses was large enough to employ statistical techniques, there was a modest visual but no statistical trend for age. There was, however, a decrease in the use of anthropocentric reasoning, with fifth-grade participants using anthropocentric reasoning more often than the three older age groups. In addition, many of the comparable questions in the Houston study and the Amazonia study (which employed children in Grades 5 or lower) elicited a lower percentage of biocentric reasoning. These data are compatible with a modified developmental explanation. Namely, it is possible that by early adolescence, biocentric reasoning has taken shape structurally but thereupon manifests differentially across a range of environmental issues (cf. Clayton, 1998). In other words, adolescents and young adults are capable of biocentric reasoning but seldom employ it.

Still, it is possible that we are misunderstanding some key ideas that lie at the intersection of biocentric reasoning, development, and culture. For example, throughout our investigations we have assumed that there is a single pathway by which biocentric reasoning emerges. But it could be argued that at least two pathways exist. One pathway may emerge (but for some reason, as shown by the Amazonia study, not in all cases) from daily, intimate contact with the land. Thus, for example, Nelson (1989) reported on the biocentric relationship that the Koyukon of Northern Alaska have with their community of nature: a community that includes not only humans, animals, and plants but mountains, rivers, lakes, and storms—the earth itself. As Nelson wrote,

According to Koyukon teachers, the tree I lean against feels me, hears what I say about it, and engages me in a moral reciprocity based on responsible use. In their tradition, the forest is both a provider and a community of spiritually empowered beings. There is no emptiness in the forest, no unwatched solitude, no wilderness where a person moves outside moral judgment and law. (p. 13)

In turn, a second pathway by which a culture can develop a biocentric orientation may depend less on daily, intimate contact with the land and more on modern philosophical moral discourse. Here, there is some historical precedence that such moral discourse leads to extending moral standing to an ever-widening range of entities. For example, over the past 150 years in the United States, moral rights have accrued to Blacks, women, and children, and some argue it is just a matter of time before they accrue to animals and nature in general. As Stone (1986) wrote,

Each time there is a movement to confer rights onto some new "entity," the proposal is bound to sound odd or frightening or laughable. This is partly because until the rightless thing receives its rights, we cannot see it as anything but a thing for the use of "us"—those who are holding rights at the time. . . . I am quite seriously proposing that we give legal rights to forests, oceans, rivers and other so-called "natural objects" in the environment—indeed, to the natural environment as a whole. (pp. 84-85)

If this "dual-pathway" account has merit, then are the biocentric conceptions that emerge by means of these two pathways the same? At stake is future research that takes seriously cultural differences while recognizing universal features in the human experience of nature and the subsequent construction of knowledge.

Although almost all of the participants were aware of environmental problems, only 1 participant mentioned overpopulation as an environmental problem, although multiple responses were encouraged. This result is surprising because many conservation biologists and others argue that overpopulation is perhaps the most fundamental and pressing problem currently facing our planet (Daily & Ehrlich, 1997/1998; Grant, 1996; Irvine, 1997/1998; McKibben, 1998). Future research could profit by systematically seeking to understand how people understand population biology.

Finally, virtually no gender differences emerged statistically for evaluations, content responses, conceptions of the natural and harmony, or justifications. In addition, we could discern no qualitative differences in the content or structure of the reasoning between females and males. Our results are in accord with the Houston study and the Amazonia study, and with a wide

range of other structural-developmental research (for reviews of the literature, see Killen, 1996; Tisak, 1995; Turiel, 1998). However, our results are at odds with some environmental survey research that found that compared to men, women tend to have a greater humanistic and moral orientation to the natural world and more emotional attachments to domesticated animals (Chawla, 1988; Kellert, 1996). If, as Mohai (1997) suggested, the effects of gender are modest at best, then it is possible that our comparatively small sample sizes (compared to survey research) have not allowed for enough power in our statistical tests to uncover statistical differences. Regardless, our results suggest that such differences, to the extent they exist, need to be understood within the context of what appear to be substantial structural similarities in the environmental moral reasoning of young people (females and males) across diverse cultures.

APPENDIX A
Conceptions of Harmony—Summary of Categories

Physical	Conception based on doing something to nature, for nature, or with nature, including negative acts ("Harmony with nature is not to destroy trees, not to destroy nature"), positive acts ("Harmony means to protect the animals and the plants"), and activity ("When a person is living in harmony with nature he goes to the countryside and has a picnic").
Sensorial	Conception based on apprehending nature directly with the senses ("Harmony means seeing everything blooming, not seeing people cutting trees down, smelling nature's environment").
Experiential	Conception based on experiencing a particular state of mind or feeling ("Harmony means feeling comfortable with yourself in that moment and in that place").
Relational	Conception based on a relationship between humans and nature, including personal care taking ("[Harmony means] when I see a wounded animal, I help it") and psychological rapport ("[Harmony means] talking with the trees. . . . Sometimes I talk to them as if they were people, like this").
Compositional	Conception based on an overarching integrity, beauty, sense of balance, or proportion where (as in a musical or artistic composition) one can focus on the entire entity, and the ways in which the pieces support the whole, including a focus on anthropocentric compositions ("We can live in harmony with nature without having to destroy more than we are allowed; nature has 'x' resources to give us, and if we take them all at once, we leave nothing to grow") and biocentric compositions ("To live in harmony, it is the balance; we trade with nature in a way that none of the parts suffer any harm").

APPENDIX B
Summary of Environmental Justification Categories

<i>Category</i>	<i>Summary Description</i>
Anthropocentric	An appeal to how affecting the environment affects human beings.
Personal	An appeal to personal predilections (“because I love fish”), personal interests (“because if the Rio Tejo were clean, we could swim in it”), or personal projects (“People get to know each other in the gardens”).
Relational	An appeal to a relationship between humans and nature, including an appeal to companionship (“[Plants] are important because as with the animals they keep us company”) or to taking care of aspects of nature as one might take care of a person (“because we can give love to animals”).
Welfare	An appeal to the physical, material, and psychological welfare of human beings, including the self, other individuals, individuals within a larger systemic social context or ecological context, or future generations (“I would [care if the water were affected because] look, again, it is a very selfish theory. . . . From an economic point of view the water would be captured and sent to a central plant where it would be treated. Who is paying for the process to clean the water? Isn’t it us? So, we are causing harm to ourselves”).
Justice	An appeal that humans have rights; deserve respect, fair treatment, or ownership of property; or merit freedom (“because it is polluting the water . . . and nobody has the right to make it dirty, it belongs to the public”).
Aesthetics	An appeal to the preservation of the environment for the viewing or, more broadly, sensorial pleasure of humans (“because dirty water is unpleasant, there is no comparison to see a river with clean water, to see the fish swimming, to see the pebbles, and to see that brown, grayish, thick disgusting water”).
Biocentric	An appeal to the moral standing of an ecological community of which humans may be a part.
Intrinsic value of nature	An appeal that nature has value, including a focus on biological life (“[Wild animals are important because] every living being has to have the opportunity to be alive”), natural processes (“[Wild animals] are important because they maintain the balance of the ecosystem”), or telos of nature (“[Wild animals] are important because if someone created them it is because they have some kind of role”), and including appeals established by means of isomorphic and transmorphic reasoning (“They [plants] are important, as the animals are important, because they are living beings and live like us”).
Harmony	An appeal to a conception of harmony between humans and nature (“because it is not going to be in harmony . . . there will be a lack of balance”).

Justice	An appeal that nature has rights, deserves respect or fair treatment, or merits freedom (“[Wild animals are important] because I think that all animals have the right to their life.”), including appeals established by means of isomorphic and transmorphic reasoning (“because I think that in the same way that we procreate, they also have the right to live, to be happy . . . because I think that they were also created the same way that we were, and because we have the right to live, everybody has a right to live”).
Harm to nature	Although no reference is made to whether appeals for nature derive from an anthropocentric or biocentric orientation, such appeals include a focus on animals, vegetation, nonliving parts of nature, species, natural process, food chains, or ecosystems (“I think it is wrong [if one person throws their trash in the Rio Tejo because] it is like helping to pollute the river, and not only the river, it is also the ground”).

NOTE

1. The word *park* translates best into Portuguese as *jardim*, which then translates best back into English as *garden*. Regardless, our interview question was easily understood by the Portuguese participants in the way that we meant: to refer to open green areas within Lisbon wherein one can readily encounter grass, plants, flowers, trees, benches, and play areas.

REFERENCES

- Brechin, S. R. (1999). Objective problems, subjective values, and global environmentalism: Evaluating the postmaterialist argument and challenging a new explanation. *Social Science Quarterly, 80*, 793-809.
- Brechin, S. R., & Kempton, W. (1994). Global environmentalism: A challenge to the post-materialism thesis? *Social Science Quarterly, 75*, 245-269.
- Bunting, T. E., & Cousins, L. R. (1985). Environmental dispositions among school-age children. *Environment and Behavior, 17*(6), 725-768.
- Chawla, L. (1988). Children's concern for the natural environment. *Children's Environments Quarterly, 5*(3), 13-20.
- Clayton, S. (1998). Preference for macrojustice versus microjustice in environmental decisions. *Environment & Behavior, 30*, 162-183.
- Daily, G., & Ehrlich, P. (1997/1998). Population extinction and the biodiversity crisis. *Wild Earth, 7*(4), 35-45.
- 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.

- Dunker, K. (1939). Ethical relativity? An enquiry into the psychology of ethics. *Mind*, 48, 39-57.
- Eisenberg, N., & Fabes, R. (1998). Prosocial development. In N. Eisenberg (Ed.), *Social, emotional, and personality development* (pp. 710-778). New York: John Wiley.
- Gilligan, C. (1982). *In a different voice*. Cambridge, MA: Harvard University Press.
- Ginsburg, H. P. (1997). *Entering the child's mind: The clinical interview in psychological research and practice*. Cambridge, UK: Cambridge University Press.
- Grant, L. (1996). *Juggernaut: Growth on a finite planet*. Santa Ana, CA: Seven Locks Press.
- Hatch, E. (1983). *Culture and morality*. New York: Columbia University Press.
- Helwig, C. C. (1997). The role of agent and social context in judgments of freedom of speech and religion. *Child Development*, 68, 484-495.
- Hertsgaard, M. (1998). *Earth odyssey: Around the world in search of our environmental future*. New York: Broadway Books.
- Howe, D., Kahn, P. H., Jr., & Friedman, B. (1996). Along the Rio Negro: Brazilian children's environmental views and values. *Developmental Psychology*, 32, 979-987.
- Inglehart, R. (1995). Public support for environmental protection: Objective problems and subjective values in 43 societies. *Political Science and Politics*, 28, 57-72.
- Irvine, S. (1997/1998, Winter). The great denial: Puncturing pro-natalist myths. *Wild Earth*, 7(4), 8-17.
- 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. (1997a). Children's moral and ecological reasoning about the Prince William Sound oil spill. *Developmental Psychology*, 33, 1091-1096.
- Kahn, P. H., Jr. (1997b). Developmental psychology and the biophilia hypothesis: Children's affiliation with nature. *Developmental Review*, 17, 1-61.
- Kahn, P. H., Jr. (1999). *The human relationship with nature: Development and culture*. Cambridge, MA: MIT Press.
- 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., & Friedman, B. (1998). On nature and environmental education: Black parents speak from the inner city. *Environmental Education Research*, 4, 25-39.
- Kahn, P. H., Jr., & Kellert, S. R. (in press). (Eds.). *Children and nature: Psychological, sociocultural, and evolutionary investigations*. Cambridge, MA: MIT Press.
- Kellert, S. R. (1996). *The value of life*. Washington, DC: Island Press.
- Killen, M. (1996). Justice and care: Dichotomies or coexistence? *Journal for a Just and Caring Education*, 2(1), 42-58.
- Killen, M., & Turiel, E. (1998). Adolescents' and young adults' evaluations of helping and sacrificing for others. *Journal of Research on Adolescence*, 8, 355-375.
- Kohlberg, L. (1984). *Essays in moral development: Vol. II. The psychology of moral development*. San Francisco: Harper & Row.
- Laupa, M. (1991). Children's reasoning about three authority attributes: Adult status, knowledge, and social position. *Developmental Psychology*, 27, 321-329.
- Lourenço, O. (1990). From cost-perception to gain-construction: Toward a Piagetian explanation of the development of altruism in children. *International Journal of Behavioral Development*, 13, 119-132.
- Lourenço, O. M. (1993). Toward a Piagetian explanation of the development of prosocial behavior in children: The force of negational thinking. *British Journal of Developmental Psychology*, 11, 91-106.

- Marascuilo, L. A., & McSweeney, M. (1977). *Nonparametric and distribution-free methods for the social sciences*. Monterey, CA: Brooks/Cole.
- McKibben, B. (1998). *Maybe one: A personal and environmental argument for single-child families*. New York: Simon & Schuster.
- Miller, J. G. (1994). Cultural diversity in the morality of caring: Individually oriented versus duty-based interpersonal moral codes. *Cross-Cultural Research*, 28, 3-39.
- Mohai, P. (1997). Gender differences in the perception of most important environmental problems. *Race, Gender & Class*, 5, 153-169.
- Nelson, R. (1989). *The island within*. New York: Random House.
- Noddings, N. (1984). *Caring: A feminine approach to ethics and moral education*. Berkeley: University of California Press.
- Nucci, L. (1996). Morality and the personal sphere of actions. In E. S. Reed, E. Turiel, & T. Brown (Eds.), *Values and knowledge* (pp. 41-60). Mahwah, NJ: Lawrence Erlbaum.
- Piaget, J. (1960). *The child's conception of the world*. Totowa, NJ: Littlefield, Adams & Co. (Original work published 1929)
- Piaget, J. (1969). *The moral judgment of the child*. Glencoe, IL: Free Press. (Original work published 1932)
- Piaget, J. (1983). Piaget's theory. In P. H. Mussen (Series Ed.) & W. Kessen (Ed.), *Handbook of child psychology: Vol. 1. History, theory, and methods* (4th ed., pp. 103-128). New York: John Wiley.
- Shweder, R. A., Mahapatra, M., & Miller, J. B. (1987). Culture and moral development. In J. Kagan & S. Lamb (Eds.), *The emergence of morality in young children* (pp. 1-82). Chicago: University of Chicago Press.
- 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.
- Snarey, J. (1985). The cross-cultural universality of social-moral development: A critical review of Kohlbergian research. *Psychological Bulletin*, 97, 202-232.
- Stone, C. D. (1986). Should trees have standing? Toward legal rights for natural objects. In D. VanDeVeer & C. Pierce (Eds.), *People, penguins, and plastic trees* (pp. 83-96). Belmont, CA: Wadsworth.
- Tisak, M. S. (1995). Domains of social reasoning and beyond. In R. Vasta (Ed.), *Annals of child development* (Vol. 11, pp. 95-130). London: Jessica Kingsley.
- Turiel, E. (1983). *The development of social knowledge*. Cambridge, UK: Cambridge University Press.
- Turiel, E. (1998). Moral development. In N. Eisenberg (Ed.), *Social, emotional, and personality development* (pp. 863-932). New York: John Wiley.
- Turiel, E., Killen, M., & Helwig, C. C. (1987). Morality: Its structure, functions and vagaries. In J. Kagan & S. Lamb (Eds.), *The emergence of morality in young children* (pp. 155-244). Chicago: University of Chicago Press.
- Wainryb, C. (1995). Reasoning about social conflicts in different cultures: Druze and Jewish children in Israel. *Child Development*, 66, 390-401.
- Wainryb, C. (2000). Values and truths: The making and judging of moral decisions. In W. Damon (Series Ed.) & M. Laupa (Ed.), *Rights and wrongs: How children and young adults evaluate the world. New directions for child development* (pp. 33-46). San Francisco: Jossey-Bass.