A number of researchers in cognitive and developmental psychology suggest that adults and children conceive of certain categories in an essentialistic way (Atran, 1998; Bloom, 1996; Gelman, Coley, & Gottfried, 1994). Specifically, the claim is that people think of categories as having nonobvious intrinsic properties that are causally related to superficial properties and that determine to which category an entity belongs (Medin & Ortony, 1989). According to some proponents of essentialism, the beliefs are couched in the way people reason about the natural environment. As Atran (1998) has stated, essentialist beliefs constitute a "habit of our minds" which might have been "naturally selected to grasp relevant and recurrent 'habits of the world'" (p. 547). A contrasting view is that essentialism about natural kinds is a habit of the culture and "a late and sophisticated achievement" (Fodor, 1998, p. 159) that has to be cultivated in children. In the present article I examine these claims, first by reviewing the evidence relevant to Atran’s contention and then by reporting an investigation designed as a first step toward directly testing his proposal.

For Atran (1998) to be right, the following assertions should be true: (a) Essentialist beliefs about living kinds emerge early in development, (b) essentialist beliefs about living kinds are found universally, and (c) cultural input is not critical for the development of essentialist beliefs. As a result of my review of the evidence regarding these assertions, it will become apparent that (a) essentialist beliefs emerge early, but we only know about North American middle-class children in this respect; (b) there seems to be some variation in how cultures categorize the natural environment, but it is unclear how different the underlying beliefs about natural categories are, and we have evidence mostly about adults; and (c) there are some differences in the input on categorization that children from different cultures receive, but we do not know the extent these have on children’s concepts. The study presented here begins to fill these gaps in our knowledge of the matter by investigating whether, when naming animals, children from different sociocultural backgrounds rely to the same extent on information that taps into essentialist beliefs.

Before I proceed, however, it is important to clarify what essentialism entails. First and foremost, essentialism constitutes a particular kind of belief about the nature of categories. As such, it does not involve strict constraints on which categories one develops nor on the organization of the categories (though see Atran, 1998). Second and more substantially, people might have essentialist beliefs about a certain category without knowing what the actual essence of the category is. In fact, that is probably the case for most categories. The belief gets manifested in that people implicitly assume that there is some fundamental quality to a category that defines it and causes its identifiable superficial features. Medin and Ortony (1989, p. 184) refer to this unknown-yet-believed-in entity as an "essence placeholder." In other words, essentialism does not involve a belief in an identifiable essence but only a belief that an essence exists (Gelman & Diesendruck, 1999).

Methodologically, this characteristic of essentialism makes it quite difficult to assess the beliefs directly. The best that researchers can do is to investigate people’s reliance on properties believed to be proxies for essences (see Gelman et al., 1994, for a discussion of this methodological issue).

Essentialism in Children

A number of studies with North American middle-class children reveal that essentialist beliefs about living kinds arise early in development. These studies have shown that young children believe that internal and nonperceptible properties of animals are
more diagnostic of the category to which an animal belongs than are other types of properties (e.g., appearance). Three- to 5-year-olds infer that animals of the same category have the same type of internal properties even if the animals do not look alike (Gelman & Markman, 1986), and, conversely, preschoolers realize that animals with the same insides, as opposed to animals with the same superficial properties, are likely to have the same name (Diesendruck, Gelman, & Lebowitz, 1998). Furthermore, preschoolers believe that removal of the stuff inside an animal, but not of the stuff outside, leads to changes in the category identity of the animal (Gelman & Wellman, 1991), and they agree that superficially transforming a porcupine to look like a cactus, for instance, does not turn it into a cactus (Keil, 1989). These findings suggest that children treat internal properties of animals as essence placeholders (see Gelman et al., 1994, for a more extensive review).

Very few studies have looked at how children from different cultures categorize natural kinds. In one such study, Stross (1973) found that Tzeltal children's pattern of acquisition of botanical categories closely corresponded to their culture's prioritized taxonomy. Namely, children identified best and earliest the plants that were highly valued by the Tzeltal culture. This study, however, did not indicate whether children's initial conception of natural categories was based on an essentialist belief (the study was not designed to do so). Thus, all that is known so far is that middle-class North American preschoolers seem to have essentialist beliefs about animals. This is not enough, however, to warrant Atran's (1998) contention that essentialism is a habit of the mind. For that to be warranted, it needs to be shown that children from other sociocultural groups also have such beliefs.

Cultural Classifications of Nature

In a recent article, Atran (1998) reviewed findings from a number of studies on reasoning and categorization patterns among adults from diverse sociocultural backgrounds (e.g., lowland Mayans and midwestern Americans). On the basis of his review, Atran argued that adults universally hold essentialist beliefs about living kinds and reason according to these beliefs, in particular about animals at the generic level (roughly the basic level of a taxonomy, e.g., squirrel, cat, tiger). Atran and his colleagues (Atran, Estin, Coley, & Medin, 1997) also showed that adults believe that differences in the morphology of animals and plants demarcate distinctions between essentially different kinds. Atran (1998) concluded that the categorizer comes equipped with a belief in the partition of the natural environment into essentially distinctive kinds and is motivated to understand the underlying nature of these kinds (see also Berlin, 1992).

A number of ethnographies, however, report on differences across cultures regarding the categorization of the natural environment that would seem to contradict Atran's (1998) claims. In most cases, the differences are due to the use of culture-specific criteria for classifying nature. Different cultures label, subdivide, or group together different kinds of plants and animals because of various organisms' unique cosmological, economic, social, or religious importance to each specific culture (Brown, 1985; Bulmer, 1967; Diamond, 1966; Morris, 1984; Randall & Hunn, 1984; Turner, 1987; see Malt, 1995, for a comprehensive review).

These ethnographies highlight two challenges to a strong universalist position about the classification of nature. First, they seem to support what Dupré (1981, p. 82) referred to as “promiscuous realism” in human classification systems. That is, there are many possible real “sameness relations” among natural organisms that can therefore give rise to many different classification systems (though see Berlin, 1992, and Lopez, Atran, Coley, Medin, & Smith, 1997, for counterexamples). As pointed out earlier, however, this in itself is not a strong challenge to the universality of essentialism because it speaks to the end-products of categorization, not to the beliefs underlying categorization. More damaging to a strong essentialist-universalist position is that these ethnographies suggest that cultures decide on which “natural” sameness relations get to be identified and labeled on the basis of criteria that are extrinsic to the natural organisms being categorized rather than intrinsic, as argued by Atran (see Ellen, 1993; Leach, 1976). Atran (1998) defended his position from this second challenge by admitting that culture-specific criteria might be especially pertinent for categories above or below the generic level. Evidently, there does not seem to be a consensus about whether people all over the world base their categorization of the natural environment on similar beliefs.

This empirical debate notwithstanding, even if it were true that adults in certain cultures do not have essentialist beliefs about living kinds, it could still be possible that these beliefs are habits of the mind. This would be the case if one were to find that children in these cultures start with essentialist beliefs but in the course of development replace them with beliefs specific to their culture. Interestingly in this regard, Walker (1992) found that Yoruban children, in contrast to adults, did not provide supernatural explanations for their judgments of the category membership of living kinds. She speculated that the inclusion of supernatural beliefs in people's concepts of living kinds occurs later in development. By the same token, cross-cultural similarities in adults' beliefs about living kinds are also not sufficient to prove that the beliefs are habits of the mind. Again, it could be the case that essentialist beliefs are instilled in children rather than develop instinctively. To borrow Sperber's (1996) terminology, the question is whether essentialism constitutes an intuitive or a reflective belief. In Sperber's view, one of the ways in which these types of beliefs differ is in the mechanisms driving their distribution. Whereas reflective beliefs owe their dissemination almost exclusively to deliberate communication, intuitive beliefs also spread via universal perceptual and inferential processes.

Clearly, then, what is needed is an examination of the effect that cultural input has on children's concepts. In Atran's (1998) view, essentialism is an intuitive belief, and thus minimal exposure to the notion that internal properties of animals are essence placeholders should be enough to trigger essentialist reasoning in children. In contrast, Dupré's (1981) and Leach's (1976) positions imply that given that the world does not present itself as constituted of distinct categories, and given that people do not have an instinctive intellectual curiosity to understand the underlying nature of things in their environment, cultural input and adult instruction play a decisive role in children's beliefs about living kinds. That is, essentialist beliefs might be a product of the peculiar cultural input to which middle-class Western children are exposed. Children exposed to different cultural values and educational practices might develop different beliefs about "natural" categories.
Cultural Input and Categorization

There are practically no systematic studies of the effect that different kinds of cultural values and practices have on children’s categorization behavior. The study by Stross (1973) that was mentioned earlier suggests that children first learn natural categories that are important to their culture. However, that study did not include a comparison group, and it did not analyze children’s beliefs about natural categories. That is, it could be the case that cultures dictate which categories children acquire first but that universal habits of the mind determine that the categories get essentialized. The study by Walker (1992) did include a comparison between cultural groups with different beliefs about living things, but it did not analyze differences in cultural practices regarding the education of categorization.

To my knowledge, two studies have addressed the issue of quality and amount of input that parents provide children about categorization. On the basis of her analysis of North American families, Heath (1986) concluded that sociocultural groups differ on the type of knowledge they try to instill in children and the manner in which they do so. She found that middle-class parents value the acquisition of knowledge by children simply for the sake of knowledge. Accordingly, a common practice among parents of this sociocultural group is to actively teach their children labels and point out similarities among entities and events in the world. In contrast, she found that parents from a working-class Black community let children figure out by themselves what the objects in their environment are and how they are related. Consequently, these parents are less likely to ask or tell children what things are and how and why things are alike.

A pattern of involvement compatible with that of Heath’s middle-class parents was found more recently by Gelman, Coley, Rosengren, Hartman, and Pappas (1998) in an in-depth study of parent-to-child talk about categories. The highly educated middle-class North American parents in their study were found to provide substantial information to their 2-year-olds about various categories. Regarding animals in particular, parents were likely to focus on taxonomic relations between categories, convey information about the inductive potential of such categories, and thus imply that animal categories are richly structured. Although nowhere in the mothers’ input did Gelman et al. (1998) find reference to internal properties or essences, it is possible that mothers foster such beliefs by highlighting for their children which categories are likely to have essences (Keil, 1998). As Keil (1998) concluded in his commentary to Gelman et al.’s (1998) study, however, “for all its importance, [the study] makes only more pressing the question of whether all this information in maternal speech makes a difference to children” (p. 153).

In sum, there is some knowledge about the effect that cultural input might have on children’s categorization (see Stross, 1973, and Walker, 1992), and there are some ideas about the possible mechanisms that might cause specific categorization tendencies in children (see Gelman et al., 1998, and Heath, 1986). There is, however, no study that attempts to test this connection. Specifically, a study is needed that investigates whether differences in cultural input lead to differences in children’s beliefs about categorization. The present study begins to address this question by comparing the extent to which children from different sociocultural backgrounds rely on internal properties of animals to assign labels for animals.

The Present Study

The present study is a methodological replication of an earlier study (Diesendruck et al., 1998, Study 1), in which 3–5-year-old middle-class North American preschoolers were told that two animals share either internal properties (e.g., “have the same bones and muscles inside”) or superficial properties (e.g., “live in the same zoo”). Children were then taught labels for these animals (e.g., “This is a snake, it’s a zav,” and “This is a snake, it’s not a zav”), and later they were tested for the acquisition of the labels. Although the experimenter’s input implied that the labels had an inclusion relation, Gelman, Wilcox, and Clark (1989) had found that given this type of input, children tended to collapse the inclusion relation into two mutually exclusive sets. We (Diesendruck et al., 1998) capitalized on this common naming mistake and tested whether certain types of property information about animals could lead children away from mutual exclusivity interpretations.

The earlier study (Diesendruck et al., 1998) found that when simply given superficial property information or no information at all, children often collapsed the hierarchy between the labels into two mutually exclusive sets. That is, children picked one animal as the referent of the novel label (e.g., zav) but only the other animal as the referent of the familiar label (e.g., snake). However, when provided with internal property information, children did not interpret the relation between the labels as one of mutual exclusivity but instead extended the familiar label to both animals. This condition effect was found for both similar- and dissimilar-looking animals. In sum, children seemed to have a default bias to restrict the extension of the familiar label and thus preserve nonoverlapping extensions, but they overcame such a bias and accepted an overlap in the extension of the labels when convinced that the animals were essentially of the same kind.

The current study used an identical procedure to the one used in the earlier study (Diesendruck et al., 1998), but it focuses on children from Brazilian shantytowns (favelas in Portuguese) and middle-class Brazilian children. The question was whether children from these two sociocultural groups1 are equally likely or not to rely on internal property information when naming animals. The comparison of these two groups provides an interesting test of the generality of essentialist beliefs. On the one hand, adults in both groups hold an urban Western conception of nature. That is, in principle, internal properties are equally good candidates for essence placeholders of animal categories for children of both sociocultural groups. On the other hand, the degree to which and how children from these two groups are exposed to this conception of nature vary substantially. A simplifying compromise of the present study is that it does not provide a detailed analysis of the input about natural categories that children receive. Instead, I relied on ethnographic and sociological studies of these populations that strongly indicate that these differences exist. The inferential logic

1 I am using the term sociocultural group as opposed to socioeconomic status to emphasize that the groups did not differ only in terms of income level or occupation but—of more importance—in terms of physical environments, values, parental practices, and children’s activities and experiences.
is that if differences between these groups are found, then essentialism would appear to be influenced by cultural input. In that case, the next research step would be to conduct an in-depth study of the input. However, if differences in children's beliefs about animal categories are not found between these diverse groups, then it is unlikely that differences will be found between more similar groups (see Coley, 2000, for a similar methodological approach).

Middle-class Brazilian parents, like North American middle-class parents (Heath, 1986), value the acquisition of knowledge simply for the sake of knowledge and thus engage their children in activities that stimulate the acquisition and understanding of new information (Fonseca, 1993; Medeiros, 1986). From an early age, most Brazilian middle-class children attend preschools with programs geared toward education and preparation for elementary school (SEADE, 1993). In contrast, parents in Brazilian shantytowns believe that their primary responsibility is to keep children safe and healthy; education is a lesser priority (Bastias, 1993; Didonet, 1993b). Teaching and stimulating children is viewed as secondary not only because its usefulness to children's immediate survival seems relatively insignificant (Bastias, 1993) but also because adultss are not well prepared as children of process children naturally go through "on their own" (Didonet, 1993a; Fonseca, 1993). At home, young children are commonly supervised by slightly older children while the adults and teenagers of the household go off to work. Some children attend community programs (e.g., creches) during the day. While many of these programs have an educational goal, in practice most programs focus on nutrition, health, and keeping children off the streets (Alves & Battaglia, 1993; Schlickman, 1993). Educational activities are rarer, partly because "instructors" are not well prepared (they are mostly women from the shantytowns who have little formal education) and partly because of a lack of materials (Faria Filho & Dias, 1993).

In sum, compared with children from shantytowns, middle-class children have more interactions with formally educated adults, have more access to educational information (e.g., books and television programs), and in general are raised in a culture that highly values and emphasizes the acquisition of knowledge. Consequently, the exposure of middle-class children to the cultural knowledge and beliefs about nature (as well as about other domains) is likely to be more frequent, richer, and more motivated than the exposure of children from shantytowns. Therefore, if essentialism is a belief children develop because of their educational experiences, parental input, and cultural practices, then Brazilian middle-class children should be more likely than children from shantytowns to acquire such a belief. Alternatively, if essentialism is a belief that emerges somewhat independent of instruction and cultural practices, children from shantytowns should be as likely as middle-class children to develop such a belief. Operationally, the culture-dependent account predicts group differences in children's tendency to infer that two animals with common internal properties are the same kind of animal and thus have a common label. The essentialist-universal account predicts similarities between groups on this measure. Additional information on this question also comes from comparing the response patterns of Brazilian children to the patterns found in the earlier study (Diesendruck et al., 1998) of North American preschoolers.2

Method

Participants

Sixty-six 4-year-olds (M = 4 years 7 months) participated in this study. All the children were Brazilians living in the city of São Paulo and were native and monolingual speakers of Portuguese. Children were recruited by coordination with the school/centers in which they were enrolled. Thirty-two of the children were from middle-class families (mean age = 4 years 7 months, range = 4 years 1 month to 4 years 11 months; 17 girls and 15 boys); the other 34 children were from shantytowns (mean age = 4 years 6 months, range = 3 years 9 months to 5 years 2 months; 22 girls and 12 boys). Half of the children from each sociocultural group were randomly assigned to one of the two property conditions. The mean age of children from the two sociocultural groups did not differ significantly, nor did the mean age of children in the two experimental conditions. Ten adults (5 Brazilian and 5 North American) provided ratings of perceptual similarity of the stimuli.

The two settings from which the samples of children were drawn differed in many aspects, to a large extent reflecting differences in their home environments. Middle-class children attended a private preschool, which was comfortably furnished and had a vast array of toys and books. Most teachers had some college training in education or psychology, and class activities had an educational emphasis (e.g., book reading). Most of the parents of these children were professionals (e.g., physicians), with at least one of each child's parents having a college degree. Children from the shantytowns attended recreational/educational programs in community centers. The centers had basic furniture, such as chairs and desks, but very few toys, books, or other educational materials. Teachers in the program were women and teenagers from the shantytown with no formal training in education or psychology. Children spent most of their time in the centers participating in recreational and artistic activities (e.g., sports, music). (The chapters in Magalhaes & Garcia, 1993, cited earlier, describe similar programs.) Most of these children's parents were blue-collar or domestic workers with no college education.

Design

The experiment was designed to allow direct comparisons with the findings of the earlier study (Diesendruck et al., 1998) on North American preschoolers. For this purpose, the present study also incorporated the variables of perceptual similarity between animals and the order of testing of labels. These variables, however, were not of central importance to the present questions and therefore are not discussed thoroughly. Perceptual similarity (dissimilar animals vs. similar animals) and order of testing (familiar label first vs. novel label first) were within-subjects variables. Property condition (internal vs. superficial) and sociocultural group (middle-class vs. shantytown) were between-subjects variables.

Stimuli

The stimuli for this experiment were sets of color photographs or realistic color drawings of animals (10 × 10 cm), arranged in an album. Each child saw 10 animal sets, and 3 filler sets were included to help maintain the children's interest in the task. On the left-hand pages of the album, there was one picture of each of the two target animals; on the right-hand pages, there were the same two pictures of the target animals plus a picture of a "distractor" animal. A cardboard flap separated the pages

2 As an anonymous reviewer pointed out, what matters most for an essentialist-universal account is whether sociocultural groups differ. The direction of the difference, if one is found, could help in accounting for an explanation of the difference.
of the album, so the five pictures were not visible at the same time (see Figure 1 for an example).

Each participant saw five sets with similar-looking pairs (snakes, horses, mice, turtles, frogs) and five sets with dissimilar-looking pairs (monkeys, lizards, fish, cats, dogs). The perceptual similarity between the pictures in each pair was established by adult ratings. Ten adults rated the degree to which two animals looked alike on a scale ranging from 1 (not at all similar) to 7 (extremely similar). The mean scores for the five dissimilar items and for the five similar items were 2.66 and 5.96, respectively, $t(8) = 10.69, p < .0005$.

Procedure

The procedure was the same as the one used in the earlier study (Diesendruck et al., Study 1, 1998) except that four of the items were substituted for animals more familiar to Brazilian children (two similar and two dissimilar items). A native speaker translated the instructions into Portuguese. The order of sets was the same for all children (snake, monkey, horse, lizard, mouse, fish, cat, turtle, dog, frog).

The experimenter showed children the two pictures on the left-hand page and provided information about properties that the two animals shared. Children in the internal condition were told the following: "This one [experimenter pointed to one of the animals] has the same stuff inside as this one [the other animal]. It has the same kind of bones, blood, muscles, and brain that this other one has." Children in the superficial condition were told the following: "This one [one of the animals] is the same size as this one [the other animal]. It lives in the same zoo in the same kind of cage as this other one."

The experimenter then labeled the two animals. For example, "This one [a typical-looking snake] is a snake; it's not a zava," and then, "This one [an atypical-looking snake] is a snake; it's a zava." After naming the pictures, the experimenter turned the cardboard flap and revealed the three pictures on the right-hand page. Children were then asked to identify the animals. For instance, "Can you show me a snake? Is there another snake?"

**Figure 1.** A. Presentation of the labels. Top left panel: Children were told, "This is a snake; it's not a zava." Bottom left panel: Children were told, "This is a snake; it's a zava." B. Testing of the labels. Children were asked to identify the animals: "Can you show me a snake? Is there another snake? Can you show me a zava? Is there another zava?" (The original photographs were in color.)
This latter prompt was repeated until the child said “no.” The experimenter then asked about the other label (zava; see Figure 1 for an illustration).

For half of the items the above order was the order in which the labels were tested (i.e., familiar label first); for the other half the order was reversed (i.e., novel label first). As in the earlier study (Diesendruck et al., 1998), it was expected that asking children for the novel label first would lead them more strongly to mutual exclusivity. This would be so because by the time they were asked for referents of the familiar label (e.g., monkey), children would have already committed to one of the animals as being the referent of the novel label (e.g., mefo for an odd-looking monkey) and thus would be drawn to exclude that animal from the extension of the familiar label. In contrast, when asked for the familiar label first, children would not have any pressure to restrict the extension of the familiar label and thus would be free to pick both animals as its referents.

In general, it is important to keep in mind that even though the labeling input clearly implied an inclusion relation between the novel and familiar labels, earlier studies found that children's predominant response in this type of task was to pick mutually exclusive referents for the labels (Diesendruck et al., 1998; Gelman et al., 1989). The prediction is that if children have essentialist beliefs about animals and internal property information taps into these beliefs, then children in the internal property condition should infer that the animals are of the same kind and accept a common label for the two animals (e.g., accept that both animals are snakes even if one of them might also be a zava). In other words, under the specific circumstances of this task, essentialist beliefs should help children overcome a mutual exclusivity tendency. Children in the superficial property condition, however, should not necessarily infer that the animals are of the same kind and thus should follow their mutual exclusivity tendency and interpret the labels as referring to mutually exclusive categories (e.g., the animal labeled zava is not a snake). In other words, the extent to which children interpret the semantic relation between the labels as one of mutual exclusivity is the main measure for assessing their essentialist beliefs.

The perceptual similarity between the animals was also hypothesized to modulate children's responses. Specifically, similar animals, more so than dissimilar animals, should be conceived as being of the same kind and thus deserving a common label. Nonetheless, if essentialism is a robust conceptual belief, then internal property information should guide children's label assignment under both levels of perceptual similarity.

Most important, if essentialism is an intuitive belief, then Brazilian middle-class children and children from shantytowns should show an equivalent tendency to assign a common label to animals with similar internal, as opposed to superficial, properties. If essentialism is a cultural product, then this response pattern should be found more often with middle-class children than with children from shantytowns.

Results

Responses were analyzed in two separate but related ways. First, analyses were conducted on children's tendency to maintain the extension of the familiar label to both animals. Second, analyses were conducted on how children interpreted the relation between familiar and novel labels.

Extension of Familiar Labels

Responses were coded in terms of whether children extended the familiar basic-level label to the two animals. As mentioned before, earlier studies found that children commonly collapsed the hierarchical relation between the labels implied in the input and interpreted the labels as picking out mutually exclusive categories. In other words, children often mistakenly narrowed the extension of the familiar label. The essentialist prediction is that children receiving internal property information would be less susceptible to this mistake. These children would be more likely to conclude that the two animals were of the same kind and thus deserved a common label.

A 2 (property) × 2 (sociocultural group) × 2 (perceptual similarity) × 2 (order) repeated measures analysis of variance (ANOVA) was conducted on the arcsine transformed proportion of items given correct extensions of the familiar label (e.g., extensions of snake to both snakes). Proportions were used instead of means because of the unequal number of trials in the cells of the 2 (perceptual similarity) × 2 (order) matrix (i.e., three similar pairs were presented with familiar first, the other two with novel first; the reverse was the case for dissimilar pairs).

As expected, children in the internal property condition were more likely to correctly extend the familiar basic-level label to the two animals (M = 73%) than children in the superficial condition (M = 34%), F(1, 62) = 55.35, p < .0001. Children were also more likely to extend the familiar label to the two animals when the animals were perceptually similar (M = 65%) than when they were dissimilar (M = 42%), F(1, 62) = 32.83, p < .0001. In other words, children were more likely to conceive of the two animals as being of the same kind when the animals shared internal properties or when they were physically similar. Consistent with our expectations, children were more likely to extend the familiar label to both animals when asked about the familiar label first (M = 67%) than when asked for the novel label first (M = 40%), F(1, 62) = 36.72, p < .0001. Finally, sociocultural group had no effect on this measure. Children from shantytowns (M = 56%) were as likely as middle-class children (M = 51%) to extend correctly the familiar basic-level label, F(1, 62) = 1.5, p > .2. None of the interactions was significant, including the crucial Property Condition × Sociocultural Group interaction.

Relations Between Familiar and Novel Labels

Children's responses were further coded into the following categories regarding the type of semantic relation they maintained between the novel and familiar labels. Whereas as pointed out earlier the most informative type of response vis-à-vis essentialism was mutual exclusivity, other responses were also coded because...
they provide indirect information about essentialism as well as other issues.

1. **Mutual exclusivity:** The child picks one animal only (e.g., the typical-looking snake) as the referent of the familiar label (snake) and the other animal only (e.g., the atypical-looking snake) as the referent of the novel label (zava). This response directly follows from Markman’s (1992) mutual exclusivity bias. With this response, children reject a common label (e.g., snake) for the two animals, implying that they were not convinced that the animals were of the same kind. From an essentialist perspective, this response was expected to prevail in the superficial condition. In fact, 24 of the 33 children made mutual exclusivity responses, \(F(1, 62) = 18.00, p < .0001\), and 56 of the 67 children made subordinate responses, \(F(1, 62) = 51.34, p < .0001\), fewer mutual exclusivity responses, \(F(1, 62) = 51.34, p < .0001\), than for middle-class children, \(F(1, 62) = 4.22, p < .05\), and synonymy, \(F(1, 62) = 4.77, p < .05\), responses but not for mutual exclusivity responses. As can be seen in Table 1, however, children from both sociocultural groups made more subordinate and synonymy responses in the internal than in the superficial conditions. Simple effects tests revealed that the significant interactions were due to a stronger effect of property condition for middle-class children, \(F(1, 62) = 19.78, p < .0001\), than for children from shantytowns, \(F(1, 62) = 3.64, p = .061\), in terms of subordinate responses. And in turn there was a stronger effect of condition for children from shantytowns, \(F(1, 62) = 18.51, p < .001\), than for middle-class children, \(F(1, 62) = 12.27, p > .2\), in terms of synonymy responses. Unexpectedly, children in the superficial condition were significantly more likely to make “other” responses than children in the internal condition, \(F(1, 62) = 4.20, p < .05\). As can be seen in Table 1, however, “other” responses accounted for less than 10% of children’s responses.

In general, it is clear that the trend was for children from both sociocultural groups to keep extending the familiar label to the two animals and overcome a mutual exclusivity tendency when the animals shared internal properties. This type of information seemed to convince children from both sociocultural groups that two animals were essentially of the same kind rather than exemplars of mutually exclusive categories.

Perceptual similarity had an analogous effect on children’s responses. There were more mutual exclusivity responses for dissimilar animals (54%) than for similar animals (31%), \(F(1, 62) = 59.14, p < .0001\), but more subordinate responses for similar animals (38%) than for dissimilar animals (21%), \(F(1, 62) = 13.32, p < .001\). In other words, similarity in appearance also served as a cue to preschoolers that two animals were of the same kind, thus sanctioning a common label. The interaction on either measure between perceptual similarity and condition was not significant, implying that the effect of internal property information held for both similar and dissimilar animals. The interactions between perceptual similarity and sociocultural group and between perceptual similarity and order were also not significant.

As expected, order had a significant effect on children’s interpretations. Children were more likely to make mutual exclusivity responses when first questioned about the novel label (54%) than when first questioned about the familiar label (32%), \(F(1, 62) = 22.37, p < .0001\). Conversely, children were more likely to

Table 1

<table>
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<th>Response type</th>
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<th>Superficial</th>
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<th>Superficial</th>
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<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>18</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
make subordinate responses when first questioned about the familiar label (39%) than when first questioned about the novel label (20%), $F(1, 62) = 24.60, p < .0001$. It seemed that, as for the North American children in the earlier study (Diesendruck et al., 1998), asking the Brazilian children for the novel label first pragmatically highlighted a mutual exclusivity relation between the labels. The interactions between order and the other factors were not significant on any of these two measures.

Finally, the findings regarding sociocultural group were quite revealing (see Table 1). Compared with children from shantytowns, middle-class Brazilian children were more likely to make subordinate responses, $F(1, 62) = 11.64, p < .001$, but less likely to make synonymy, $F(1, 62) = 6.08, p < .05$, superordinate, $F(1, 62) = 6.03, p < .05$, and “other” responses, $F(1, 62) = 21.58, p < .001$. The only response type in which the two groups of Brazilian children did not differ was mutual exclusivity, $F(1, 62) = 1.76, p > .1$.

**Comparison of Brazilian and North American Data**

To get a more comprehensive picture of the generality of essentialist beliefs, I compared the responses of Brazilian children in the present study with the responses of the middle-class North American 4-year-olds tested in the earlier study (Diesendruck et al., 1998; Study 1; $N = 32$; mean age = 4 years 7 months). Recall that the experimental procedures were practically identical in the two countries. The mean ages of children from these three groups did not differ statistically.

As can be seen in Figure 2, the pattern of responses of children from these three sociocultural groups was quite similar, especially regarding the effect of property condition. ANOVAs revealed that children in the internal condition from the three sociocultural groups made fewer mutual exclusivity responses, $F(1, 92) = 50.19, p < .001$, but more subordinate responses, $F(1, 92) = 19.31, p < .001$, and more synonymy responses, $F(1, 92) = 11.57, p < .005$, than children in the superficial condition. It is important to note that only in terms of synonymy responses was the interaction between condition and sociocultural group marginally significant, $F(2, 92) = 3.10, p = .05$. In general, the effect of property condition was in the direction predicted by an essentialist account for all three measures in the three sociocultural groups.

There were also effects, and revealing null effects, of sociocultural group on the type of semantic relation between labels that children maintained. Specifically, sociocultural group had no effect on the frequency of mutual exclusivity responses, $F(2, 92) = .93, p > .3$, but had a significant effect on the frequency of subordinate responses, $F(2, 92) = 7.02, p < .005$, and a trend in terms of synonymy responses, $F(2, 92) = 2.93, p = .058$. As can be seen in Figure 2, Brazilian children from shantytowns made fewer subordinate responses than Brazilian and North American middle-class children. In fact, only 1 child out of the 34 children from Brazilian shantytowns made subordinate responses on more than six of the items, whereas 9 of the 32 middle-class Brazilian children and 11 of the 32 middle-class North American children did so, $\chi^2(1, N = 98) = 10.94, p < .005$. There was no difference in the proportion of middle-class children and children from shantytowns who made mutual exclusivity responses on the majority of the items, $\chi^2(1, N = 98) = 0.07, p > .9$. Taken together, these
findings reveal that children from the three sociocultural groups were equally likely to maintain mutual exclusivity but differently likely to make subordinate responses.

Discussion

The main goal of the present study was to provide a test of the claim that essentialism is a habit of the mind. As was pointed out in the introduction, for this claim to be true, it has to be the case that essentialism emerges early, universally, and quite independently of cultural/educational input. The review of the literature relevant to these points revealed that a crucial piece of evidence still missing was whether children from diverse sociocultural backgrounds develop essentialist beliefs. The present study was a first attempt toward providing this type of evidence.

The main finding of the study was that Brazilian children raised in substantially different cultural environments were equally likely to rely on internal property information when naming animals. Specifically, when told that two animals had common internal properties, Brazilian 4-year-olds from shantytowns and from middle-class families were equally more likely to extend a familiar label to the two animals than when told the animals shared superficial properties. Children from the two groups were also equally less likely to interpret the labels as picking out mutually exclusive categories when told the animals shared internal properties than when told the animals shared superficial properties. This pattern of responses found with Brazilian children was comparable to the one found in an earlier study (Diesendruck et al., 1998) with North American middle-class 4-year-olds. In other words, children from three different sociocultural groups were similarly persuaded that animals with common internal properties were the same kind of animal.

Although the present study did not supply a detailed ethnography of the types of input to which children from Brazilian shantytowns and the middle-class are exposed, a number of investigations indicate that the cultural/educational experiences of children from backgrounds similar to the children tested in this study are substantially different. This is an important point because it is the basis for the claim that the comparison of these particular sociocultural groups is interesting and informative regarding the universality of essentialism. These differences have to do with the general concern with children (survival enhancement vs. intellectual enhancement), the value of knowledge acquisition (for practical purposes vs. for the sake of knowledge), and the quality and amount of exposure to educational information children have (minimal vs. “optimal”) (Bastías, 1993; Didonet, 1993b; Gelman et al., 1998; Heath, 1986; Magalhaes & Garcia, 1993; Medeiros, 1986). The implication was that if Fodor (1998), for instance, is right in asserting that essentialist beliefs have to be cultivated in children, then these sociocultural differences should have led middle-class children to be more attuned than children from shantytowns to their culture’s criteria for categorizing animals. That is, middle-class children should have been more likely than children from shantytowns to believe that internal property information is indicative of animal kind. The finding that both groups of children were equally swayed by internal property information suggests that the significance of this type of information to children does not derive from the richness of the cultural input they receive. This finding is consistent with Atran’s (1998) notion that essentialist beliefs do not require explicit instruction or a peculiar cultural context to emerge.

In this regard, it is worth noting that the differences in cultural input to which Brazilian children from shantytowns and the middle class are presumably subject were not in terms of belief systems. That is, adults in these sociocultural groups arguably share the same conception of animals as primarily biological beings, and thus, ultimately, this is the model of the natural world to which all children are exposed. As noted previously, the sociocultural groups differ in the extent to which this model is readily available to and inculcated in children (see, e.g., Gelman et al., 1998, and Keil, 1998, for discussions on the availability of this model to Western middle-class children). Under these circumstances, the question of whether all children equally rely on internal property information or whether instead they differ according to the richness of their cultural input allows a straightforward answer. If in contrast I had investigated children from a culture with a qualitatively different conception of animals than the one held by middle-class Westerners (e.g., the Itza-Mayan or the Yoruban, as Atran, 1998, and Walker, 1992, respectively, described), I might have expected differences in terms of the animal properties believed to be essential. Under these latter circumstances, however, it would have been harder to compare the degrees to which children from different cultures hold essentialist beliefs.

A number of cautionary remarks on the present research should be noted. First and foremost, one has to keep in mind an interpretative matter present in all investigations of essentialism. Essentialism is a belief people have about the nature of certain categories in the world, even though people may never know what the essence of a category is. People fill this knowledge void by attributing essence-like qualities to certain properties, which then operate as essence placeholders (Medin & Ortony, 1989). What this implies is that it is very hard to investigate essentialist beliefs directly and that instead researchers have to settle for investigating the properties that seem to operate as essence placeholders. Numerous studies with children in which a variety of converging methods were used have found that internal properties of animals seem to be treated as essence placeholders (Gelman & Markman, 1986; Gelman & Wellman, 1991; Keil, 1989). The present research draws from these previous studies its interpretative power and validity regarding the relevance of internal properties in animals to the issue of essentialism.

In addition to this interpretative matter, there are some methodological issues that need to be kept in mind. One problem, present in most cross-cultural investigations, is that some populations are more accustomed to being in a testing situation than others. The present study is no exception: As can be seen in Table 1 (e.g., the percentage of “other” responses) and from personal impression, it seems that children from shantytowns were less comfortable and thus perhaps more error prone than middle-class children. What is striking is that children from these two groups nonetheless responded in similar ways to the internal and superficial property information.

Another methodological matter that could be addressed in future work is that children were told the same set of internal or superficial properties throughout the 10 items. One potential problem with this design is that it is unclear how generalizable to other sorts of internal and superficial properties the present findings are. That is, perhaps there are other so-called superficial properties that
could sway children away from mutual exclusivity responses (e.g., behavioral or ecological information). In this regard it is interesting to note that sets of internal and superficial properties similar to the ones used here about animals were used in another study regarding artifacts (e.g., children were told that two cars "have the same parts and stuff inside" vs. "are the same size"; Diesendruck et al., 1998). In that study, neither internal nor superficial properties led children away from mutual exclusivity responses. In other words, it seems that the internal properties used in the present study were deemed essential because they were applied to animals. In any case, it would be valuable to address this issue more directly by comparing the effectiveness of different kinds of properties of different kinds of entities in directing the responses of children from various sociocultural backgrounds. Findings on this issue would help to clarify the nature of essentialist beliefs (e.g., are internal properties the only essence placeholders or can other kinds of properties fulfill this role?) and their distribution in different cultures (e.g., are internal properties essence placeholders in all cultures or only in Western ones?). I return to this latter issue later.

A second problem arising from the particular internal and superficial properties used in the present study is that it appears that more information was conveyed in the internal than in the superficial conditions. This is a problematic issue, because it is difficult to assess how "objectively" informative the instructions were. That is, although there were more components in the instructions of the internal condition than of the superficial condition, it could be that some of the components in the internal condition were taken as redundant, whereas each of the few components used in the superficial condition added a substantial amount of new information. Moreover, on the basis of the earlier findings (Diesendruck et al., 1998), it seems that the amount of information children were told about pairs of artifacts did not affect children’s responses. Finally, it is important to keep in mind with regard to these potential problems with the properties used that whatever differences that might have been between the internal and superficial conditions, these differences affected the responses of North American and Brazilian middle-class children in exactly the same way that they affected the responses of children from Brazilian shantytowns. Ultimately, then, one needs to understand not only what exactly the procedure did for the children but also how it did the same thing for children from such disparate backgrounds. In this light, the essentialist explanation is indeed a very plausible one.

Evidently, the scope of the essentialist explanation needs to be limited. In particular, the present results are far from implying that essentialist beliefs are innate or a result of natural selection. This is so for a number of reasons. First, we still need a thorough account of the cultural input children receive. If the two sociocultural groups had been found to differ in terms of their reliance on internal properties when naming animals, then the idea that essentialist beliefs are input-independent could be challenged. However, the finding of similarity between sociocultural groups cannot lead one to conclude decisively the inverse proposition—namely, that essentialism is input-independent. It could be the case that the differences in the cultural input to which children from the two groups were exposed were not substantial enough to lead to variations in essentialist reasoning. Second, to establish the generality of essentialist beliefs, researchers need to overcome certain methodological problems and investigate cultures with fundamentally different underlying beliefs about the natural world (e.g., Westerners and Yorubans). Third, there is still much to be uncovered about the precise nature of essentialist beliefs. For instance, researchers debate about what components of essentialism may be innate (Atran, 1998; Keil, 1995), how the "full-blown" adult essentialist beliefs emerge (Hirschfeld, 1996; Sperber, 1996), and whether such beliefs are domain-specific (Bloom, 1996; Schwartz, 1978). In sum, the present study at best shows that with minimal exposure to a Western conception of nature, children develop essentialist beliefs about animal categories.

A tenable, though speculative, account of the origin and nature of essentialist beliefs that arises from the present and related findings is that culture provides the content of the beliefs, and the mind provides the form in which the beliefs are represented (see Keil, 1995, and Sperber, 1996, for discussions of this issue). That is, children might come prepared to essentialize living kinds, and they need minimal cultural input to define the set of properties that trigger this essentialist reasoning. For Western children, internal properties do the trick. And the present findings show that they do the trick no matter how exposed the child is to this Western conception. It is possible that for Yoruban or Mayan children, supernatural and ecological properties, respectively, do the trick.

A final point to be noted regarding the results of this study has to do with the general patterns of label extensions found among children from the different sociocultural groups. The most striking finding was the similarity among groups in terms of the frequency of mutual exclusivity responses (e.g., picking only the typical-looking snake in response to the label snake and only the atypical-looking snake in response to zava). This similarity among North American and Brazilian middle-class children and children from Brazilian shantytowns would seem to indicate that differences in the labeling practices to which these children arguably are exposed do not affect their tendency to interpret labels as picking out mutually exclusive categories (see Au, Dapretto, & Song, 1994, Markman, 1992, Nelson, 1988, and Tardif, Shatz, & Naigles, 1997, for discussions of the effect of input on naming biases). This finding, however, cannot unequivocally determine whether this mutual exclusivity tendency derives from lexical constraints or from general pragmatic considerations (cf. Diesendruck & Markson, 1999; Woodward & Markman, 1998). The finding of a persistent order effect on children’s interpretations at the least intimates the existence of a pragmatic component to children’s naming decisions.

In contrast to this similarity in mutual exclusivity responding, children from the three sociocultural groups differed in the likelihood with which they made subordinate interpretations. Specifically, children from Brazilian shantytowns were less likely than Brazilian and North American middle-class children to interpret a novel animal label as denoting a subtype of a familiar basic-level animal category (e.g., interpreting snake as referring to both snakes and interpreting zava as referring to the atypical-looking snake). At this point it is unclear whether this difference is due to basic differences in children’s ability to follow the labeling instructions or to deeper discrepancies in children’s capacity to organize knowledge into hierarchies. In general, the present findings regarding children’s interpretation of the semantic relations between labels point out the need for further cross-cultural studies examining this issue.
Conclusions

Brazilian 4-year-olds from shantytowns were as likely as Brazilian middle-class 4-year-olds to decide that animals with common internal properties belonged to the same category. In fact, Brazilian children's responses were quite similar to the responses of North American middle-class 4-year-olds studied in an earlier investigation with a similar procedure (Diesendruck et al., 1998). These findings indicate that the differences in the cultural and educational background of these children do not affect their belief in internal property information as indicative of kind membership. To the extent that internal properties of animals can be taken as proxies for essences in these sociocultural groups, the present findings support—though by no means prove—Atran's (1998) notion that essentialism is a habit of the mind that does not require explicit or peculiar types of cultural input to emerge.

As discussed earlier, there are a number of conceptual and methodological issues regarding the present investigation that prevent strong conclusions from being drawn about the cultural specificity or universality of people's underlying beliefs about living kinds. This study should be viewed as an initial attempt at looking at the effect cultural differences might have on children's concepts of living kinds. In so doing, the present study supplies evidence pertinent to an issue that, although of fundamental importance to the question of cognitive universals, has received minimal empirical attention.

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