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Naming the Living Things: Linguistic, Experiential and Cultural Factors in Wichí and Spanish Speaking Children

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Abstract

This work focuses on the underlying conceptual structure of children's category of living things from a cross-cultural, cross-linguistic perspective. School-aged children (n = 129) from three Argentinean communities (rural Wichí-speaking, rural Spanish-speaking, urban Spanish-speaking) were asked to generate the names of living things. Analyses were focused on the typicality, semantic organization, and hierarchical level of the names mentioned. We identified convergences among the names generated by children in all three communities, as well as key differences: the typicality, habitats and hierarchical level of the categories mentioned varied as a function of children's language and their direct experience with the natural world. These findings provide evidence concerning the role of language, culture and experience in shaping children's folkbiological concepts.

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Keywords

Living thing concept – folkbiology – semantic organization – cross-culture – cross-linguistic – Spanish – Wichí

Introduction

All human groups respond to the diversity of their biological habitats by grouping all living things into named categories that are organized as taxonomic hierarchies (e.g., carob tree, tree, plant). The depth and specificity of these conceptual and lexical hierarchies, which are structured in accordance with strong universal principles (Berlin et al., 1973; Atran, 1998), are also shaped markedly by individual experience. Three powerful shaping forces have been implicated, including (1) language (e.g., whether and how key folkbiological categories are marked in an individual's native language (Anggoro et al., 2008; Taverna et al., 2012), (2) direct contact with the natural world (e.g., the amount and kind of interaction an individual has with the natural environment (Proffitt et al., 2000; Atran et al., 2001; Ross et al., 2003; Tarlowski, 2006; Winkler-Roades et al., 2010) and (3) culture (e.g., the community-wide belief systems about the natural world) (Stavy and Wax, 1989; Astuti et al., 2004; Medin et al., 2006; Waxman and Medin, 2006; Bang et al., 2007; Waxman et al., 2007; Atran and Medin, 2008; Taverna et al., 2012).

In the current investigation, we examined how children raised in three distinct linguistic, experiential and cultural communities spontaneously name living things in a free-listing task. This task, which has been shown to reflect the underlying semantic and conceptual organization of living things, is straightforward enough to lend itself well to investigations involving young children from a range of different cultural communities. Here, we document that this task is also sensitive enough to identify the contribution of factors including language, culture and experience on children's organization of living things.

Free-Listing Task

The free-listing task, also called semantic conceptual fluency or category production task, has been widely used in anthropological and psychological investigations (e.g., Deese, 1965). It is elegant for its simplicity. Participants are simply asked to name as many members of a category (e.g., living things) as

they can within a brief time period (typically, several minutes). The logic of this task is based on the well-supported assumption that when a word (or concept) is activated, in turn activates others that are semantically or associatively related (Neely, 1991). Based on this assumption, the order in which names are produced is taken as an index of the psychological proximity of their underlying concepts. Therefore, the lists that people generate in the free-listing task provide a window into their underlying conceptual organization of a domain.

Previous studies have shown that the most familiar and prototypical members of a category tend to be mentioned first, with less familiar and prototypical members being mentioned later in the list (Kail and Nippold, 1984). Moreover, there is convergence among participants in naming the typical members, but considerable variablity in the names generated for less typical members (Henley, 1969; Uyeda and Mandler, 1980; Kail and Nippold, 1984; Grube and Hasselhorn, 1996). In addition, the hierarchical level at which members are named varies as a function of participants' expertise within a given domain, with experts providing more specific names (e.g., "oak") than novices (e.g., "tree") (Atran, 1990; Johnson and Mervis, 1994; Medin et al., 1997).

There is also considerable evidence that children and adults tend to list animals in clusters that reflect organizing principles, including habitat (Storm, 1980; Lucariello et al., 1992; Crowe and Prescott, 2003), size and ferocity (Henly, 1969). This evidence, based on English-speaking participants, has recently been augmented to suggest that the free-listing task is sufficiently sensitive to identify ways in which culture and experience shape children's and adults' naming clusters (Ross and Medin, 2005; Winkler-Rhoades et al., 2010). Winkler-Rhoades and his colleagues (2010) examined free-listings of animal names among children from three communities in the US: rural Native Menominee, rural majority culture and urban majority culture. Although the structure of the animal categories produced was consistent across all three communities, two key differences were identified: both, the particular animals mentioned and the order in which they were mentioned varied reliably as a function of the children's cultural community and their habitual interaction with the natural world.

In the experiment reported here, our goal was to extend the empirical base by gathering new evidence from children growing up in three distinct populations of Argentina: a rural indigenous group of Amerindians living in the Chaco forest, in the province of Formosa and speaking Wichí (in addition to north Argentina the Wichí people are located in Tarija, Bolivia); a rural majority-culture group living in the Pampas in the province of Santa Fe and speaking Spanish; and an urban majority-culture group living in a large city in the

province of Santa Fe and speaking Spanish. At issue here is whether and how the listings produced by children from these three populations are shaped by the distinct linguistic, experiential and cultural backgrounds in which they are being raised.

This investigation is part of a broader research project on Wichí folkbiological knowledge and reasoning which, to the best of our knowledge, represents the first investigation of this native community from a cognitive and developmental perspective (Taverna et al., 2012). The Wichí people are of particular interest for several reasons. First, in contrast to most Amerindian populations studied to date, the Wichí language is very much alive. As the primary language within the family and community, Wichí is acquired naturally and spontaneously from infancy. Second, daily life for Wichí adults and children involves extensive contact with local plants and animals, many of which have enormous cultural significance. The Wichí harvest a wide range of forest products such as wood, different fruits (*algarroba, chañar, trusca*), honey from a dozen of species of bees and children participate on these activities from an early age. Third, the Wichí peoples' beliefs about relations among entities in the natural world differ from those in most Western, technologically-saturated communities (Wilbert and Simoneau, 1982). For example, the Wichí identify spiritual beings (*ahot* in Wichí) that interact with plants, animals and other natural kinds (see Taverna et al., 2012 for a more extensive description of the Wichí population, its language, fundamental folk-biological concepts, cultural beliefs and interactions with the natural world).

Finally, although documentation of the Wichí language is currently underway (e.g., Golluscio, 1993; Vidal and Nercesian, 2005, 2009; Terraza, 2009), there is already intriguing evidence about the linguistic devices that mark the key folk- biological concepts. Three such devices are relevant to naming living things. First, the Wichí language has a distinct folkbiological lexicon which, from a Western perspective, links the entities from the biological and the spiritual world. There is a phrasal description *hunhat lheley* (translated as 'inhabitants of earth') which is applied to all humans, non-human animals, plants and spiritual beings. This phrase has sometimes been interpreted as close in meaning to living things or *seres vivos* (Spanish), but Wichí linguists and anthropologists have taken issue with this interpretation (Vidal, personal communication). Another key distinction concerns the way(s) in which humans are named. The Wichí noun *hin'ulh* refers to all humans, but is rarely used by either adults or children. Instead, humans are described either as *wichí* (Wichí people), *siwele* (*criollos* or white people) or named with a number of other nouns that apply to people of other ethnic groups (e.g., *Nivaklé*). A third intriguing Wichí naming practice involves the higher-order names for distinct animals and plants. Like

English and Spanish, Wichí also includes names for inclusive categories from the animal and plant kingdom. Unlike English and Spanish, however, the Wichí names respect not only the taxonomic but also the ecological relations among entities, including *tshotoy* (animals of the forest), *tshotoy inot lheley* (animals of the water), *tshotoy fwiy'ohen* (animals of the air), *hal'o* (wild trees and shrubs with woody trunks that inhabit the forest); *tokos* (cultivated plants), among others (see Suárez, 2009, 2010, 2011a,b for a detailed documentation of the species included in the plant kingdom).

In addition to examining the names generated by Wichí children, we also considered those generated by majority-culture Spanish-speaking children from two distinct communities, one urban and the other rural-agricultural. Although these children are raised in communities that share the same language (Spanish) and their families share the same Western-oriented belief systems, there are significant differences in their daily experiences with the natural world.

Survey of Children's Engagement with the Natural and Built Environment

To provide a firm foundation for our assumptions concerning children's interaction with the natural world, we first conducted a survey to identify the activities in which children in each community are typically engaged. The interview focused on the participant's practices and experiences with respect to the outdoors (21 Wichí speaking children aged 6-to-12 year olds, 17 rural-Spanish speaking aged 6-to-13 year olds, and 25 urban Spanish speaking aged 6-to-10 year olds were interviewed). We began by asking about 25 different kinds of activities, leaving time for the participant to mention others. Their responses were tabulated. Detailed survey results are reported in Table A1 in the Appendix. As we expected, Wichí children reported extensive first-hand experience with the natural world. They are engaged daily in activities with a strong orientation to the natural world and are rarely engaged in activities involving artifacts and technology. The survey also confirmed that in the rural Spanish-speaking community (in the Pampas), where agricultural, livestock and dairy farms form the backbone of the community, the children (like the rural Wichí) have considerable direct experiences with the natural world. At the same time, however, children from this rural Spanish-speaking community have more contact with human artifacts (including books, games) and technology (on the farms and in the homes) than the rural Wichí. The experiences of the urban Spanish-speaking children, growing up in densely-populated Rosario, the third largest

city of Argentina, stand in clear contrast to both rural populations. These children have considerably more contact with human made-artifacts and technology and less exposure and direct contact with the natural world.

Predictions

If the free-listing task is sufficiently sensitive to reflect the shaping role of language, cultural community and habitual contact with the natural world, then, the names that children generate should vary systematically across communities. First, we expect that the names children generate will reflect both the particular living things with which they interact and the naming practices of their community. For example, Wichí-speaking children should be more likely to name forest animals and plants; they also may be less likely to name humans, reflecting the absence of an overarching name that refers to all humans in their language (Taverna et al., 2012). Second, we suspect that although children raised in the rural communities will tend to name living things that they encounter in their own direct experience, those raised in the urban community will be more likely to name the 'exotic' biological kinds that they learn about indirectly (e.g., in children's books, television, movies). Third, based on their 'expertise' with living things that they habitually encounter in the natural world, we predict that Wichí children will provide more specific names (basic- or folk-generic level) while urban children (with less direct experience with the natural world) will provide names at more general hierachical levels (superordinate or folk-kingdom level). It is an open question whether the names provided by rural Spanish-speaking children will align more with those of children from the rural Wichí or urban Spanish-speaking communities.

Method

Participants

We recruited children from three distinct communities of Argentina, including children at three ages: 5- and 6-year-olds (n = 46; M = 5;9 (year; month); 8- and 9-year-olds (n = 41; M = 8;5) and 11- to 14-year-olds (n = 42; M = 11;7) (see Table 1).

Communities

Rural Wichí-Speaking Community

Forty-one native-speaking Wichí children from a native Amerindian community living in the Chaco forest north of Argentina were recruited from the Wichí Lako School (Laguna Yema, Formosa, Argentina). At this public school, which is under the direction of Argentina's Intercultural Bilingual Education program, the Spanish language is introduced gradually beginning at the age of 6, but children are not conversant; their use of Spanish is restricted largely to specific classroom settings.

TABLE 1 *Sample sizes by age and community*

	Rural Wichí	Rural Spanish	Urban Spanish
5–6 year-olds	14	10	22
8–9 year-olds	14	12	15
11–14 year-olds	13	16	13
Total	41	38	50

Rural Spanish-Speaking Community

Thirty-eight monolingual Spanish-speaking children were recruited from five public schools in the Pampas region of the province of Santa Fe, a region with hundreds of rather isolated educational institutions far from any urban centers serving primarily children of agricultural workers. Our participants came from schools with a single multigrade classroom, a single teacher, and few students (ranging from 4 to 17).

Urban Spanish-Speaking Community

Fifty monolingual Spanish-speaking children were recruited from a private school in the large, densely-populated city of Rosario in the province of Santa Fe.

Materials and Procedure

All children participated in the free-listing task in an individual interview in a quiet area of their school. The free-listing task was part of a larger battery of biology-related tasks, and its position in the battery was counterbalanced across participants. There were no effects of task order. They were simply asked to "Name everything you can think of that is alive". When children paused, they were prompted for more names. The task ended either when the child paused for a second time or had produced 10 names. Interviews were administered in the child's primary language. Wichí children were interviewed by a native teacher in collaboration with the first author; Spanish-speaking children (Spanish urban and Spanish rural) were interviewed directly by the first author.

Results

Children's naming responses revealed several cross-community commonalities. They also reveal key differences, demonstrating that the free-listing task is sufficiently sensitive to reflect the shaping role of language, cultural community and contact with the natural world. With regard to commonalities, we

TABLE 2 *List of living things mentioned by at least 15% of children by each community*

Rural Wichí (label %)		Rural Spanish (label %)		Urban Spanish (label %)	
Label	**%**	**Label**	**%**	**Label**	**%**
Dog	46.3	Animal	73.7	Human	71.1
Bird	31.7	Dog	68.5	Dog	55.6
Cat	29.3	Human	65.8	Animal	55.6
Horse	29.3	Cat	60.5	Lion	46.7
Cow	24.4	Cow	52.5	Cat	46.7
Fish	22	Horse	39.5	Tiger	40
Rabbit	22	Pig	36.8	Bird	35.6
Tsuna[a]	19.5	Plant	36.8	Tree	31.1
Bee[b]	19.5	Hen	36.8	Plant	28.9
Pigeon	19.5	Duck	34.2	Horse	26.7
Armadillo	19.5	Snake	26.3	Fish	24.4
Fox	19.5	Lion	21.1	Giraffe	24.4
Hen	19.5	Sheep	21.1	Turtle	24.4
Jaguar	17.1	Bird	23.7	Cow	22.2
Snake	17.1	Hare	18.4	Elephant	22.2
Carob Tree	17.1	Giraffe	18.4		
Pig	17.1	Elephant	15.8		
		Tiger	15.8		

[a] *Tsuna* refers to a kind of deer which lives in South America from Colombia to Argentina.
[b] The living thing BEE that appeared in the Wichí sample (see Fig. 1) was named through different generic terms – *wun'a_wu, pini* and *neslo*. We collapsed the three terms under the English label "bee" in order to meet the frequency criterion by which living things had to be mentioned by at least 15% of children in each community.

identified considerable developmental continuity, suggesting that within each of the three communities, children from 5 to 14 years of age share a common underlying organization of living things. See Table A2 in the Appendix. We also found that in all three communities, children overwhelmingly named animals (primarily, but not exclusively, mammals) (Table 2).

In addition to these commonalities, we also identified differences across the communities. As predicted, the particular living things that children spontaneously named and the hierarchical level at which these were named varied as a function of the community. We examined these differences using a correspon-

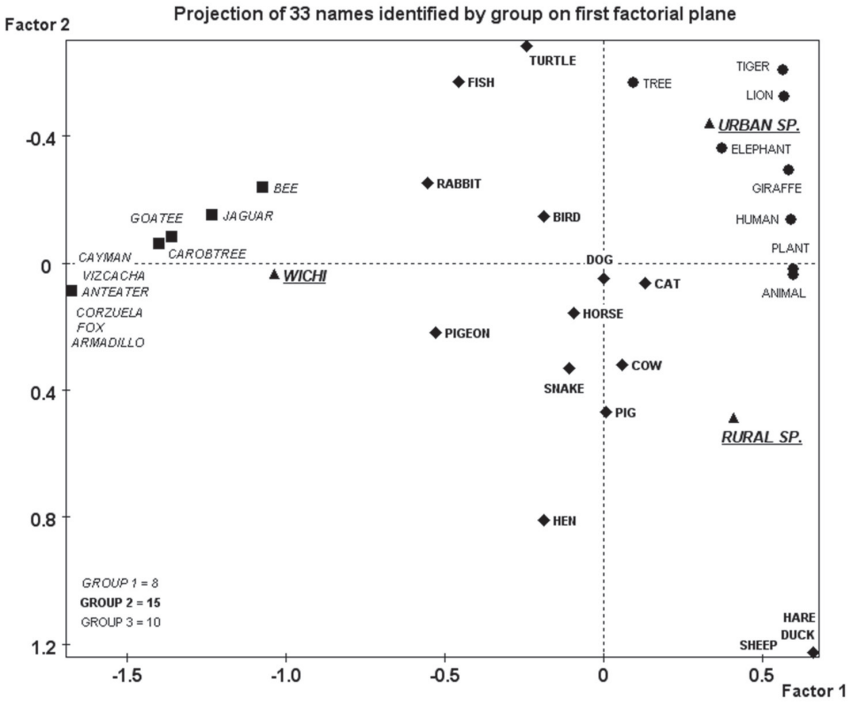

FIGURE 1 *Projection of living things names identified by clusters on first factorial plane. Domestic animals such as dog, cat, horse were in the point 0, suggesting they were named by children from all three communities.*

dence analysis and a cluster analysis (Benzécri, 1976, 1981; Bécue, 1991; Lebart and Salem, 1998; Murtagh, 2005). These multidimensional analyses complement one another for the statistical analysis of textual data. The correspondence analysis focuses on the distribution of the different words (living things names) in the factorial plane, reflecting the statistical associations between variables (living things names and cultural groups). The cluster analysis, generally applied to enrich the interpretation of a correspondence analysis, renders variable groupings (e.g., living things names) into clusters.

The correspondence analysis yielded two factors, displayed in Fig. 1. The first factor identifies a difference between the names produced by Wichí- vs Spanish-speaking children. As predicted, Wichí-speaking children's names reflect their expertise in the forest: they provided specific names (mostly basic or folkgeneric level) for biological entities from the forest. Figure 1 also reveals that although Spanish-speaking children tended to mentione humans (or people), not a single Wichí child did so. These differences between Wichí- and

Spanish-speaking children may stem from differences in their language, their culturally-based belief systems (native Wichí vs. Western culture) or from an interaction between them. The second factor distinguishes the urban from the rural Spanish-speaking children, one that likely stems from children's access to direct, hand-on experience with the natural world. As predicted, urban children showed a tendency to name exotic (rather than local) species.

The cluster analysis, calculated over the factorial coordinates produced by correspondence analysis, yielded three clusters or groups, suggesting that there are distinct naming patterns within each community (Fig. 1). Cluster 1, associated with the urban Spanish children ($z = 9$; z is the corresponding value of the probability obtained from a t-test based on the comparison between percentage frequency in sample and percentage frequency in group (Morineau, 1982) (see Table A3 in the Appendix for more detailed information about statistical significance)), includes primarily higher-level names (e.g., animals) and basic level names for many exotic animal species. Cluster 2, associated with the rural Spanish children ($z = 4$), includes basic-level names of predominantly native, farm animals. Cluster 3, associated with rural Wichí ($z = 13$), includes exclusively native living things, particularly forest animals. Several domestic animals (dog, cat, horse) were named by children from all three communities (see Figure 1).

We next tested the prediction that urban children would be more likely than rural children to name exotic, as compared to native species. For this analysis, we focused specifically on animal names because these were most frequently produced in all communities. We coded each animal name as either native (to Argentina), exotic, or domestic. Ambiguous names (e.g., bird, fish, animal) were excluded from this analysis. As predicted, children's production of native vs. exotic animal names varied reliably across the three communities ($\chi^2 = 147.1$; $g_l = 4$; $p = 0.001$). Wichí children named more native and fewer exotic animals than did the rural Spanish children ($\chi^2 = 24.9$; $g_l = 2$; $p = 0.001$) who, in turn, named more native and fewer exotics than did the urban Spanish children ($\chi^2 = 49.9$; $g_l = 1$; $p = 0.001$). We found a significant and considerable strong relation between the distribution of exotic/native animals and the community type (Cramer's $V = 0.513$, $p = 0.001$). There were no differences across communities in the tendency to name domestic animals ($\chi^2 = 0.4$; $g_l = 2$; $p = 0.70$).

In the final set of analyses, we tested the hypothesis that the hierarchical level of the names produced would vary across communities, reflecting differences in children's expertise with different biological kinds and the cultural salience attached to them. As predicted, the Wichí children provided more specific names (basic level, or folk generic) than did their Spanish-speaking counterparts who tended to provide more general higher-order names (super-

TABLE 3 *Percentage of children generating living things names in the first, second or third position by community*

Rural Wichí		Rural Spanish		Urban Spanish	
Label	**%**	**Label**	**%**	**Label**	**%**
Tsuna	85.7	Plant	100	Animal	80
Snake	75	Animal	92.8	Human	77.1
Fox	62.5	Human	63.6	Tree	75
Bee	62.5	Bird	55.5	Plant	62.5
Hen	57.1	Tree	44.4	Dog	57.6
Rabbit	50			Cow	50
Jaguar	46.1				

Note. Names that were mentioned by at least 15% of the children within a given community are included.

ordinate level, or folk-kingdom taxa) (Table 3). Notice that although the rural Spanish-speaking children have more direct contact with the natural world than their urban counterparts, this was not reflected in their name generation: Like the urban children, they tended to produce names at the superordinate or folk-kingdom level.

Taken together, these analyses suggest that the name generation task is indeed sensitive enough to detect differences in children's experience, including their native language, the cultural communities in which they are raised, and their opportunities for direct engagement with the biological world.

General Discussion

When children are asked to name the living things that 'come to mind', their responses provide insight into the contributions of language, culture and daily experiences in children's underlying organization of the natural world. Children in the study reported here varied in either their native language, their habitual contact with the natural world, or in both. Our intention in selecting these populations was not to reify simple contrasts along any one dimension (e.g., urban vs rural; Spanish vs Wichí), but instead to conceptualize these as three communities occupying three distinct positions in a multi-dimensional

space. Adopting a triangulation strategy (Bailenson et al., 2002; Medin et al., 2002; Ross et al., 2003), our goal was to identify commonalities and differences, and to use these differences to begin to home in on their potential source(s).

The current results advance our understanding of commonalities and differences in young children's knowledge and organization of the biological world. First, the Wichí children's responses on the free-listing task converge well with recent evidence about the underlying organization of the domain of living things in this remote population (Taverna, et al., 2012) and extending it to include additional Argentinean populations.

Second, evidence from the free-listing task revealed developmental continuity within each of the three communities in children's underlying organization of the living thing domain. Our interpretation of this continuity is straightforward. It does not suggest that development in this domain is 'complete' by 5 years of age. Instead, the continuity revealed in this particular task indicates that a framework for organizing and learning about the biological world (living things) is already in place by 5 years of age, and that this framework will be amplified over development and with experience. We suspect that in other tasks, especially ones that tap into more specific biological phenomena (e.g., conceptions of life and death status, interpretations of taxonomic, ecological and evolutionary relations among living things), developmental effects will be more evident (Backscheider et al., 1993; Inagaki and Hatano, 1993; Johnson and Carey, 1998; Opfer, 2003; Opfer and Siegler, 2004; Jipson and Gelman, 2007; Angorro et al., 2008; Rosengren et al., 2009; Hermann et al., 2010; Evans et al., 2011, among others).

Third, we found that children in all communities named predominantly animals as compared to plants. This outcome, which converges well with infants' and young children's special interest in animals, suggests that when teaching scientific concepts (e.g., taxonomic relations, ecological relations, evolution), it may be advantageous to use examples from the animal kingdom as a foundation for learning about the plant kingdom and about relations between animals and plants.

Fourth, we found that in addition to these commonalities among communities, the lists of living things that children generated also bore the stamp of their particular linguistic, cultural and experiential backgrounds. Differences were apparent in the individual living things they named, the level at which they named them, and the sources through which they likely learn about the biological world. For urban children, the domain of living things is organized largely around exotic animals, ones with which they have little or no direct experience. This highlights the crucial role of children's books and films

as sources of input, especially for children raised in urban environments (Dehghani et al., 2013; Bang et al., data not shown; Waxman et al., data not shown).

This finding, which echoes evidence from urban and rural children raised in the US, also has implications for science education. In developing strong and effective scientific curricula, it is essential that we take into account the underlying organization and knowledge that children from different backgrounds bring with them into their classrooms. For example, results like the ones reported here may provide a foundation that permits Wichí teachers to identify systematic ways in which their students' knowledge and organization of the natural world may differ from the models used in standard primary school curricular materials including texts. These results may also provide a foundation that permits teachers of urban children to identify the ways in which storybooks, movies and other media may have shaped their young students' representations of the natural world.

In the current investigation, we examined children's folkbiological from a broad perspective, asking them to "Name everything you can think of that is alive". A goal for our ongoing work is to pursue children's folkbiological reasoning more deeply focusing on the way Wichí people understand folkbiological concepts and their relations, how they reason about folkbiological categories and about relations among folkbiological entities (Taverna et al, 2012, data not shown).

Finally, the results reported here reveal that to discover how language, experience and culture shape children's acquisition and organization of fundamental folkbiological concepts, adopting a cross-cultural and cross-linguistic developmental approach is essential. The differences that we have identified among children in our three communities may reflect differences in their language, their culture, and their experiences with the natural world or an interaction among these powerful sources for learning.

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Appendix

TABLE A1

Practice	%
Proportion of everyday free-time practices in Wichí community	
Farming	90
Ceremony	90
Collecting wood	85.7
Collecting *chaguar* (Bromelia sp.)[a]	76.1
Fruits picking	71.4
Forest walk	66.6
Swimming in the canal	66.6
Trapping lizards	61.9
Playing football	52.3
Weaving *yica*[b]	47.6
Camping	33.3
Playing instrument	33.3
Fishing	33.3
Hunting	23.3
Proportion of everyday free-time practices in Rural Spanish population	
Field-walks	73.6
Farming	57.8
Fishing	47.3
Truck-garden	42.1
Hunting	47.3
Sowing/harvest	31.5
Watching TV	31.5
Playing sports/hobbies	21
Playing computer games	10.5
Proportion of everyday free-time practices in Urban Spanish community	
Watching TV	95.2
Playing no-electronic games	85.7
Playing sports/hobbies	76.1
Playing video/computer games	66.6
Visiting squares or parks	57.1

Practice	%
Visiting/shopping/movies	33.3
Feeding domestic animals	14.2

[a] *Cháguar* is the common name of two related species (*Bromelia hieronymi* and *Bromelia urbaniana*) of South American plants of the Bromeliaceae family which are non-woody forest plants with sword-shaped evergreen leaves. These plants are extensively employed by Wichí people; they provide a durable fiber that can be woven to make a large variety of textile products: bags and purses, ponchos, skirts, fishing nets, string, ropes, hammocks, mats, covers and clothing.
[b] The *yica* is the common name that receives the bags made with *cháguar* by Wichí women and according to our consultants it constitutes a symbol of identity for this ethnic group (but see Montani (2007) for a more detailed analysis about the significance of these bags for this ethnic group).

TABLE A2

	5–6 year-olds	8–9 year-olds	10–12-year-olds
Percentage of living things mentioned by Wichí-speaking children at each age			
Armadillo	0	21.4	38.5
Bee	21.4	35.75	0
Bird	28.6	35.7	30.8
CarobTree	0	14.3	38.5
Cat	14.3	28.6	46.2
Cow	28.6	21.4	23.1
Dog	42.9	50	46.2
Fish	14.3	28.6	23.1
Fox	7.1	28.6	23.1
Hen	28.6	21.4	7.7
Horse	21.4	21.4	46.2
Jaguar	14.3	21.4	15.4
Pig	14.3	14.3	23.1
Pigeon	14.3	28.6	15.4
Rabbit	14.3	21.4	30.8
Snake	14.3	21.4	15.4
Tsuna	14.3	21.4	23.1

TABLE A2 (*cont.*)

	5–6 year-olds	8–9 year-olds	10–12-year-olds
Percentage of living things mentioned by Rural Spanish-speaking children at each age			
Animal	70	66.7	81.2
Bird	20	33.3	18.8
Cat	50	58.3	68.8
Cow	50	58.3	50
Dog	40	83.3	75
Duck	40	25	37.5
Elephant	30	8.3	12.5
Giraffe	0	25	25
Hare	0	25	25
Hen	40	33.3	37.5
Horse	50	33.3	37.5
Human	70	58.3	68.8
Lion	20	25	18.8
Pig	10	33.3	56.2
Plant	0	50	50
Sheep	20	16.7	25
Snake	10	41.7	25
Tiger	10	8.3	25
Percentage of living things mentioned by Urban Spanish speaking children at each age			
Animal	23.5	80	69.2
Bird	29.4	40	38.5
Cat	29.4	46.7	69.2
Cow	29.4	26.7	7.7
Dog	47.1	53.3	69.2
Elephant	29.4	20	15.4
Fish	23.5	20	30.8
Giraffe	23.5	26.7	23.1
Horse	23.5	33.3	23.1
Human	52.9	73.3	92.3
Lion	29.4	66.7	46.2
Plant	0	46.7	46.7

	5–6 year-olds	8–9 year-olds	10–12-year-olds
Tiger	29.4	46.7	46.2
Tree	17.6	33.3	46.2
Turtle	29.4	13.3	30.8

TABLE A3 *Cluster analysis: characterization by frequencies of names generated in each group*

Characteristic culture	Frequency in sample (%)	Frequency in group (%)	*z* value	Culture frequency
Group 1				
Urban Spanish	40	62	9	307
Rural Spanish	34	36	1	263
Wichí	26	3	−12	202
Group 2				
Rural Spanish	34	40	4	263
Wichí	26	29	2	202
Urban Spanish	40	31	−5	307
Group 3				
Wichí	26	90	13	202
Urban Spanish	40	10	−6	307
Rural Spanish	34	0	−8	263

*The corresponding probability obtained from a t-test based on the comparison between percentage frequency in sample and percentage frequency in group (Morineau, 1982).