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**Title:** Experiencing nature and children's conceptualizations of the natural world

## **Abstract**

This paper examines young children's concept of nature, paying attention to the role played by types of daily experience with nature on 832 children's constructions of the natural world. We observed the roles of three types of experiences, as determined by the children's place of residence (urban, rural mountain range and rural agricultural). Participants wrote what they thought about when hearing the word 'nature'. Content analysis revealed an overarching two-level conceptual structure formed with four underlying and interconnected themes. Level 1 includes the first theme, (1) Natural and Non-natural Elements and the second integrates the other three (2) the Human-Nature Relationship, (3) Emotional Experience of Nature and (4) Actions in Natural Settings. The type of daily experience with nature accounted for variability in children's concept of nature. These results reinforce the importance of considering the role played by personal and situational characteristics in shaping children's constructions of the natural world.

**Keywords:** children, nature experience, concept development, content analysis

## **Introduction**

The word *nature* is commonly used in environmental social science research, and the human-nature relationship is frequently assessed. Studies about the effects of contact with nature on children's well-being (Kelz, Evans, and Röderer 2015, Wells 2000) and those evaluating the possible link between nature experiences and youngsters' pro-environmental attitudes and behaviors are proliferating (Cheng and Monroe 2012, Collado et al. 2015). However, researchers do not use a common vocabulary when referring to natural environments, probably assuming that their own concept of nature is shared by the children participating in their investigations. People's conceptualizations of the natural world might not be as universal as it is generally believed. Rather, it seems to be contingent on multiple factors. This paper focuses on the evaluation of 6 to 12 year-olds' concept of nature by considering one such factor. Specifically, we address the possibility that children's type of daily experience with nature will shape their conceptualization of the natural world. In our approach, we considered three types of children's daily experiences with nature: experience of 'manicured' nature in an urban area (E1), experience of nature in a rural mountain area (E2) and experience of nature in a rural agricultural area (E3). These types of experiences are mainly determined by the sociocultural context in which children live. The following section reviews relevant literature about children's conceptualization of the natural world and the factors that seem to shape this concept.

### ***Children's concept of nature***

The need for understanding what people have in mind when talking about nature has become a significant issue in nature management policy and actions (Buijs 2009; Keulartz, Van der Windt, and Swart 2004). Thus, the vast majority of research about people's conceptualizations of nature has quite specific applications. However, the

evaluation of the overall content of people's concept of nature has not received consistent scholarly attention. An exception is the early but still useful study conducted by Mausner (1996). Aiming to find some common ground when talking about the human-nature relationship, fourteen adults were interviewed about their concept of nature. The adult concept of nature was described as a complex net formed by 4 interrelated underlying themes (e.g., human place in nature). The childhood experience in the outdoors is important to the present study because it is considered a significant factor shaping adults' conceptualization of nature. Other variables, such as current place of residence, gender and cultural heritage, were also thought to lead to individual variability. However, Mausner (1996) did not report differences in adults' concepts of nature in relation to variations in these or any other factors.

In concordance with the work conducted with adults, most of the studies about children's conceptualization of the natural world have focused on the evaluation of very specific nature-related issues. These include assessing children's moral reasoning about different environmental problems (Kahn, 1999) or evaluating whether children think of humans as similar to other living beings (mainly animals) (Carey 1985, Herrmann, Waxman, and Medin 2010, Levin and Unsworth 2013, Medin, et al. 2010). Researchers generally agree that children's concept of nature may not be universal and that several factors account for its variability. Age, language, culture, gender, place of residence and time spent in outdoor settings have been highlighted as significant influences on children's conceptualization of nature (Anggoro, Waxman, and Medin 2008, Atran et al. 2001, Herrmann et al. 2010, Unsworth et al. 2012). Interestingly, how close a child feels to the natural world seems to account for variability in the concept of nature (Inagaki and Hatano 2002, Medin et al. 2010). This psychological proximity to nature appears to be associated with different types of daily exposure to natural environments (Cheng and Monroe 2012, Macnaghten and Urry 2000). For instance, following Carey 's (1985)

projection task, Ross et al. (2003) evaluated the possible differences in projecting novel properties from humans, wolves, bees, goldenrods and water to sixteen target objects (e.g., human, eagle, and rock). Three groups of children participated in the study: urban children, European American rural children, and Native American rural children. They specifically chose the latter group as it has been known to work the land in a sustainable way and for emphasizing the interactions of living organisms, including humans, in the local environment. Ross et al.'s (2003) results showed that rural children tend to have a more ecological way of thinking, compared to their urban counterparts. This is evident in the Native American rural group in all ages but only in older European American rural children. Following the same research approach, Medin et al. (2010) compared the category-based inductions of urban and rural children and found that rural children, who have greater experience with a wider array of animals, were less likely to exhibit anthropocentric (i.e., human-centered way of reasoning) patterns of responses.

A final example here involves Adams and Savahl' (2015) research about young adolescents' perceptions of the natural environment in South Africa. Thirty-two adolescents were interviewed about their views in relation to their nearby natural environment and environmental issues. According to the authors' findings, participants' type of experience in nature highly influenced their perceptions of the natural world. Specifically, crime and safety issues, frequently found in South African natural areas, were a recurrent theme in adolescents' perceptions of nature. The experience of *nature as the dangerous other* was in fact an overarching theme, and the rest of the categories found in adolescents' nature perceptions were directly related to or overshadowed by this theme.

In sum, the results described above support the idea that the predominant type of daily exposure to the natural world shapes the way children think about nature.

However, little is known about the content of childhood conceptions of the natural world. As far as we know, no common definition of nature has been included in the growing body of research examining children's relationship with nature. When specified, nature has generally been described as the presence of isolated elements, mainly plants and animals (Larson, Green, and Castleberry 2011, Wells 2000), but there is evidence suggesting that this conceptualization needs to be seen from a more complex, holistic perspective (Adams and Savahl 2015, Buijs 2009, Keulartz et al. 2004, Mausner 1996). Given this background, we find that there is a need for a common vocabulary when evaluating young children's relationship with the natural world as well as for a better understanding of the factors and processes that lead to the concept of nature. In this study, we offer a first approach to respond to this need. Our aim is to evaluate the underlying themes that form children's concepts of nature. In addition, the type of daily experience with nature, mainly determined by place of residence, will be considered a factor that may shape the way children think about the natural world.

## **Method**

### ***Study areas***

Data was collected in three areas in Spain: urban, rural mountain range, and rural agricultural area. These were chosen according to two assumptions: first, the concept of nature will be determined by participants' type of daily experience with the natural world (Adams and Savahl 2015, King and Church 2013). Second, the agricultural area is of particular interest because of the traditional knowledge and interaction with nature that characterizes people in this region.

By 'type of daily experience', we refer to the different modes of direct and indirect contact and interactions (such as through conversation) that children have with nature on a daily basis as well as the frequency of these interactions. This is thought to be



determined by children's place of residence. Considering these two assumptions, we defined three types of daily experiences in nature. Experience 1 (E1) refers to experiences in nature in a medium-size city (60.000 inhabitants). Urban children are expected to have access to nature mainly through nearby urban parks. The kind of natural elements likely to be found in parks are ornamental vegetation and local, rather domesticated animals (e.g., doves, dogs, ducks). In the city, nature does not constitute a livelihood. Therefore, conversations about nature are not expected to be salient in children's daily lives.

Experience 2 (E2) alludes to children living in a mountain range. These children have easy access to the *wild*<sup>1</sup> nature, including uncultivated vegetation, rivers, and non-domesticated animals (e.g., rabbits and deer). As nature does not constitute a livelihood, conversations about nature are not expected to be salient in a daily basis.

Last, Experience 3 (E3) refers to experiences with natural elements found in agricultural fields (e.g., sunflowers, cereals, vineyards). It is common for children to help their parents in an agricultural family business (Collado et al. 2015, McCormarck 2002) and children are expected to be involved in conversations about nature in a regular basis. Direct contact with nature is expected to be daily for rural children and sporadic for urban ones (Medin et al. 2010).

These three study areas are located in the same Spanish territorial entity, which permitted us to control for possible confounding factors, such as different schooling standards. To support our site selection, we gathered data about children's frequency of daily exposure to nearby nature and the appearance of nature-related issues in participants' daily conversations.

### ***School selection and participants***

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<sup>1</sup> Note that the term, 'wild', used here refers to nature that has little human intervention compared to E1 and E3 and does not refer to a mainly pristine, natural areas.

Data was collected in children's schools. These were selected according to the following criteria: (1) they were situated either in the city or in one of the villages included in our site selection, and (2) they were public schools.

A total of 20 schools and 832 children aged 6 to 12 ( $M$  age = 10;  $SD$  = 1.30) participated in the study. Forty-nine percent of the children were boys and most children (86%) were born in Spain. All participants came from a middle socioeconomic background. In each school, all children between 6 and 12 years old were invited to participate. By marking the top of the questionnaire, teachers pointed out those students whose literacy and writing skills might not have developed enough to appropriately follow the data collection procedure. This was done the students had handed in the questionnaires and children could not see whether their questionnaire was marked. The responses of the marked questionnaires ( $n = 34$ ) were excluded of the analysis.

### ***Instruments***

#### *Children's concept of nature*

Children's concept of nature was measured using an open-ended question previously used with children (Larson et al. 2011). The question is: 'What do you think about when you hear the word 'nature'?'

#### *Frequency of daily exposure to nearby nature*

Children's frequency of daily exposure to nearby nature was registered with two items in a 5-point, Likert-type scale (1 = never, 2 = almost never, 3 = sometimes, 4 = almost always, and 5 = always). These have been previously used in other studies to register youngsters' frequency of contact with nature (Collado et al. 2015). The items were: 'Do you spend time in natural places after school?' and 'Do you spend time in natural places during the weekends?' Internal consistency was  $\alpha = .71$ .

#### *Appearance of nature-related issues in children's daily conversations*

The appearance of nature-related issues in children's daily conversations was registered on a 5-point Likert-type scale (1 = totally disagree, 2 = disagree, 3 = I'm not sure, 4 = agree, and 5 = totally agree). The items included were: (1) 'I talk to my parents about things that have to do with nature', (2) 'My parents usually talk about nature, even if it is not with me', and (3) 'I talk to my friends about nature'. Internal consistency was  $\alpha = .78$ .

### *Procedure*

Letters were sent from the schools to the children's houses and authorizations were signed by one parent or guardian and sent back to the school. Children gave their written consent. Data collection was carried out collectively in the classroom. Children were given a sheet with the open-ended question and instructions. To avoid reading comprehension problems, both the question and the instructions were read aloud by one of the researchers. The participants had all the space they needed and were told there was no time limit. If participants asked what 'nature' meant, they were told to think about what they associated with that word. Once they answered the open-ended question, they were given a second piece of paper to register their frequency of daily contact with nature and appearance of nature-related issues in their daily conversations.

### *Data analyses*

First, a one-way ANOVA was conducted to check the possible differences in frequency of daily exposure to nature, according to children's place of residence. Frequency of daily exposure to nature was introduced as the dependent variable and the three groups of children as factor levels. Post hoc, pair-wise comparisons, with a Bonferroni adjustment were calculated to test differences among the groups. A similar analysis was performed to check possible differences in appearance of nature-related issues in children's daily conversations.

In the next step, we pursued the main objective of our analytic approach, which was to study children's concepts of nature. We also addressed the possibility of finding variations in this concept due to children's type of daily experience in nature. A qualitative approach was followed, using the content analysis (CA) technique. We based our analysis on the 6-step approach described by Cáceres (2003). First, we considered our main objective. Given that the majority of studies about the relationship between childhood and natural environments use the term, 'nature', as an abstract concept (e.g., Cheng and Monroe 2012, Larson et al. 2011), this study was designed to obtain responses pertaining to what children think about nature and not to conceptualize specific natural environments. Second, we transcribed children's written responses into a Word document and then imported to Atlas.ti software<sup>2</sup>. Third, our units of analysis were chosen. Children's written responses were their communication tool, and attention was paid to the content of their responses in combination with their contextual meaning (Hsieh and Shannon 2005). Children's responses varied from a few single words (i.e., 'plants' or 'animals') to more elaborate responses of one, two, or three short sentences. Based on the objectives of our study as well as on the type of response obtained, we had two units of analysis: (a) key words and (b) sentences.

The next step involved a cyclical reading process. The text was read and re-read several times with the objectives of the research always in mind so that it could be categorized and analyzed. We started the analysis with some assumptions about the codes and categories that might emerge, beyond those expressed in previous studies (Adams and Savahl 2015, Mausner 1996). The content of the responses was analyzed in terms of the similarities, differences, consistency, and inconsistency among the participants of the three areas. Text fragments that were relevant to this study and that

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<sup>2</sup> The authors acknowledge that Atlas.ti was designed to analyze data from a grounded theory approach. Nevertheless, it is a reliable tool for sorting out information and was used to help us organize the information obtained.

could indicate the grouping of similar text fragments into codes were highlighted. This permitted the first open coding (Step 4 of the analytical approach). As the text was being re-read, the codification process was polished. Once the codes were established, we read the text again to reassure the text fragments had been correctly coded. Two independent researchers carried out this interpretation process of the text content, conducting a systematic classification by using codes (Ruiz, 1996). Inter-rater reliability was  $r = .86$ .

Fifth, through a collaborative reflection between the two researchers based on children's responses and the established codes as well as on the results of previous studies, the codes were classified into 'themes'. Through a recursive, two-way process (Ruiz 1996), the concept of nature started to emerge as a themed structure.

Sixth, the themes obtained were synthesized in a conceptual model.

Once a common conceptualization of nature (i.e., a construct shared by the participants in the study) was found, the analytic approach focused on examining the possible differences in children's concepts of nature, according to their daily type of experience in nature. To statistically examine the differences found across the three groups of children regarding their *frequency of mentioning* codes,  $X^2$  tests were conducted.

## **Results**

First, children's differences in frequency of daily exposure to nature and appearance of nature-related issues in daily conversations are presented. Then, the results of the CA are described as a pattern of similarities emerged among the three groups of children, which led to an overarching *concept of nature*. Following that, the differences found across groups are exposed.

***Frequency of daily exposure to nature and appearance of nature-related issues in daily conversations, according to children's place of residence***

The one-way ANOVA showed that children's daily frequency of contact with nature varied across groups ( $F_{8,831} = 18.64, p < .001$ ). Bonferroni post hoc comparisons indicated that children living in the urban area had less daily contact with nature ( $M = 3.52, SD = 0.67$ ) than those living in the mountain range ( $M = 4.22, SD = 0.45, p < .001$ ) or in the agricultural area ( $M = 4.10, SD = 0.66, p < .001$ ). No significant differences were found between children living in the two rural areas.

With regard to the frequency of appearance of nature-related issues in daily conversations, differences were found across the three groups ( $F_{2,828} = 40.25, p < .05$ ). According to the Bonferroni post hoc comparisons, nature appears most frequently as the conversation topic of children from the rural agricultural area ( $M = 4.20, SD = 0.65$ ), followed by those in the mountain range ( $M = 3.90, SD = 0.46$ ). Urban children were the ones who spoke least about nature-related issues ( $M = 3.08, SD = 0.57$ ). The above results supported our selection of sites.

***Similarities found in the concept of nature within the three groups of children***

Similarities and common patterns among children's responses were observed in the first phase of the CA. After a systematic codification and a collaborative reflection, these were grouped into four big themes, according to their similar attributes or dimensions. These were titled: (1) Natural and Non-Natural Elements, (2) Emotional Experience of Nature, (3) Human-Nature Relationship, and (4) Actions in Nature. The themes and codes obtained as well as the percentage of children who mentioned each one can be seen in Table 1. We propose that children's concept of nature is formed from these four underlying and interconnected themes. They are described here in a linear way to facilitate comprehension; however, following Mausner's (1996) approach, children's

concept of nature corresponds to a model in which one or more of these four themes are included and used in a circular way. The first one, *natural and non-natural elements*, refers to the elements children describe that form nature. This theme, mentioned by 93% of the participants, appears to correspond with the first level of conceptualization where children start talking about one or several of the other three themes included in the second level. In other words, to describe the themes included in the second level, children had to identify what elements form nature. This conceptualization of nature can be seen in Figure 1.

#### FIGURE 1

The second theme, mentioned by 40.34 % of the participants, describes children's *emotional experience of nature*. It includes responses concerning what children feel in natural settings or their aesthetic judgments. The third theme is characterized by children's analysis of the *human-nature relationship* (27.15%). The fourth one includes participants' thoughts about the *actions* (52%) that they find compatible with natural places (Theme 4).

Following, we describe the themes obtained and the codes we used. These are illustrated with examples of the children's responses, indicating the child's gender, age, and the type of daily experience with nature (i.e., E1, E2 or E3). Examples of text fragments included in each code and theme can be seen in Tables 2, 3, 4, and 5.

#### TABLE 1

##### *Theme 1: Natural and non-natural elements*

Children wrote down natural elements that they consider part of nature or non-natural elements that illustrated to them what nature is not. When children describe parts of nature, they include living organisms like animals and plants (89.70%) and also inert elements like water (23.80%). The words, 'trees', 'plants', and 'flowers' are recurrent in

children's speech together with 'animals', 'birds', and 'bugs', amongst others. These living, natural elements are grouped into the category, Flora and Fauna (see Table 2). For example, an 8 years old girl (E3) claimed thinking about *animals, plants, flowers and trees* when hearing the word nature.

In addition, nature consists of the category, Water, in which, besides the very word 'water,' participants also included 'rivers', 'lakes', and 'ponds', amongst others. Overall, when children named 'water', it was usually in combination with plants, animals, or both, such as *'I think about animals, plants and water'* (Boy, 10, E1).

At a higher level of abstraction, eighteen percent of the participants mentioned landscapes or ecosystems, which led to the code, Landscape. In this case, children continue to focus on what nature is, describing not just isolated elements, such as plants or a river, but conceptualizing nature as the countryside, the beach or the forest. For instance, *'I think about the animals that I like, the valleys I have seen and what has impressed me and about the landscape'* (Girl, 12, E2).

Finally, participants mentioned what nature is not, or the elements that are outside what they consider a natural environment (11.20%). The answers given emphasize that nature is not human made. For example, *'About a quiet place, without noise, far away from the city and from the pollution'* (Boy, 10, E1).

## TABLE 2

### *Theme 2: Emotional experience of the environment*

Once children have defined the elements that form nature, they might indicate their feelings when in natural environments as well as establish aesthetic judgments. Three codes were included in this second theme: first, Feelings of Well-Being (mentioned by 36.77% of the participants), such as relaxation, being comfortable, tranquility or peace. In addition, responses regarding Activation in Natural Environments (23%) like



happiness, enjoying oneself, feeling free or doing what one wants to do can also be observed in children's responses. Examples of these are *'I think about freedom, because nature is something big, you can relax there, you can talk to the plants and animals, and it helps you think'* (Girl, 12, E1) and *'It is very pleasant and sometimes very beautiful. When I'm in nature I can relax and forget everything that is bad in my life'* (Girl, 11, E3).

Some children conduct an Aesthetic Judgment (34.85%) on what they consider natural environments. Thus, adjectives, such as beautiful, marvelous, or pretty are used to refer to nature. Some examples are *'Nature is something beautiful and marvelous, contrary to ugly buildings or nasty pollution'* (Boy, 11, E1) and *'I think about plants: they are very beautiful, and about animals that are happy'* (Girl, 10, E2).

### TABLE 3

#### *Theme 3: Human-nature relationship*

The relationship between people and the natural world is also included in the children's conceptualization of nature. Youngsters reported what they consider right and wrong to do in and with nature. Once they have established what nature is formed of (Theme 1), some children describe the Human Impact (mentioned by 13.2% of the children) over natural environments, talking about climate change, fires, pollution, and endangered animals. For instance, *'I think about animals, plants, a river, climate change, etc.'* (Boy, 9, E1).

According to children's responses, this impact can be diminished by Prevention and Mitigation Actions (19%), such as recycling and protecting or looking after nature. Some examples are *'I think about the fact that we need to recycle and to look after the animals and plants, and we shouldn't throw rubbish on the floor'* (Boy, 10, E3) and *'I*

*think about the countryside, river, animals, plants and that we need to look after them and preserve nature*' (Boy, 12, E2).

When thinking about the damages that human actions bring to natural environments, about 10% of the children express Feelings of Worry and Sadness. This encompasses a third code included in this theme. For instance *'About animals and about pollution because I become quite sad when I see everything polluted'* (Boy, 11, E3).

In addition, more than 12% of the children described the human-nature relationship as a dependency. Some examples are *'I think about plants because I can't live without them and about all the living organisms'* (Girl, 10, E3) and *'I think about animals and plants. I also think about the countryside and the sea. In my opinion, we can't live without nature'* (Boy, 10, E2).

#### TABLE 4

##### *Theme 4: Actions in nature*

More than 49% of the children described nature as a place where different activities can be conducted. Play is the most frequently mentioned, but other leisure activities, such as running, taking a rest, jumping, or spending time with friends also appear. Activities related to working in agricultural fields (e.g., harvesting) are also reported. Some examples of the responses given by children are *'About the countryside, about playing in it, about picking flowers, about running and about playing football'* (Boy, 10, E1), and *'About being outdoors and playing with animals and being with the plants'* (Girl, 10, E3).

#### TABLE 5

##### ***Differences in children's concept of nature according to the type of daily experience with nature***

Overall, when thinking about nature, children related personal experiences in places that they consider natural. These descriptions have served as a reference to obtain the common themes seen previously, but differences were found in the discourse of personal experiences revealed by children in the three study areas. While urban participants tend to talk about past experiences in natural places and about sporadic experiences, usually far away from cities, rural children describe day-to-day encounters with nature. These differences are reflected in the following examples: *'I think about the village where I live because there is a lot of nature around and I always go to there with my bike or with my friends'* (Boy, 11, E2) and *'I think about the countryside, about the areas that surround the village where I live, about pine forests, etc.'* (Boy, 12, E3).

Urban children also talk about personal experiences in nature, but stress that natural environments are outside their everyday lives. For instance, a 12-year-old girl indicated *'I think about my cottage, which is far away, in the middle of nowhere in the country side, and I like it very much'*. Or they describe nature as something found in city parks (e.g., *'I think about plants and the park nearby my school'* (Boy, 10, E1).

A second difference found is in relation to Theme 1. Urban children are more likely to mention non-natural elements when describing what nature is ( $M = 11\%$ ) compared to children from the mountain range, who did not make this distinction, and to those in the agricultural area ( $M = 2\%$ ),  $X^2(2) = 16.56, p < .001$ . Some examples of urban children's answers are *'It is something that hasn't been made by humans'* (Girl, 11, E1) and *'I think about animals, plants, insects, clean air and, most of all, the tranquility of being away from everything related to the smoke of the cars'* (Boy, 10, E1).

Another point worth mentioning is regarding the category, Dependency on Nature. Overall, children are aware of the fact that humans depend on nature to survive.

However, this relationship of dependency is more present in the discourse of children in rural areas ( $M = 4\%$  for urban children,  $12\%$  for children in the mountain range and  $16\%$  for those in the agricultural area,  $X^2(2) = 7.83, p < .05$ ). Urban children claim that nature is important for people to live, but they do it in an abstract way, for example, *'Plants give us O<sub>2</sub>'* (Girl, 11, E1). This kind of response is also found in rural children but, in addition, they add arguments that reflect their closeness to natural environments, such as *'I think there is a need to help plants and animals, as we can breathe because of them, and they give us food'* (Boy, 10, E2). For rural children, nature is understood as a means of sustenance: *'I think about nature, how helpful it is for our lives and I think it helps us eat and work'* (Girl, 11, E3). Thus, compared to urban children, those in rural areas stress that nature is necessary for people's existence, showing a clearer knowledge about where food comes from and of humans' dependency on it. It is in this same theme, Human-Nature Relationship, where we find the next difference worth noting: Rural children's concept of nature includes, to a great extent, allusions to natural resources preservation and conservation ( $M = 32\%$  for children in the mountain range and  $21\%$  for those in the agricultural area). The emphasis placed by the urban children in this respect is less prominent ( $M = 10\%$ ),  $X^2(2) = 14.58, p < .001$ .

The last difference refers to the types of Actions (Theme 4) children relate to natural areas. While participants in the city and in the rural mountain range mainly describe leisure activities, those in the agricultural rural area also mention work-related actions ( $M = 25\%$ , compared to  $4\%$  of the children in E2 and  $0\%$  in E1),  $X^2(2) = 33.30, p < .001$ . In other words, children in agricultural areas consider the recreational function of natural settings together with the role nature has for livelihood. They seem to help their families with agricultural labor, and they include these activities in their constructions of nature. On the other hand, children in the mountain range and in the

city appear to have a purely recreational relationship with nature. Some examples of responses given by youngsters in the agricultural area are *'I like nature very much, I think about animals and plants, and about harvesting. I like helping my parents out. I step on the grapes with the trailer; I drive the tractor, etc.'* (Boy, 9, E3) and *'I think about plants, animals, the countryside... I have harvested and there are many fruits and stuff that we can eat afterwards'* (Girl, 9, E3).

## **Discussion**

To extend our understanding of how children conceptualize nature, the current paper presents research involving youngsters with three different types of daily experience with nature, mainly determined by their place of residence: rural mountain range, agricultural rural area and urban. Frequency of contact with nearby nature and appearance of nature-related issues in children's daily conversations were registered to support our site selection. Similar to what has been found in previous studies, rural children's contact with nearby nature is more frequent than that of urban ones (Collado et al. 2015, McCormack 2000). Moreover, rural agricultural children seem to talk about nature more than those in the other two groups. This supports our expectation that children living in an area where nature constitutes a livelihood would be more frequently involved in discourses mentioning nature than children from families whose mean of sustenance is not nature.

Our results show a pattern of similarities seemingly exists in children's concept of nature, although there is evidence of certain flexibility in the development of this concept. In concordance with previous studies conducted with adults (Mausner 1996), children's concept of nature appears to be constructed by several underlying and interconnected themes, leading to a common pattern of response. this involves two levels and four themes (Figure 1). In the first theme, which constitutes the first level,

children describe the elements that are part of nature. Animals, plants, and water are included in children's descriptions together with non-natural elements, such as cars or the city. This theme also appeared in adults' conceptualizations of nature, although the diversity of elements was wider than the one explored by children (Mausner 1996). This dimension is consistent with what other authors have called cognitive beliefs about nature (Buijs 2009, Keulartz et al. 2004). It reflects the association established between an object (nature) and the attributes that are assigned to that object (Eagly and Chaiken 1998). Interestingly, heterogeneity was found in children's constructions of nature, with urban children being more likely to emphasize the difference between natural and built-up settings than rural ones. It may be that urban children take their familiar environment (i.e., the city) as a prototype setting and describe other settings (e.g., natural) in comparison to it.

When children talk about nature, they do not only report their cognitive beliefs but also take into consideration other conceptual frameworks gathered in the second level. Similar to what Mausner (1996) described with adults, feelings of relaxation and freedom appeared in children's conceptualizations of nature. It implies describing their emotional experience in environments considered natural, including positive feelings and emotions like happiness and feeling full of life or well-being. This interpretation is consistent with stress reduction theory (Ulrich 1983) and the wide number of empirical studies reporting the psychological benefits of contact with nature, such as more positive mood and relaxation (Kelz et al. 2015, Talbot and Kaplan 1986). In concordance with the results obtained with teenagers (King and Church 2013), natural settings are described as places that offer action opportunities. These opportunities of action are similar to what other authors have defined as *affordances* (Clark and Uzzell 2002, Gibson 1979). Natural environments seem to support certain activities that are

compatible with what the child wants to do (e.g, to play). These constitute a fourth theme in children's concept of nature. However, nature is not just a place that promotes leisure activities. Rather, depending on children's daily types of experiences with the natural world, nature can also be understood as a place to work. Specifically, children in the agricultural area describe nature as a setting where activities, such as harvesting or using the tractor are conducted. This dual vision of nature is not shared by children in the mountain range or the city.

In line with previous studies about landscape preference (Herzog, Maguire, and Nebel 2003), children think of nature as an aesthetically pleasant place or what Keulartz et al. (2004) claimed were *expressive, aesthetic experiences* about nature. Scenic beauty is also a recurrent topic in teenagers' discourse (King and Church 2013). Contrary to what has been reported for adults (Mausner 1996), children establish a direct link between a natural place and the positive evaluation of its beauty. When youngsters hear the word 'nature', they think about an esthetically pleasant place, and use adjectives, such as 'beautiful' or 'marvelous'.

Considering that children will in time face environmental problems, the allusions found concerning the human-nature relationship (Theme 3) are worth mentioning. Similar to Adams and Savahl's (2015) findings with young adolescents, the participants of the current study showed awareness about the impact of human beings on natural environments and proposed actions to ameliorate it. This interpretation is consistent with the dimension of *normative values* (those that would guide what is moral, desirable and right in regards to nature) described by Buijs (2009) in a study of adults' constructions of nature. Contrary to Kings and Church's (2013) results with teenagers, children seem to not only value nature because it supports activities they want to conduct but also because of its inherent value. Again, attention needs to be paid to

children's daily type of exposure to nature, as children in the rural areas are more likely to stress the need to preserve nature together with people's dependency on natural resources than those living in cities.

To the best of our knowledge, this is the first time that the content of young children's concept of nature and its relationship with their daily types of experience with nature has been examined. Our results indicate that children's constructions of nature include both commonalities and heterogeneities. This has implications when evaluating the child-nature relationship as well as when designing science curricula and environmental education (EE) programmes. In concordance with previous studies (Hermann et al. 2010), our results show that pro-environmental attitudes are more salient in rural areas compared to urban ones. Thus, when attending an EE program, children's background needs to be considered, as different designs might be needed when approaching different audiences.

Our findings also have implications for studies evaluating the children-nature relationship. We may not obtain the same results when children are asked about nature versus when they are asked about plants and animals (Larson et al. 2011), the earth (Manoli, Johnson, and Dunlap 2007) or environmental issues (Kahn 1999). As no common definition of nature has been used, it could be that different children have different conceptualizations of nature in mind when answering researchers' questions. If we want to make comparisons among studies, an effort to use a common vocabulary is needed. Rather than investigating natural elements in isolation, we encourage researchers to consider children's concept of nature as an overarching conceptualization including underlying categories. Moreover, this study shows that children living in different rural areas do not necessarily experience nature similarly and, concomitantly, might understand nature differently. Thus, the general trend of comparing urban and



rural populations when examining the child-nature relationship does not seem to be enough. We suggest considering children's daily types of experiences with nature instead.

There are, of course, a number of limitations to the current study. First, keeping in mind that the aim of the study is to offer a first approximation to children's concept of nature, we consider the methodology used was sufficient for the scope of the study. Nevertheless, other methodological approaches, such as individual and collective interviews with the children, or observational data, would complement the results obtained. This might be especially useful for younger children (6-7 years old) whose literacy and written skills might not be fully developed. Second, it is difficult to distinguish between the effect of daily types of experience with nature and that of other factors, such as prevailing social discourse, appearance of nature in the media, or in school curricula, as they usually come together. Future evaluation considering the combined effect of these and other factors in children's conceptualization of nature awaits new scholarship. Similarly, factors, such as age, parental profession (professionally related to nature or non-related), and gender might account for within-group variability and deserve further exploration. Finally, people's concept of nature seems to change through the lifespan. Thus, our results represent the concept of nature that young children have. Longitudinal studies would help clarify whether the knowledge created at this early stage through different types of experiences in natural environments serves as a basis for people's conceptualization of nature as they grow up together with the factors and processes that shape their constructions of nature along the way.

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