

Article

Czech Preschool Children's Conceptions about Nature

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Abstract: This study focused on young children's understanding of nature, an issue observed to be a research gap in the scientific community. The question "What nature?" is central to this research. Answers to this question were obtained from 342 children from 21 Czech kindergartens, and results showed 302 preschool and children (aged from 3 to 6.5 years) from the sample displayed a conceptual understanding of nature and expressed their ideas verbally. Qualitative content analysis and comparative analysis (nouns and verbs separately) were performed on the results. Most children interpreted nature through lists of objects or as a space or a concrete place, and most of the objects mentioned related to living nature. Children used verbs describing natural events more often than verbs describing their own or human activities in nature. The comparison between children's, adults', and pupils' concepts of nature shows that children expressed their concepts in a similar, albeit not identical, manner to adults. They expressed the utilitarian and aesthetic value of nature, showed a scientific interest and an emotional connection to nature, and showed their joy in interacting with nature. Children understood nature more positively (no fear, aversion, or efforts to control nature) than adults. Czech children noticed more plants and mushrooms than Norwegian children. A similar percentage of Czech and Australian children included people on their lists of nature. Although certain similarities in children's answers were noted, each child understands nature individually. Teachers should respect this fact and consider this in environmental and global education.



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1. Introduction

1.1. Early Childhood Research "Hole"

Little attention in pedagogical research has been focused on early childhood. This is a serious lack because, in accordance with constructivist theory, early childhood is key to education. The scientific community realized this in 2009 when Julia Davis published the significant article "Revealing the research 'hole' of early childhood education for sustainability: a preliminary survey of the literature" in the journal *Environmental Education Research* [1]. Following this article, "Transnational Dialogues in Research in Early Childhood Education for Sustainability" was begun in 2010 [2], and the overview study "Research in early childhood education for sustainability: International perspectives and provocations" [3] and a number of other relevant articles were published. From extensive research, Ingrid Engdahl determined that young children (from birth to eight years) have significant knowledge about the Earth and important ideas about environmental issues, in addition to knowledge about the responsibilities of individuals with respect to sustainability. It was clearly apparent in the research findings that adults often underestimate the competencies of young children [4]. Aihua Hu and Siv Ødemotland [5] indicated that purposely designed activities can promote early childhood education for sustainability and the quality of early childhood education. Claudia Melis, Per-Arvid Wold, Anna Maria Billing, Kathrine Bjørgen, and Børge Moe interviewed 56 kindergarten children (5–6 years old) about their perception of the importance of several organisms in Norway in 2010 [6]. Today, there is no doubt that focusing on the youngest is very important [7].

1.2. Concepts of Nature

“Nature” itself is a fuzzy concept and individuals’ descriptions of “what nature is” are each slightly different. The content of the meaning of this concept is not fixed, and its significance is not clear [8].

In 1983, Joachim F. Wohlwill introduced the basic concepts of understanding nature as (a) a manifestation of processes of growth and changes, (b) a refuge, and (c) a symbol. Wohlwill noted that “nature” is a concept often used by laypersons and scientists, but it received little attention in scientific articles [9]. Subsequently, researchers have focused on defining the concept of nature.

Anders Hansen [10] studied how the media interpreted the concept of nature. He discovered and wrote about five primary media interpretations of nature: 1. nature is good, unspoiled, ideal; 2. nature is vulnerable; it needs to be protected; 3. nature is dangerous; 4. nature is an imperfect space that needs to be improved; 5. nature is a challenge (it is necessary to fight it, to overcome it).

Stephen Kellert focused on studying the meaning of nature for different people. Based on this, he outlined ten value meanings of nature: 1. aesthetic—physical appeal of and attraction to nature; 2. dominionistic—mastery and control of nature; 3. humanistic—emotional attachment to nature; 4. moralistic—moral and spiritual relation to nature; 5. naturalistic—direct contact with and experience of nature; 6. negativistic—fear of and aversion to nature; 7. scientific—study and empirical observation of nature; 8. symbolic—nature as a source of metaphorical and communicative thought; 9. spiritual—feelings of transcendence; respect for nature; 10. utilitarian—nature as a source of physical and material benefit [11].

Phillip Payne [12] studied 28 sixth grade Australian children’s conceptions of nature and described a gap between theory and practice in environmental education, because the learner’s concepts are different from the children’s concepts. He focused on the following concepts:

“Nature is often viewed as external.”, “There are risks in imposing a view of nature, consciously or unconsciously, on children.”, “Children’s lives are hardly ‘natural’ anymore!”

However, no previous research has focused on younger children’s understanding of nature. The goal of this study was to take the first step in determining children’s conceptions and mental representation of “nature representations”, and compare them to findings in previous work [13].

1.3. Early Childhood Education in the Czech Republic

In the Czech Republic, most preschoolers (85%) attend kindergarten [14]. The Czech curriculum, named the Framework educational program for preschool education [15], uses the words “nature” or “natural” 20 times in 46 pages. Several of its goals are related to nature, i.e., visiting nature, learning about nature, the joy of nature, nature conservation, etc.

In a traditional Czech kindergarten, teachers go outdoors with the children “if the weather is nice.” This means that they rarely go outside at some times of year, especially in winter.

The movement for forest kindergartens was established in the Czech Republic 15 years ago. There are now almost 150 forest kindergartens in the Czech Republic. These care for and educate about 3000 children [16].

Kindergartens in the Czech Republic are further influenced by the movement for the transformation of school gardens into natural gardens and the “Go out!” movement.

1.4. Purpose of the Study

If teachers are to visit, observe, or protect nature with preschool children, it is essential that they think about the concept of nature, are aware of its different understandings by different people, and are interested in how preschoolers understand it. Our ideas of how children understand nature are very superficial. The aim of this study was to discover, classify, and compare the ideas about nature of Czech preschool children. Follow-up surveys among preschoolers from other countries are welcome.

2. Goals, Methods, and Participants

The goals of this study were:

- To take the first step in discovering children's conceptions and mental representation of "nature representations" (the expected output is a detailed description); and
- Compare these to findings in previous work.

The method of qualitative research was chosen as being suitable for fulfilling the goals. This allows fine and unexpected details to be captured.

The main steps were:

1. Interviews and their exact transcription.
2. Open coding, and subsequent grouping and categorization.
3. Quantification of the number of categories and subcategories in terms of numbers and percentages (according with [17]).
4. Analysis, axial coding, and subsequent pattern searching, regrouping, and interpretation.
5. Discussion and Comparison.

The respondents were preschool children from the Czech Republic. A qualitative method was used, i.e., a short structured interview, in which there was only one open question: "Tell me what nature is?"

Because preschoolers often have communication problems with an unfamiliar person, their teachers conducted the interviews. Teachers were trained and informed about how to proceed with the interviews with the preschoolers. The interviews were conducted individually during several months in the spring of 2015. Teachers transcribed the answers verbatim and sent the answers to the researcher.

Answers were obtained from 342 children from 21 Czech ordinary kindergartens. The average age of the respondents was 5.1 years, and the group was roughly evenly split between boys and girls. Twenty-one teachers took part in collecting the answers.

The answers were tabulated and classified using qualitative content analysis and comparative analysis according to the sampling in grounded theory [18].

Several samples and patterns were found in the data. Finally, children's and adults' concepts of nature were compared.

Ethical issues were discussed within the faculty with the Commission for Ethics in Research. Because the research was anonymous and did not monitor sensitive data, the approval of the commission was not required for its implementation. The research participants were not harmed, nor exposed to an unpleasant situation. None of the described ethical conflicts [19] occurred.

3. Results

3.1. Introduction and Two Main Approaches

A significant majority of 302 (i.e., 88%) of the 342 Czech preschool children answered the question "What is nature?". Only 40 (i.e., 12%) answered "I don't know what nature is." In the following text, we examine the answers that were able to be processed; thus, we consider the responses of 302 children.

Even a cursory review of the children's answers made it clear that this is exciting material. Some of the children's responses to the question were simplistic due to verbal clumsiness or inadequacy; however, it was nonetheless possible to analyze the responses of all 302 children who answered the question.

Two basic approaches were chosen in analyzing responses, i.e., monitoring (a) nouns and (b) verbs in children's answers. Both word types carry essential information about children's concepts of nature.

3.2. Evaluation of the Nouns in Children's Answers

The children used a wide variety of nouns, thus allowing the main frameworks in children's responses to be categorized. The following main categories were found (see Figure 1): (a) nature is interpreted using a list of objects (289 children, i.e., 96%); (b) nature

is interpreted as a space (76 children, i.e., 25%); (c) nature is interpreted as a concrete place (23 children, i.e., 8%); and (d) other (37 children, i.e., 12%)

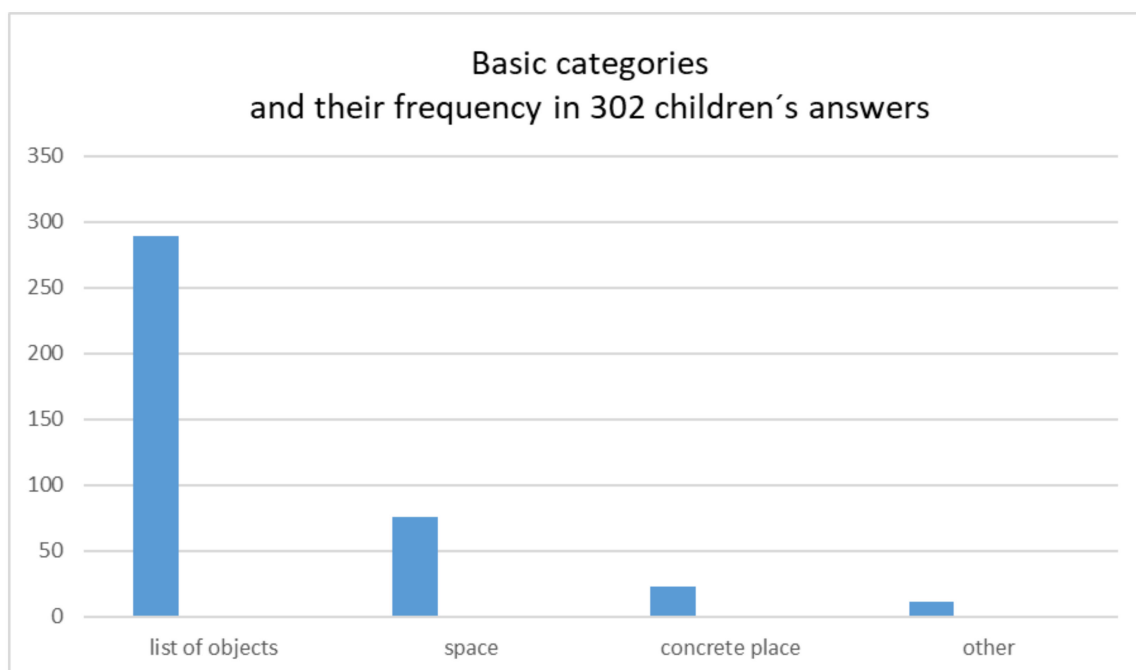


Figure 1. Basic categories and their frequency in 302 children's answers.

These sections can be divided further into subsections, providing a concise and precise description of the experimental results, their interpretation, and the experimental conclusions that can be drawn.

3.2.1. Nature as a List of Objects

Most children (289, i.e., 96%, see Figure 1) answered the question “What is nature?” with enumeration, using lists of objects, for example: “Animals, flowers, meadow, forest.” (Vít, 6 years old) or “Nature? It’s a forest and big beetles on plants.” (Tobias, 6 years old).

Children most often listed two objects in their lists. The maximum was 23 objects in the answer of one five year old girl, Hana: “Nature is trees, grass, forest and mushrooms. Still flowers and golden rain, shrubs, wicker, water, bees, flies, ants, beetles and even more clouds, birds, butterflies, snails and bunnies, birds. Squirrel and bunny are also nature. Raspberries and berries.” (see Figure 2).

Most of the objects mentioned by children belonged to living nature (748 times). The objects of inanimate nature were mentioned significantly less often (112 times). Ecosystems (including the word “zoo”, 12 times) were mentioned by 137 children. People were mentioned as a part of nature by 12 children, 32 children mentioned human construction and products: buildings were mentioned 29 times and a car three times (see Figure 3).

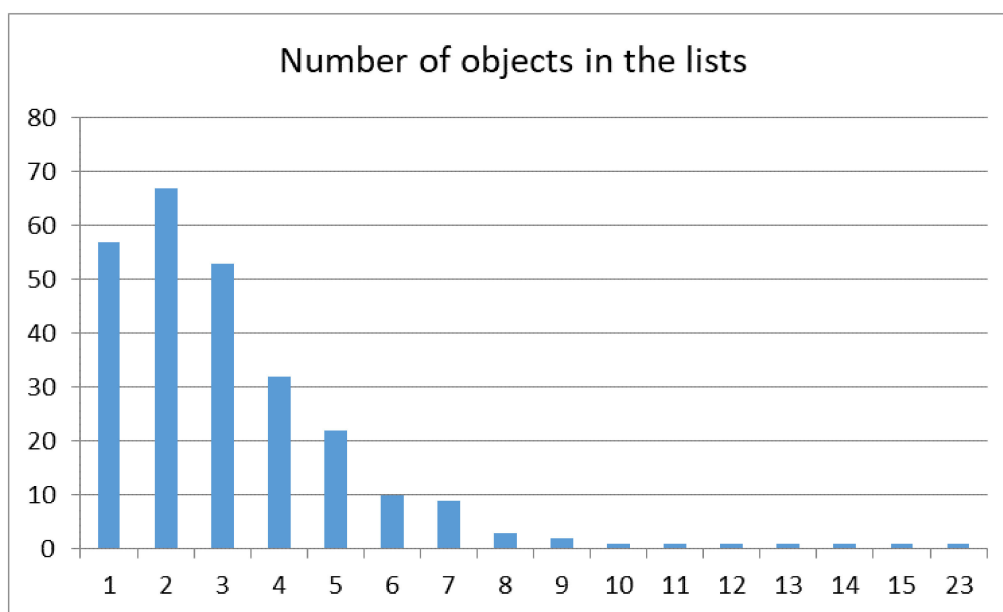


Figure 2. Number of objects in the children's lists.

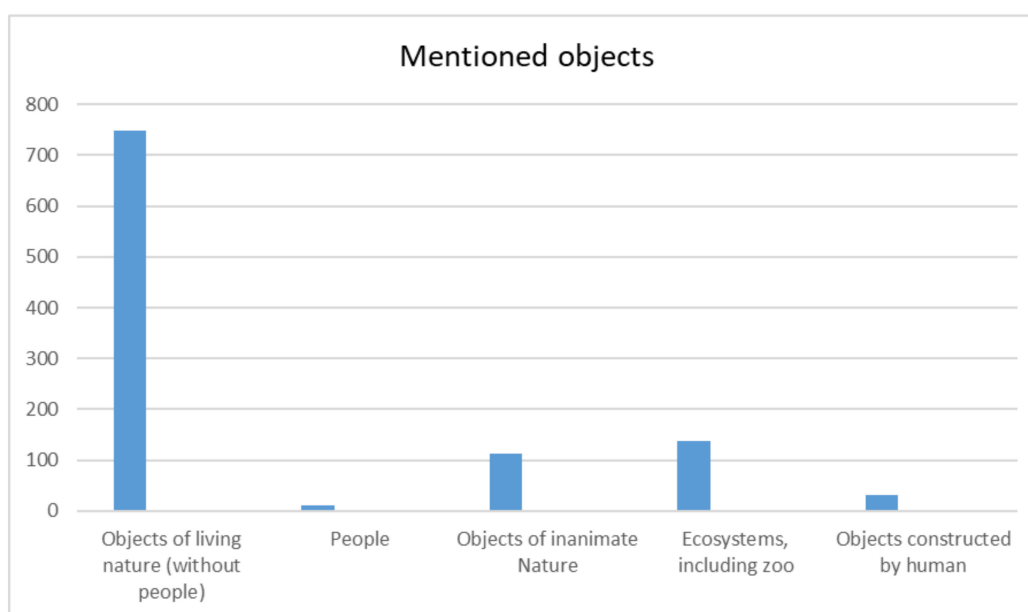


Figure 3. Mentioned objects.

Further analysis focused on the details of each child's answer. It was observed that the lists children made included either individual natural elements—from the higher taxonomic categories such as “animals” or “plants”—to individual species, such as “golden rain tree” elements; celestial formations, such as “water” or “sun”; and entire classified ecosystems, most often “a forest”, “a meadow”, “a field”, “a garden”, or “a pond”, or occasionally “wetland”. There were five main subcategories of objects (see Figure 4).

All categories were examined in more detail, beginning with the most frequently mentioned subcategory of “species, genera or other taxa.”

A total of 228 children listed species, genera, or other taxa, with most answers including several different items falling into this category. Items of this category were sorted into sub-subcategories: plants, including edible fruits (443), animals (324), and fungi (8), according to the three natural kingdoms (see Figure 5). No child mentioned the protista or monera kingdoms.

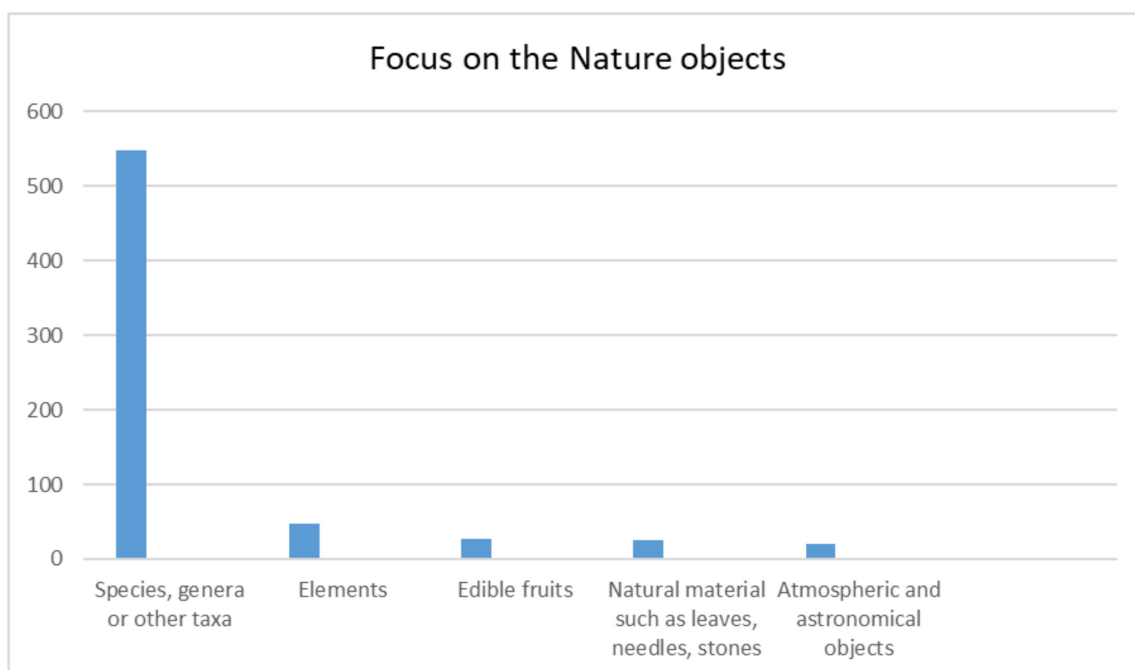


Figure 4. The subcategories of nature's objects in 302 children's answers.

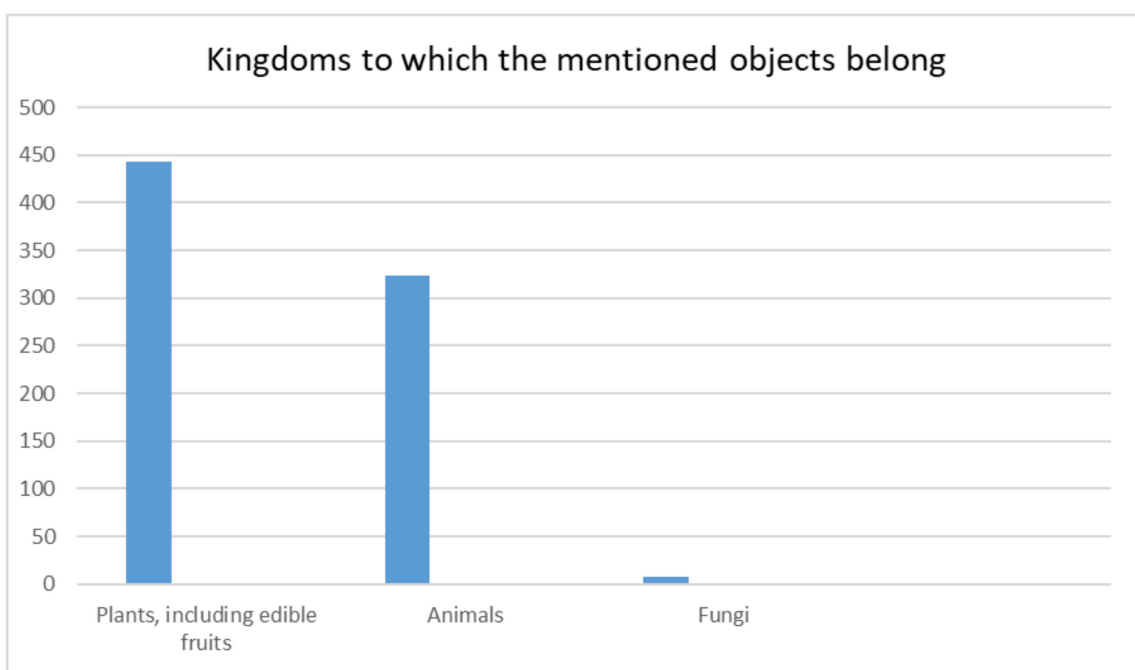


Figure 5. Kingdoms to which the mentioned objects belong.

The majority of children listed representatives from both plant and animal kingdoms (100 children), apparently expressing an effort to cover diversity. If children mentioned representatives from only one kingdom, they more often chose the plant kingdom (78 children) than the animal kingdom (48 children), although the children refined more representatives from the ranks of the animal kingdom (see Figure 6). Only one child mentioned representatives of all three kingdoms (5 year old Hana).

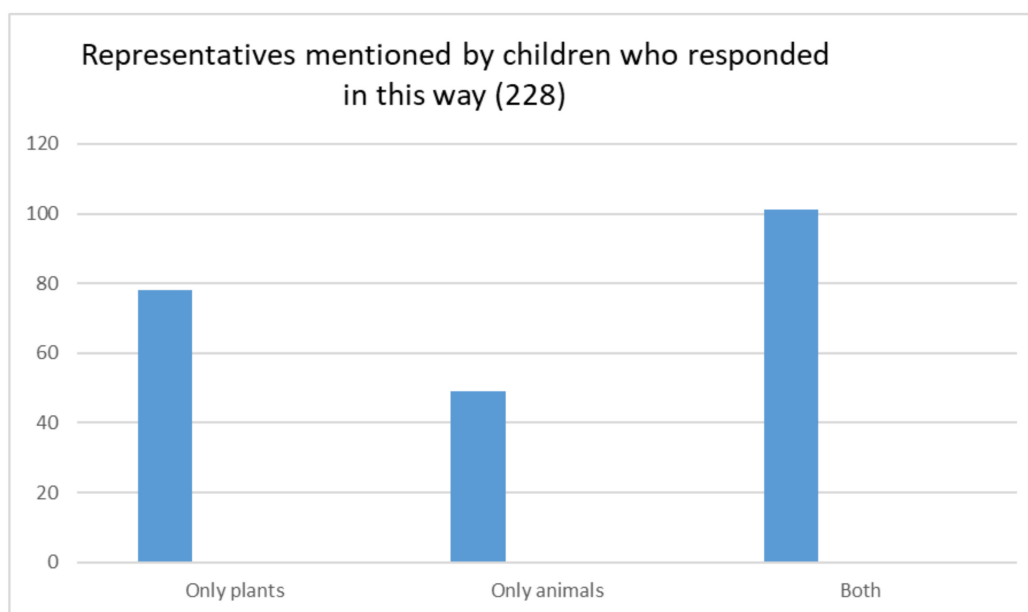


Figure 6. Listed objects broken down by kingdom.

From the plant kingdom, children mentioned various specific objects (see Table 1).

Table 1. Details on the main sub-subcategories of the plant kingdom.

Plants	Frequency of Appearance	Details or Comments
Trees	107	The most typical answer was “tree” (100×). Only 7 concrete species of trees were mentioned. None was significantly repeated.
Plants	103	The most typical answer was “plant” (67×), most likely meaning “herbs” or “flowers”. Only 36 concrete genera of plants were mentioned. None was significantly repeated.
Grass	63	The typical answer was “grass”. No child mentioned a concrete species.
Edible fruit	27	The relatively abundant occurrence of fruits (most often “strawberries”, “apples”, “cherries” and “blueberries”) in children’s words is interesting, because data collection took place in the spring, when the trees were in bloom. Nevertheless, the children focused on the fruits.
Bushes	16	The typical answer was “bush”. No child mentioned a concrete species.

From the animal kingdom, children mentioned “animals” (just animals) 93 times and 177 children mentioned various specific animal orders, genera, or taxa. These animals can be divided into the categories “vertebrates” and “invertebrates”, although no child actually named these categories in their answer. The children mentioned 131 representatives of vertebrates and 46 representatives of invertebrates.

Children most often mentioned specific mammals (for more details see Table 2).

Table 2. Sub-subcategories of animals in detail.

Animals (People Are Not Included Here)	Frequency of Appearance	Details or Comments
Mammals	80	No child actually used the subcategory “mammals” (just mammals). Exotic mammals (total 41): elephant (8), giraffe (7), bear (5), tiger (3), hippo (2) and several different pets (7). Domestic mammals (total 36): dog (10), cat (9), horse (5), cow (5), pig (2) etc. Wild mammals (total 3): wild pig (2), wolf (1).
Insect	36	Just “insect” 5 times. Concrete taxon: “butterflies” (13), “beetles” (7), “ants” (6), “wasps” (3), “fly” (2).
Birds	29	The most typical answer was just “bird. Only 8 concrete species of birds were mentioned, most often “parrots” (4).
Reptiles	4	No child actually used the subcategories “reptiles” (just reptiles). They spoke about “lizard” (2), “turtle” (1) and “crocodile” (1).
Dinosaurs	4	Only “dinosaurs”. They did not mention types of dinosaur.
Fish	4	The typical answer was just “fish”. No child spoke about concrete species.
Earthworm	2	
Snails	1	

Children most often mentioned exotic mammals, including exotic pets. Domestic mammals were mentioned less often and wild animals of the Czech Republic were mentioned the least. Wolves were mentioned only once, for example, but are also very rare in Czech landscapes.

3.2.2. Nature as a Space

Seventy-six children (25%) described nature as a space, or a place where something occurs or takes place. For example, “A world in which there are flowers, plants, shrubs, trees, grass, it should not be destroyed and there are rocks, stones, animals.” (Tobiash, 5 years old).

Some of the children in our sample did not have sufficient verbal skills to fully express their ideas, and their attempts to define nature were therefore very simple, for example: “Such as grass where animals live.” (Philip, 6.5 years old), “Something where there are no cars and free animals.” (Daniel 5.5 years old), “We see animals, flowers and animals there.” (Anna 4.5 years old), “It gives us flowers.” (Helena, 4 years old).

Further categorization of nature as a space was not performed due to the diversity of responses captured and the insufficient verbal skills of children.

3.2.3. Nature as a Concrete Place

A minority of 23 children described nature as a specific concrete place they know, such as “village” or “at grandma’s” or “our garden”. For example, “Nature? I was there in the summer with my grandmother and grandfather, we were in the Tatras.” (Viktorka, 6 years old).

Further categorization was not performed due to the low number of cases and the variety of responses captured.

3.2.4. Other

The answers of 37 children (12%) were impossible to categorize. The main reason was that they were too short, for example “Doctor.” (Claudie, 3 years old) or “Kindergarten.” (Pepa, 3 years old).

The second reason that some answers were impossible to categorize was the verbal or mental insufficiency of the respondents, combined with an inability to find the context. For

example: “Nature is that my parents left me alone in kindergarten.” Or “Martin lives there and wanted to eat a rabbit for lunch.” (Anetka, 4 years old) or “Death.”

3.3. Evaluation of Verbs

Almost all children used the verbs in their answers, and attention was paid only to those answers in which the verb had a main or even a key role. There were 139 such cases in our sample (302 children’s answers).

In these answers, children used verbs to describe what was happening in nature, or what the children or their loved ones could do in nature.

Natural processes were mentioned by 87 children (25%) and the activities of the child or their loved ones were mentioned by 52 children (17%). A total of 18 children (6%) mentioned natural processes and human activities in nature at the same time (see Figure 7).

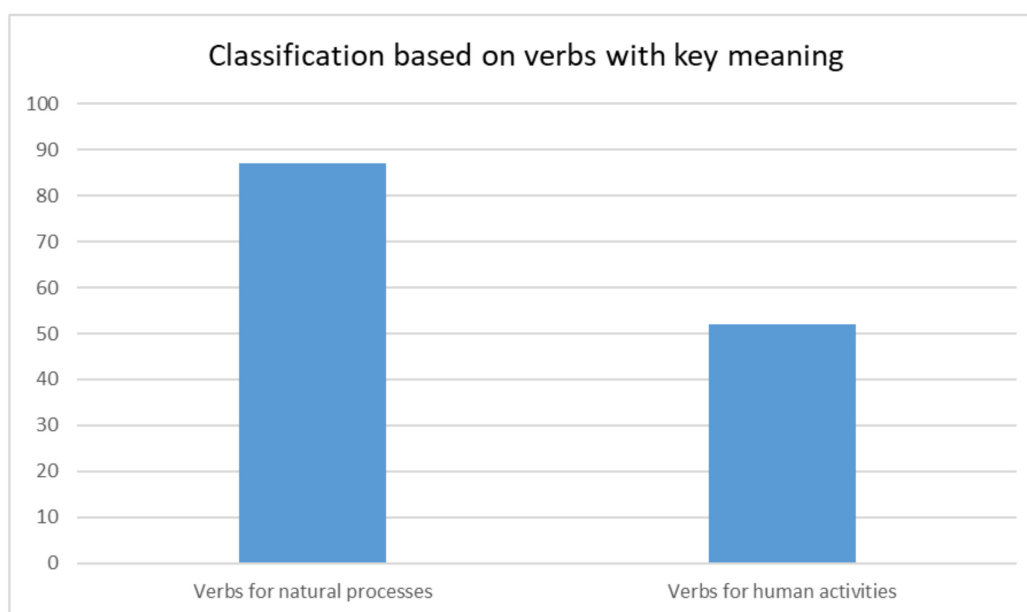


Figure 7. Classification based on verbs with key meaning.

Five-year-old Vilda used the most verbs in his description of nature: “It is beautiful. It is a world where trees and plants grow. We can camp in it. We can go fishing. We can play in it.”

3.3.1. Natural Processes

Children most often described natural processes with the help of the verb *is/exists*, *grows*, *lives*, or *provides/gives* us.

For example: “Nature is what grows. So probably potatoes, carrots, tomatoes, peppers. We grow all this in our garden at home. We also have flowers growing there, so it will probably be nature as well. And also trees and grass. It all grows.” (Tomash, 5 years old); or “Everything that grows.” (Misha, 5 years old); or “That it grows a lot there” (Marketa, 6 years old).

Rarely did children use other verbs, such as *fly* or *fly out* (birds and butterflies) or *died*, in the sentence, or referred to more complex processes, such as food chains, pollination, or the provision of food and oxygen, such as: “Nature is flowers and then bees and ants pollinate them, which can then grow and have fruit, such as apples” (Peter, 6 years old), or: “The fish will die if you take them out of the water” (Andrea, 6 years old). Even *pollinate* was used (only once) in a response.

3.3.2. Human Activities

Less often, children described nature as a place where they can carry out activities such as walking, seeing, playing, running, going on trips, camping, fishing, or even taking photos.

For example, “You go on trips and you’re fine there.” (Vaclav, 6 years old) or “When it’s nice, we go out, we can run there.” (Misa, 4 years, old) and “Nature is a taking photos.” (Zbysek, 6 years old).

Some answers indicated caring for nature: “We are given flowers there.” (František, 5 years old).

Several children mentioned rules of behavior in nature, for example: “Nature is a place where we can play. But we should not tear everything in the forest and in the meadow, otherwise there would be nothing for a long time. This is nature in which nothing should be destroyed. Do not dig into mushrooms, do not tear plants. That is nature.” (Tony, 6 years old); or “We must not throw papers and things that I no longer need in nature.” (Dominik, 5 years old), “Cars don’t drive there.” (Daniel 6 years old); or “Paper and things I no longer need should not be thrown there.” (Dominik, 5 years old).

3.4. Traditional and Unusual Concepts in The Sample

Some preschoolers had relatively standardized concepts about nature and were able to formulate them verbally. For example: “Nature is what humans have not produced.” (Adam, 5 years old); or “Nature is what we live on, we live in nature.” (4 year old Anna); or “Everything around us.” (Andrej, 6 years old). However, most of them expressed nature in their own words, such as 5 year old David: “Nature is like a home.”

In one answer, the religious beliefs of the child’s family were evident (the kindergarten is not run by the church and does not include religious teaching): “Nature, these are flowers, these are animals that the Lord God created. Nature was created by the Lord God. They are trees, so are cheetahs. Just a lot of animals. Nature is still very suitable for us because we can ride and breathe fresh air there.” (4 year old Antonin).

In several cases, the romanticization of nature was discovered: “People are never sick there.” (6.5 year old Bara), “Nature has to take care of babies and children” (4 years old Eliska), “It is paradise.” (6 year old Hynek).

The answers of 28 children (9%) included concepts that do not match the general idea of nature. They described nature as a kindergarten, car, or house, or stated clear misconceptions such as “Animals probably. Only animals.” (5 year old Adam), or “Summer and spring.” (6.5 year old Bara).

One boy in the survey, 6 year old David, answered when asked what nature is, “I think animals. We have sheep and cows on the tablet and maybe we will have a dog and a cat and we have wheat there. It grows for five minutes.” Nature is for him in the tablet.

Several children mentioned the feeling of their own inability to answer verbally according to their ideas. For example: “A lion is hiding in it. But I don’t know what it looks like” (5 year old Karel); or “It’s grass, leaves, trees. I would describe it with crayons.” (4 year old Ales).

4. Discussion

Like adults, individual children understand nature differently.

Czech children described nature mainly using examples, which is expected, according to (a) Jan Krajhanzl [20], Czech adults also do (“... under the word nature, most people in our culture imagine trees, forests, meadows, birds, animals”), and (b) grade six children from Australia, from Philip Payne’s sample [12].

Some children understand nature as their environment, what surrounds them, where they can spend time every day. On the contrary, nature is very remote for some children, who describe it as a place that is beyond their reach (Africa) or that they visit very rarely (Tatras Mountains). This corresponds to Payne’s category “Nature is viewed as external”.

In our sample 12 preschoolers include people on their list. In Payne's sample, only one sixth grade pupil [12] included a person. As a percentage, this corresponds to approximately 4% of respondents in both cases.

Some preschoolers have a relatively standardized idea of nature (nature is the opposite of culture) and can even express this clearly. For example, a 5 year old child replied: "Nature is what humans did not produce." The answers correspond to the idea common to Czech adults that nature is the opposite of culture, a concept that comes from traditional Czech and non-Czech textbooks. Most Czech adults believe that "nature is the opposite of culture" [20], but this concept does not hold up to close examination. There is no place on the planet Earth today that is not affected by human activity. Even in the virgin tropical rainforest, fumes from European factories have been detected, and DDT was found in the bodies of penguins from Antarctica. Joachim F. Wohlwill [9] discussed whether man-made lakes or farms are nature. Therefore, the relationship between culture and nature has to be reconsidered; culture is presented as a continuation of nature, not the opposite. Subsequently, the terms "cultural landscape" for unnatural ecosystems (meadows and ponds) are beginning to be used, and the term "cultural heritage" has spread from monuments to ecosystems or landscapes.

The comparison of Joachim F. Wohlwill's concepts of nature [9], i.e., nature as (a) a manifestation of processes of growth and changes, (b) a refuge, and (c) a symbol, with the children's answers, shows that the children in our sample have a similar understanding of nature with regard to the first two points. Regarding symbols, abstract thinking is not yet fully developed in preschool age children; therefore, they cannot think in symbols in the same manner as adults. Nevertheless, some symbols in their answer can be observed (paradise, wolves, etc.). The inclusion of extinct animals (dinosaurs) in the list of objects can be considered to be sign of a certain abstraction and evidence of symbols. The probable interpretation is that children repeat adults without a deep understanding of the symbolic meaning.

Ander Hansen's comparison of children's understanding of nature with how nature is presented in the media [10] shows that children understand nature in a positive light.

Attitudes such as "nature is good, unspoiled, ideal" and "nature is vulnerable; it needs to be protected" were found in the answers of children in our study. Attitudes such as "nature is dangerous", "nature is an imperfect space that needs to be improved", and "nature is a challenge" (it is necessary to fight it, to overcome it) were not found in the children's answers.

Similarly, a comparison with Kellert's typology of the value meanings of nature [10] shows that children expressed their attitudes towards nature only slightly differently from adults. Children from our sample expressed "Aesthetic", "Scientific", "Humanistic", "Moralistic", "Naturalistic", "Scientific", "Utilitarian", and "Spiritual" values of nature. They did not express "Dominionistic", or "Negativistic" values. Determining whether they expressed the "Symbolic" value was not possible from the answers we received. Examples are shown in Table 3.

Table 3. Comparison of the answers obtained from 342 preschoolers with how adults understand nature according to Kellert [11].

Kellert's Value	Description	Did it Appear in the Statements of Preschoolers? Examples
Aesthetic	Physical appeal of and attraction to nature	Yes "Beautiful trees", "Something nice", "Where it is clean . . . "
Dominionistic	Mastery and control of nature	No None of the children surveyed responded with even a hint of this point of view
Scientific	Study and empirical observation of nature	Yes "Nature is flowers, and then bees and ants pollinate them, then they can grow and have fruit such as apples.", "The fish will die if you take them out of the water (Andrea, 6 years old)." "That the cow dies in the grass."
Humanistic	Emotional attachment to nature	Yes "That we all like each other.", "You go on trips and you're well."
Moralistic	Moral and spiritual relation to nature	Yes "A place where we can play. But we should not pick everything in the forest or the meadow, otherwise there would be nothing for a long time." This is nature, in which nothing should be destroyed. Do not dig up mushrooms, do not pick plants. That is nature.", " . . . paper and things I no longer need should not be thrown there."
Naturalistic	Direct contact with and experience of nature	Yes "I like to swim there", "It's paradise", "Nature is a forest where different animals live. We could go visit there."
Negativistic	Fear of and aversion to nature	No None of the children surveyed responded with even a hint of this point of view
Spiritual	Feelings of transcendence; respect for nature	Yes "Nature is flowers. There are animals created by the Lord God. Nature was created by the Lord God. There are still trees, cheetahs. Just a lot of animals. And nature is still very suitable for us, because we can go out in it and breathe fresh air." "There are people never sick." (girl, 6.5 years), "Nature is the doctor" (girl, 3 years), "Nature has to take care of babies and children" (girl, 4 years) and, already mentioned, "I like it" (boy, 6 years).
Symbolic	Nature as a source of metaphorical and communicative thought;	It is not possible to tell from the answers obtained (discussed above).
Utilitarian	Nature as a source of physical and material benefit	Yes "food", "flowers", "oxygen", "sheep's milk", "berries" etc.

The fact that we did not notice specific attitudes in the children's answers, of course, does not mean that children do not have them. When observing children, we can see domineering behavior, such as throwing small snakes or raindrops at classmates, or the construction of small dikes on creeks. Other work found an increase in children's fear of nature and living systems. Usually, however, these were the emotions of older children [21].

For this reason, it is appropriate to ask whether children adopt some of their parents' attitudes, in addition to adopting attitudes from their environment. Further study of preschool children may help answer these questions. Philip Payne thought similarly, highlighting the risk of imposing a view of nature [12].

In our sample, 12 children mentioned the zoo. The question of whether zoological gardens and botanical gardens are nature was also asked by Joachim F. Wohlwill [9] and Philip Payne. Neither adults nor sixth graders agree on the answer to this question. For

some, zoos are nature and for others they are not. The zoo was classified as an "ecosystem," after some hesitation, in this work.

Although comparable studies have been performed using different methodologies, and the comparison has limitations, it has been shown that Czech children do not perceive nature as positively as Norwegian children. Czech children perceive the diversity of nature better than Norwegian children, whereas Norwegian children suffer from plant blindness and fungi blindness [6]. Czech children paid a large amount of attention to plants—more than that paid to animals—and several of them (eight) also mentioned mushrooms. This is surprising, both in comparison with Norwegian children and perhaps because there is no need to learn about mushrooms in the Czech Framework educational program for preschool education [15]. Greater attention to mushrooms may be related to the fact that many Czechs collect mushrooms in the forest and use them in the kitchen. Some Czech children tended to display a spiritual or ethereal understanding; this was also mentioned by Philip Paine [12] and corresponds with Kellert's "spiritual value" [11].

It is interesting—and somewhat surprising—to find that children who showed an effort to express diversity mentioned representatives from both plant and animal kingdoms, and if they mentioned representatives from only one kingdom, they more often chose a plant kingdom. The explanation for this is perhaps a greater personal experience with plants, which have less ability to move than animals, and are therefore more accessible to children.

Surprisingly, children used verbs describing natural events more often than verbs describing their own activities in nature. At this age, children display egocentric thinking and primarily perceive themselves, while coming to understand the world through themselves. Monitoring the verbs used by preschoolers appears to be a suitable goal for further research. Monitoring the verbs used enables monitoring of the understanding of phenomena and processes, thus making preschool science pedagogies available that go beyond subjective/objective and concrete/abstract binaries [21,22].

A certain number of children in this study understand nature very freely, including houses, a car, and a swimming pool in their lists. In this context, lecturers must be careful not to misinterpret what "nature conservation" can be. This is in accord with the emphasis of Philip Payne [12]. He noted: "If the changes that elephants make in the ecosystem, we perceive as natural, why the changes made by humans could not also be perceived as natural? From this point of view, we cannot condemn children's ideas as misconceptions. We can only watch them."

5. Conclusions

The Czech kindergarten children interviewed in this study showed an early understanding of the concept of nature. The preschool children in our sample were able to answer the question "What is nature?" and express the ideas of nature in similar ways to adults and older children. They expressed the utilitarian and aesthetic value of nature, showed a scientific interest in nature (they noticed natural processes and patterns), showed an emotional connection to nature, and showed the joy they had of living in nature. None of the children interviewed expressed an effort to control nature, or showed fear or an aversion to nature or its components. Compared to adults, children showed that they understood nature more positively.

Only small differences were found when comparing the results of the current study to those of existing research. Compared to children from Norway, Czech children paid more attention to plants and mushrooms. A similar percentage of Czech and Australian children included people on their lists of natural objects.

The main finding of this study was that preschool children have different concepts of nature, as in the case of adults and elementary school students. If teachers do not understand the full range of children's concepts, they will be unable to educate them effectively in an environmental manner, and encourage them pursue nature conservation and sustainable living.

The instruction “Protect nature!” will be perceived differently by children who, by the term “nature”, imagine a distant landscape in Africa, compared to those who consider “everything around us” to be nature, including people, buildings, cars, and roads.

For some, tree felling, animal husbandry in zoos, and growing crops in the field is a natural process, whereas, for others it is not.

Teachers, parents, and the media have the power to influence children’s views of nature and responsible adults should be aware of the risks of imposing a view of nature on children [23].

The findings from this research will result in modifications to the manner in which primary teachers in training are introduced to nature protection at the Faculty of Education, Charles University.

Further research on preschool children’s concepts about nature in other countries will be the next step in expanding our knowledge and understanding.

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