



Taxonomy of Types of Children's Perceptions of a Protected Natural Area

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Summary

The evident distance between children and the natural environment raises concerns about the loss of understanding and interactions between environmental elements and their surroundings. In this study, three types of environmental elements are considered: abiotic, biotic and anthropic. The types of childhood perceptions that children who live in space have been investigated Protected Natural Area (PNA). To do this we analyzed 421 drawings sketched by children of 5 years of Early Childhood Education who live in each of the towns included in this PNA of Valencia (Spain): the Albufera Natural Park. With qualitative and quantitative methods, we analyzed what types of elements predominated in each outlined perception and what groups of perceptions had been drawn more and less frequently. From the results, it was possible to establish a taxonomy of six groups of homogeneous perceptions depending on the environmental elements that had been drawn most frequently. Our findings indicate that the perceptions of children who live in an PNA show a notable disconnection of biotic elements from their natural environment and, on the contrary, a considerable link to anthropic ones related to their urban environment.

Keywords: Early childhood education; Environmental elements; Environmental perception types; Protected Natural Area; Drawings

Introduction

An environment could be defined as the amalgamation of all the elements that influence an ecological community. Likewise, it could be added that the interaction between these elements determines the structure and viability of both the environment itself and the living beings that surround it they inhabit. However, Bertrand [1] considers that it is not simply the sum of some elements but the result of the dynamic and, therefore, unstable combination of physical elements, biological and anthropic that, interacting dialectically with each other, make a whole unique and inseparable in continuous evolution.

Children perceive the environment and its elements¹ as part of their life and they build relationships between the different contexts in which they interact [2]. This interaction multisensory

and experiential shapes the way each child understands and relates to its environment and the environmental elements that make it up. Tuan [3] argues that experiences of those who occupy a space make that place meaningful to them. For this reason, each child develops a unique internal representation, since it is intrinsically linked to their experiences and experiences with their environment, a complex system made up of elements biotic, abiotic, and anthropic that children need to discover and explore, given that they are agents that develop their expression and surprise in the face of a new world [4]. In a way, each child's drawing and perception will depend on the lived experiences and interactions in the environment of each child, since we do not see the space of the world, but rather we live our field visual.

It should be noted that the act of perceiving is a learning process that the child begins in the place where it is born and the environment where it grows and develops. Perception is the first stage in human communication [5,6]. The way to know the environment and its elements is through "living it", that is, through experiences, since the perception of the environment is an active and not passive process in which people can evaluate and define it according to their interests or needs [7,8]. In this way meaning and value are given, depending on your own needs, opportunities, and context in which you are located [9].

However, the growing disconnection between people and nature has often been related to rapid urbanization and the reduction of daily contact with nature, which has resulted in a reduction in interactions and experiences both in childhood and throughout life [10-14]. All of this leads to so much talk about the loss of interactions of people with the natural environment, as well as the serious consequences that this fact can lead to [13,15-18]. Which shows that many children have hardly any chance of living experiential experiences with nature or with biotic elements, even living near these natural environments.

As a consequence of these facts, more and more authors support the benefits that has an education for children in contact with nature and outdoor activities, since that there are many possibilities, it offers for well-being in all areas of your life [19-25]. Therefore, it is vitally important. That schools encourage interaction with the natural environment and with the different elements that it houses, so that the little ones learn to relax, to use the natural space, to solve fears and knowing how to relate to the different environmental elements and, above all, to take responsibility for the consequences of their actions on the environment [20,26]. In addition, contact with nature and outdoor activities helps them develop social skills, such as communication, cooperation, and empathy, which leads to reinforcing, from a very early age, emotional harmony, security, and self-confidence.

The environment in which we focus our study is the Albufera Natural Park, an PNA that is located 10 km from the city of Valencia (Spain). Those environments that have the distinction of PNA encompass threatened natural systems or of special ecological, scientific, landscape, geological or educational and are dedicated, especially, to the protection and maintenance of the biological diversity, geodiversity and associated natural and cultural resources [52]. This environment, in addition to being recognized as an PNA, is also a Wetland of International importance with Ramsar site n°454 [51]. At the same time, it constitutes one of the most important

restinga-albufera systems in the region. Mediterranean Europe, basically, is considered "an example of human-nature interaction" [27].

Taking into account this approach and that the selected sample lives in an PNA with different types of natural environments (lake, coastal sandbank, dunes, wetlands, pine forests, etc.) we consider the following questions: What type of environmental perceptions do 5-year-old children who live in in this PNA? What types of environmental elements will be drawn most frequently? That type of perception will be the one most outlined by the participants?

Methodology

The objective of this study is to determine a taxonomy with the different types of perceptions environmental conditions of the child population living in an PNA. To address our objective, we present a methodological proposal that allowed grouping, systematizing, and describing the perceptions environments drawn by the sample. This is an innovative methodology, since it has considered a descriptive cross-sectional design [28] with a focus mixed methodological [29,30] based on employment simultaneous use of qualitative and quantitative methods [31] with the purpose of organizing and structure in different groups of homogeneous productions that constitute the perceptions environmental concerns expressed by children who reside in the same environment, in this case, an PNA. As a qualitative method, data categorization and coding have been used. As quantitative method, cluster analysis has been used that has allowed us to identify different groups of homogeneous productions based on the elements that appear in the drawings.

To carry out this methodological approach, a real sample of 421 subjects was used, of which of which 224 were boys (53%) and 197 girls (47%) of 5 years of Early Childhood Education. It was decided to use of drawing as the main tool for collecting information, given its relevance [32-38], complemented with individual interviews in order to be able to identify all the drawn elements. To do this, we asked: "What elements have you drawn?" The children answered this question and pointed at us. Finger each of the drawn elements; this fact allowed us to identify them and write down their names in their drawings. Thus, the drawing allowed the children to represent their perceptions about their environment spontaneously, creatively, and dynamically without limits. On the other hand, the interview allowed me to take notes on the drawing itself to know what the child had drawn. This made it easier for us a lot of understanding and interpretation the drawing and the subsequent categorization of the elements environmental issues outlined in the drawings.

¹ In this context, three types of elements are considered: abiotic (non-living factors, such as climate and soil), biotic (living organisms, such as plants and animals) and anthropic (human influence, such as urbanization, pollution and climate change).

Categorization and Coding

Firstly, the information collected has been transcribed and organized into categories based on the three types of environmental

elements: abiotic, biotic and anthropic. From the categories Biotics and Anthropics some subcategories have emerged. It can be seen in Table 1:

Table 1: Categories and subcategories of drawn elements.

Categories	Subcategories	Drawn elements
Abiotics	-	sun-clouds-sky-water-wind-snow-rain-rainbow-sea-river-mountain-lakealbufera-stone-rock-sand-earth.
Biotics	Plants	flower-tree-plant-shrub-branch-leaf-tree-olive-mulberry-poplar-almond-cactusherb-plant-daisies-lilies-seaweed-garden- field-nettle-canec-rose-lavender orange tree-pine-palm tree-oak.
	Animals	Ant-snail-bee-ladybug-elephant-giraffe-lemur-rooster-cow-pig-lion- monkey chameleon-bear-sheep-dog-cat-dragon-squirrel-horse-worm-snake- mouse butterfly-crab- jellyfish-octopus-duck-clam-turtle-fish-heron-pigeon-seagullstarfish-seahorse-squid-swordfish-manta fish-shark-piranha
Anthropics	Means of transport	boat-sailboat-boat-car-train-bus-car-motorcycle-truck-tractor-submarine- plane.
	Social	people-me-brother-sister-uncle-aunt-grandfather-grandmother-dad-mom-greatgreat-grandfather-great-grandmother-cousin-cousin-people-man-woman-girl-María Amparo-seller-seller-friends-bullfighter-teacher-family-fishermanpassenger-heart (of a person).
	Beach	hammock-umbrella-float-towel-fishing rod case-beach clothing-fishing rod hook-tent-hose-beach bag-food basket-bucket-shovel-rake-surfboard-castle sand.
	Furniture and objects	sofa-chair-clothes-necklaces-blackboard-table-backpack-fan-clock-poster-shelfhanger-carpet-bed-vase-dishes-curtains-bow-umbrella-cauldron-dress-potflowerpot-shoes-pencil-bell- t-shirt
	Games	balloons-toys-racket-ball-ball-snowman-coin to play- doll-slingshot-balls basket-game-skates-kite-numbers-cannon-cars.
	Meal	candy-ice cream cone-food-cake-fruit-walnut-cherry-orange-apple-bananavegetables-onions-lettuce-tomatoes-carrots-watermelons.
	Fantasy world	Unreal characters such as: SpongeBob-king-queen-dwarf-royal cook-royal guardian-Rapunzel-Rapunzel castle-crown-characters stories-movie Star Wars and Avengers in New York-Miniums.
	Waste	garbage-dirty mud-smoke-dirty smoke-dirty water.
	Urban infrastructure	park-bridge-barrack-school-house-street-hole-stairs-light-castle-flag-garagefireplace-road-pool-building-sign-railing-slide-cabin-antenna- porch-elastic net swing-fence-ditch -bank-Consume-fountain-goal- stage-motored-food machine windows-climbing wall-fruit shop-tent- barrier-tower-lighthouse-town hall lantern-walk-shop-apartment- trampoline-sidewalk-path -terrace-elevator-pipes bar-water pond-sign- bricks-zip line-tunnel-oven-bakery-ice rink-wall-market building structure-museum-paellero-roller coaster-tracks-cinema screen- seats lifeguard tower-hackable-Ferris wheel-church-pier-circus-Charter-swing wheel health center-soccer field-floor-bowling alley-catwalk-farm-theater-ramp-box office-Gulliver park-bench (football)-pastry shop-supermarket-tennis court trashcan-garbage container.

After categorizing all the drawn elements (table 1), we consider establishing criteria with the purpose of following an identical process to coin and name each of the groups of perceptions obtained in the cluster analysis.

The first criterion consisted of assigning a keyword only to the categories and subcategories that had exceeded a 40% difference with respect to the element with the highest percentage. This keyword referred to some element related to the category or subcategory. At the same time, we assigned a code to each keyword to identify it; in this case, we consider the first letter of the keyword as its code (table 2):

The second criterion was to highlight the dominant categories and subcategories, that is, those that exceeded 40% based on the

most notable value of the cluster analysis. If for example the highest percentage was 95%, because from there, we highlighted all the categories and subcategories of elements that exceeded 55%; or if the highest value was 100%, they highlighted those that exceeded 60%. In this way, they all had the same relationship.

To better exemplify the process we carry out, we show the data from the first group of environmental perceptions obtained from cluster analysis. This is SPH Perception: the dominant categories and subcategories are those included in Table 3. The ones that are highlighted in bold, means that they have been drawn more frequently. As seen in the table, those that exceeded 40% based on the most notable value are three: Abiotic, Urban infrastructure and Social (Table 3).

Table 2: Keyword and code of dominant categories and subcategories.

Categories	Subcategories	Keyword	Code
Abiotics	-	SUN	S
Biotics	Plants	FLOWER	F
	Animals	-	-
Anthropics	Means of transport	-	-
	Social	HEART	H
	Beach	-	-
	Furniture and objects	-	-
	Games	BALL	B
	Meal	-	-
	Fantasy world	UNREAL	U
	Waste	-	-
	Urban infrastructure	PARK	P

Table 3: Group 1, SPH Perception.

Categories	Subcategories	Percentage %
Abiotics	-	100,0
Biotics	Plants	29,4
	Animals	44,3
Anthropics	Means of transport	21,7
	Social	62,0
	Beach	16,3
	Furniture and objects	5,9
	Games	5,4
	Meal	3,2
	Fantasy world	0,9
	Waste	4,1
	Urban infrastructure	68,3

We would like to explain how we coined and named each group of perception obtained in the analysis from the data. First, the underlined categories and subcategories that exceeded a 40% based on the most notable value, we replace them with the keyword assigned to your category or subcategory and we arrange them in descending order, from highest percentage to lowest, according to the results. Thus, following the data in table 3, we have that:

Abiotic=Sun; Urban infrastructure=Pak; Social=Heart. This is why, once we reach this point, we use the first initial of each of the keywords (S+P+H) and, with this, we obtained the name of the first type of environmental perception based on the representation and frequency of the elements drawn environmental conditions (figure 1): SPH perception.

SUN + PARK + HEART
SPH

Figure 1: Designation example of the first perception type.

Next, we present the third group of perceptions (PF Perception) to serve also as an example. In this group, the dominant categories and subcategories are those that stand out in Table 4 because they exceed 40% based on the most notable value. In this case, the

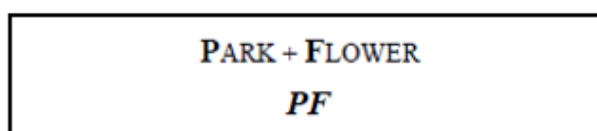
highest value is that of the Urban infrastructure element (100%) and is followed by the Plants subcategory (61.9%) included in Biotics (Table 4).

Table 4: Group 3, PF Perception.

Categories	Subcategories	Percentage %
Abiotics	-	47,6
Biotics	Plants	61,9
	Animals	16,7
Anthropics	Means of transport	7,1
	Social	0,0
	Beach	0,0
	Furniture and objects	4,8
	Games	0,0
	Meal	0,0
	Fantasy world	2,4
	Waste	7,1
	Urban infrastructure	100,0

In Figure 2 you can see that, analogously to what was done in group 1, we used the Keywords of the dominant elements: Urban infrastructure=Park; Plants =Flower. Likewise, with the first

initial of each of the keywords (P+F) we coin the third group: PF Perception.

**Figure 2:** Designation example of the third perception type.

Although other types of element categories appear, the predominant ones are Urban infrastructure and Plants. In a similar way to group 1, we can see that, although the predominant categories, other categories, and subcategories. That is, there are some elements from other categories and subcategories that they accompany the most dominant ones and do not occur all at the same time in the same drawings. Likewise, the categories and subcategories that are not represented in the drawings are evident. children: all those that show 0% representation. Hence, the cluster technique and the criteria that we followed helped us to rigorously determine each of the types of perceptions children in this PNA.

Results

Based on the categorization of the environmental elements drawn by the children (table 1), a cluster analysis is carried out that allows identifying groups of homogeneous productions depending on the type of elements that appear in the drawings. For this, a cluster has been used hierarchical that allows classifying the different productions (cases) of the 5-year-old child population who lives in an PNA. A previous exploration has allowed us to identify up to six groups of productions. Table 5 shows the number of productions and percentage that makes up each cluster:

Table 5: Frequency and percentage of perception types based on their elements.

Group	Types of perceptions	Frequency	Percentage %
1	SPH	221	52,5
2	BPS	20	4,8
3	PF	42	10,5
4	HFSP	72	17,1
5	US	24	5,7
6	FSP	40	9,5
	Total	421	100,0

As stated previously, the same method was followed to coin and organize the codes of the names of the groups of perceptions obtained in the cluster analysis. With which, the result obtained was that of Table 6:

Table 6: Distribution and designation of perception types based on their elements.

Group	Perception	Dominant categories and subcategories	Keyword assignment
1	Perception SPH	Abiotics Anthropics: Urban infrastructure; Social	SUN+PARK+HEART
2	Perception BPS	Anthropics: Games; Urban infrastructure Abiotics	BALL+PARK+SUN
3	Perception PF	Anthropics: Urban infrastructure Biotics: Plant	PARK+FLOWER
4	Perception HFSP	Anthropics: Social Abiotics Biotics: Plant Anthropics: Urban infrastructure	HEART+FLOWER+SUN+PARK
5	Perception US	Anthropics: Fantasy world Abiotics	UNREAL+SUN
6	Perception FSP	Biotics: Plant Abiotics Anthropics: Urban infrastructure	FLOWER+SUN+PARK

Taxonomy of types of perceptions

Next, we break down and describe the groups obtained from perceptions based on the percentages of appearance of environmental elements in each group:

1. Perception SPH. This group is the one that corresponds to just over half of the perceptions outlined (52.5%). It is defined by the presence in all drawings of elements of the category Abiotics (100%), and in approximately two thirds of them, the subcategories Social (62%) and Urban infrastructure (68.3) in the Anthropic category. Drawings of this type (figure 3):
2. Perception BPS. Subcategories of the Anthropic category stand out with a high presence. In descending order, they appear: Games (100%) and Urban infrastructure (95%). Finally, there appears Abiotic category (70%). Examples of drawings of this perception (figure 4):
3. Perception PF. This type is defined by the Urban infrastructure subcategory (100%) included in the Anthropic category; it is the majority presence. It is followed by the presence of the subcategory Plants (61.9%) from the Biotics

category. Examples of drawings of this type of perception (figure 5):

4. Perception HFSP. It is defined by the presence in all the drawings of Anthropic elements of the social subcategory (100%), and in two thirds of them approximately as many elements Abiotic (68.1%), as well as Urban infrastructure (63.9%) and Biotic elements, Plants (69.4). It is the second most represented perception (17.1%). Examples of drawings of this type (figure 6):
5. Perception US. In this group, in descending order, the presence of Anthropic stands out Fantasy world (100%) and is followed by the Abiotic element (70.8%). Other elements appear biotic and anthropic, but in percentages less than 40% with respect to the most notable element. Examples of drawings of this type of perception (figure 7):
6. Perception FSP. The elements with the most presence in this group is Biotics, Plants (100%). Abiotics (92.5%) and Anthropics also appear significantly. Urban infrastructure (70%). Examples of drawings of this type of perception (figure 8):

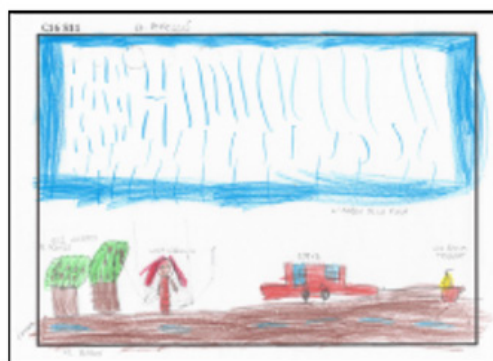


Figure 3: Drawings examples of type 1: SPH Perception.



Figure 4: Drawings examples of type 2: BPS Perception.

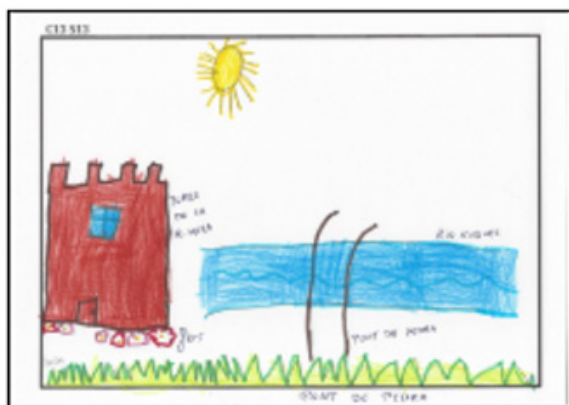


Figure 5: Drawings examples of type 3: PF Perception.

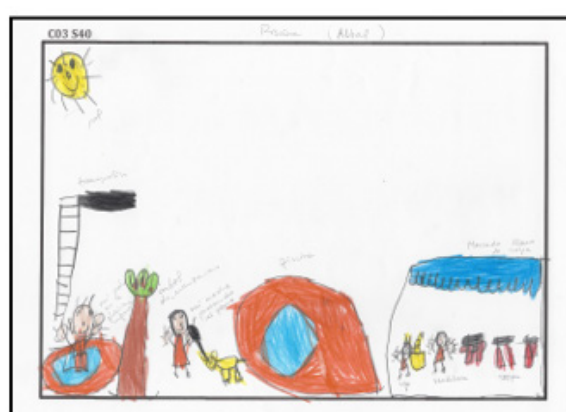


Figure 6: Drawings examples of type 4: HFSP Perception.

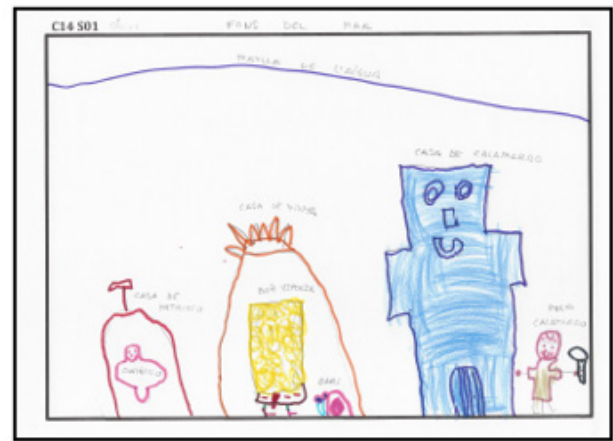


Figure 7: Drawings examples of type 5: US Perception.

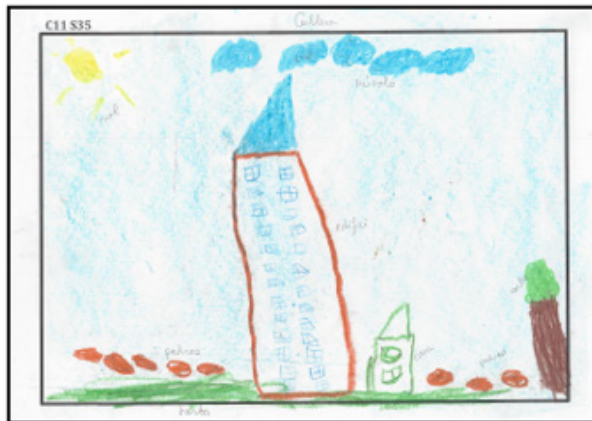


Figure 8: Drawings examples of type 6: FSP Perception.

Discourse

The objective of this study was to determine a taxonomy with the different types of environmental perceptions that the child population living in an PNA has.

To carry out the study, three types of environmental elements were considered: abiotic, biotic, and anthropic. 421 drawings made by 5-year-old children of Education were analyzed. Children who live in each of the towns that encompass the Albufera Natural Park, a Protected Natural Area (PNA). Through qualitative and quantitative methods, we analyzed what types of elements were those that predominated in each perception outlined and what groups of perceptions had been drawn more and less frequently. Thus, with cluster analysis, were able to classify different types of environmental perceptions.

From the results, a taxonomy of six groups of perceptions could be established. homogeneous and that have been coined with a name taking into account the elements dominant environmental factors in each type. Therefore, with this study, we provide the following taxonomy of environmental perceptions of young children living

in an PNA: SPH perception; BPS Perception; PF Perception; HFSP Perception; US Perception; FSP Perception.

Of all of them, it is worth highlighting the SPH Perception, given that it is the type most outlined by the sample participants. Specifically, a little more than half of the drawings obtained (52.5%) they belong to this type of perception; a type of perception that does not represent biotic elements of the natural space in which these children live, but quite the opposite, the elements of social character and urban infrastructure.

Our results indicate that the perceptions of children who live in an PNA show a notable disconnection of the biotic elements from their natural environment and, on the contrary, a considerable link to anthropic related to its urban environment. And we cannot help but say that the existence of this reality raises concerns because it is considered that there is a loss of taking advantage of the elements of the natural environment and their benefits for children. In that sense, the importance of children interacting with the natural environment through their own experiences [39-45] because even, being a close environment, it remains a great unknown to them. It is evident the distance that exists between children and the

natural environment. Therefore, our findings add to those of other authors who consider that it is necessary to strengthen the bond between children and the natural environment because it favors their connection [3,46-49]. In the same way, we recognize the importance of children interacting with the natural environment through their own experiences [39-45] and encourage other teachers and researchers to carry out new studies in this field of knowledge for the improvement of Early Childhood Education.

Finally, we would like to highlight that both our results and those of other researchers in this field, reveal that drawing is an effective language and, therefore, a form of visual communication that provides valuable information to analyze the meaning of young children's environmental perceptions [20,26,32-34,36,37,50,56, 58,59,61]. Furthermore, the drawing is a pleasant and easy activity for the child, and, in turn, this visual language is like a mirror and reflection of your mind, since it reveals to us what you think, what you know and what you understand; in short, his meaning [33,53-55,57,60,64] because they are considered expressions full of meaning and understanding [54,62].

To conclude, we would like to emphasize that our work offers a taxonomy of perceptions of young children who live in an PNA and that it could be interesting to do an analysis comparative with children who live in other natural environments. Have the evidence of our study and the taxonomy that determines the different types of perceptions that children have of this natural environment could be interesting to check if other 5-year-old children living in other natural environments have the same types of perception or, on the contrary, perceive more biotic elements of the natural environment in which they live.

Acknowledgment

None.

Conflict of Interest

There is no conflict of interest of any kind.

Notes on Contributor

Amparo Carretón Sanchis, PhD. Her research focuses on Early Childhood Education, specifically in children's drawings as a representative language to understand their perceptions of the environment.

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