

The socio construction of mathematics as guidance to a systemic analysis of children in street situation's culture

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Abstract

This paper explores the aspects of the conception of space among the 'street children' from a project called the "Art and Life House", in São Paulo city, Brazil. In the "Art and Life House" I used the conception of space to investigate the children's reality, motivating them to learn more about the reality around them, finding and describing meaning in their environment.

Introduction

During a sharp walk in São Paulo's downtown it is very easy to see children in a street situation. They are always there in small groups, with the main leader of them all, frequently a child too – called "street mother" or "father"-, and only playing for survive.

In this "playing" it is contextualized the necessity of taking a fast decision, after all, children in a street situation live in the borderline of misery , violence and mortal pressure- expressed in the whole society eyes. Those children treatment, according as this necessity, shows a very common peculiarity: They treat the space concept in a social context or in owner mathematics culture.

Studying this mathematics culture in their own habitat, that means, in the street or in lodging- houses, makes very clear the mathematics practices or cognitive developments used in many of the social contexts. Anyway, my central focus here it's not studying their mathematics culture in a totality, but thinking about space and mathematics like two social identities that solidify the existence of social structures, those who create others new, and provide order and meaning (Restivo,1993).

The reflection about space and mathematics is, in this article, clarified by mathematics' description, - focusing space concept - like a social and cultural construction. By means of space concept I raise the relation that exists among power, genus and culture, defining mathematics and used mathematics. The mathematics, like any other culture constructions, supports the identity and social-cultural history, through those children daily routine.

Space Concept

In *Les Formes Élémentaires de la Vie Religieuse* (1912), Durkheim boards the space question, defining it, such as time, like understanding's category. According to the author, both are collective representations that express collective realities; social "things", results of collective thoughts.

To talk about collective representation, according to Durkheim (1912), is essentially to talk about a first coordination introduced through the dates of the sensitive experience. This coordination would be possible if the space's parts were qualitatively equal, if they could really replace each other. For **dispose** things in a **spatial** way it's necessary to **place them in a different way**: some to the left, other to the right, some up, some down, North, South, East or West, etc.

At this sense, to represent the space is essentially to ordinate the heterogeneous. Or in other words to **produce**, spatially speaking, **sense**.

The space for itself has no right nor left, nor high nor low, nor South nor North, etc. All these distinctions come from different affective values attributed to these regions. And as all the men of a same culture represent the space in the same way (Durkheim 1912), it is evidently necessary that these **affective values** and **the distinctions that depend on them** are equally common; which implies that they are of social origin. Being thus, the space is not dissociable of the society that inhabits it.

The space while material substratum of the societies

The Durkheim's vision of the space is not limited to the dimension of the representations. The space also has a material dimension that is necessary to study. In 1899, Durkheim made an entrance in the magazine *Année Sociologique* entitled "Social Morphology", and in 1904-1905, Mauss, reviewing for a previous text, defines the social morphology as being the science that studies the material substratum of the societies not only to describe it, but also to explain it or at least to explain the form that the societies assume when establishing themselves in the ground, the volume and the density of the population, the way as it distributes itself, as well as the set of things where the collective life is placed.

Mauss (1904/5, 1974) exemplify his proposal of work with his study on the variation of the seasons, dedicating himself to the Eskimo ethnographic. This author affirms that the Eskimos live in two spaces with a completely different material organization, corresponding each of them to a season of the year.

As well as Mauss, all along the XX century, some ethnographic researchers had covered a study in the social morphology way. We can mention here the study of Rik Pinxten that during 10 months – between 1976 and 1977 – has lived with the Navajos of Arizona. In 1983, in his work entitled *The Anthropology of the Space*, Pinxten presents a complex analysis of the space relations of the Navajos examining the extensive natural philosophy of this culture and showing that, in essence, the Navajos live in a dynamic space: for them "everything is moving", since the temporal scale implicated rarely allows them to see movement.

As it is, just like the Eskimos, the Children in the Street Situation live in two spaces; but they live **simultaneously** in two spaces. The spatial organization of these children is on

to the referential, that is sometimes static and sometimes dynamic; and this dynamic referential is demonstrated analogous to the dynamic space lived by the Navajos.

Levels of spaces

Pinxten (Pinxten et al., 1983) examine, at great length, as different cultures establish space concepts and consider, as referential for any culture, three levels of space: *physical space*, *social-geographic space* and the *cosmological space*. The “world” of the space has multiples perspectives; not only by means of geometric notions but also by means of notions of:

- Directional space (internal and external) intrinsic to the *physical space*;
- Positional space (intra and interpersonal), intrinsic to the *social-geographic space*;
- Unlimited space (global vision), intrinsic to the *cosmological space*.

Working inside of these multiples perspectives of space, I observe that the notions of directional space, positional space and unlimited space are intimately linked with our own image and identity, or else, that the concept of space is intimately linked with our own life.

Just as a tool of analysis for these multiples perspectives and its relations with our own image, I go, in here, through the definition of the “life phenomenon” of Ubiratan D’Ambrósio, as it follows:



Figure 1

For this author the life is the resultant of three facts: the individual, the other and the nature. These facts and the relations among them are not dissolvable; one does not live without the other. These three facts - which I understand as three spaces and which are presented in figure 1 as individual, other/society and nature, and the relations among them, reflects the image of the physical, social-geographic and cosmological spaces established by Pinxten (1983).

According to D’Ambrósio (2001a), we are currently walking towards a planetary civilization, in which **sharing knowledge** and **making behaviours compatible** could

not be restricted to some specific cultures – intrapersonal positional space, nor to the own exchanges to the cultural dynamics – interpersonal positional space. Knowledge and behaviour, in this civilization, will be *transcultural*: transdisciplinary knowledge and behaviours are subordinated to a bigger ethics. The balance and the harmonization of these relations between the facts, **or the spaces**, constitutes what D’Ambrósio defines as the ethical of the diversity, better saying, the establishment of order in these relations of the “phenomenon life” by means of the respect to the other, of solidarity with the other and of the cooperation with the other.

Respecting, looking for living the ethics of the diversity and focusing the study in the levels of space considered by Pinxten, I looked for developing a way in which the child in street situation, with its own mathematical knowledge and behaviour, could understand the true value of its individuality and in which the child could practise this individuality with the intention of being valorised for what he/she really is and not for what he/she does.

Culture of the Street Child

Considering **culture**, in this text, as the system formed by the tools and instruments of work or production, by the institutions (education, legal, religious professionals, etc.), by the language, by the customs (social, entertainment, etc.), by the religious beliefs and rituals and by the scientific and technician knowledge (that passes from generation to generation) which a group of human has created or adopted to live, I allude some important questions:

How could a group of children constitute a culture? How to associate a child in street situation to verbs like “to make”, “to consist”, “to form”, “to establish”, “to form the essence of”?

Children in street situation could be identified as children who live with other children in streets, respecting a “sort of ethics of the street code”, that normally have their responsible or “parents”, but that usually prefer to run away from the monotony of the material and/or affective “lacking” running away from what we call home. They can also be recognized by means of their own language, of their own explanation systems, of their own subsistence methods, of their own dance and of their own rituals.

Inside this ethics of the street code, they have their behaviours subordinated and made compatible with systems of values existing among them, for example: the conquered food must not be taken from the one who conquered it, but it should be shared with them all without the exchange relation between them. I consider this the strongest example of this code of ethics, once it is insurmountable to any situation lived by these children.

I stand out that, still mentioning this specific code, there is the necessity of respecting pacts, of liquidating debts and of maintaining loyalty in an intra, inter-personal

positional space. Even with these necessities, the relations in the streets are considered, for these children, "less weighed" than the relations they used to have at their old home.

I categorize this group as being a cultural group formed by the way certain institutions take – state, school, family, church – when confronted with these complex situations as the material and affective misery, the domestic tension and violence, the unemployment, the lack of linking between the know-making at school and the know-making in use, the lack of non-scholar, sportive and leisure activities inside the urban population.

There is, clearly, an inter and intra-groups hierarchy. Between the groups, for example, there is a respect in what concerns the territories, which means their “performance areas”. Inside the groups, I can say there is respect and loyalty from the new ones to old ones. The” new ones” should be understood here as the children that have just arrived in streets, so they are children with less street-living time.

The hierarchy also appears in inter and intra-groups relation by means of sort. Imagine two different groups are becoming one single big group, for territorial power reasons. If the leader of one of the groups is a male and the other leader in question a female, the male leader will always assume the general command of the new group. When disputing the leadership of a group the male leader, which they call “street father”, will always be considered stronger than a “street mother” even if the second one has more street-living time and is considered “older” to this culture.

Concept of space in this culture

As already related in this paper, the culture of the Child in Street Situation lives in two spaces; we can categorize them as static and dynamic.

I categorize as static space, the space that these children identify with inanimate objects aid, as for example, buildings, parks, bridges, telephone booths, etc. I call dynamic space the space that these children identify by means of objects of the nature, as for example the sun, the moon, the stars and the wind.

To find these images of the space among the children in street situation I looked at the street, the house, the shelter, and the relations between the children and these places in what concerns orientation notion. In all these relations I found not only a mere spatial knowledge but a whole and complex question that involved gender, power and culture.

Preambles of the identification

From May of 2000 to the September of 2001 I worked, two times per week, in this research with 28 children in an institution called “Art and Life House”. This institution was the first shelter for children in street situation created in the city of São Paulo. I participated of the initial project of opening and trod a long way as voluntary – about 9 years. It was a long path of learning and integration with these children.

Of these 28 children, the data presented here mention only 14, since these 14 had been assiduous in all the sessions' proposals. The children and adolescents who had participated of this research are between 3 and 16 years old. All the sessions are registered by a description of the session during/after, some had been recorded and other had been filmed.

These 14 children are identified as being of 2 different street groups. One of them led by a street father and the other for a street mother.

The institution "Art and Life House" had two groups of educators alternating during the week days. The function of these educators, according to the municipal politics of those days, was to create and to carry through activities for these children. In general, these activities had an employment and/or educational character – manual works, playful games, etc. In general, the educators work in state jobs during the day and expend intercalated nights carrying through this work as educator in this shelter.

With the insertion in this culture, I observed, inquired and participated of colloquies with all the involved people during the day-by-day of these children; the educators themselves, the cooks, the housemaids, the guards, the doctors, the psychologists, the assistants, the responsible parents for these minors, the neighbouring community of this shelter and the pertaining community of the two groups, that I observed, "performance areas", as well as all the participants of the administrative part of the shelter.

Moreover, I revised all the effective laws, at the time, which concerned the children in street situation.

Space and child in situation of street

To identify better the two spaces, dynamic and static, of the culture of the child in street situation I will describe, here, two relative sessions of orientation notion.

First session

In the first session, the group seated in a circle and by means of press conferences I observed what orientation notion, as we call it, represented to each of those children.



Figure 2

There were 20 children in this session. During our conversation I asked:

"What do you do when you get lost?"

The children had difficulties in understanding what “get lost” really meant. By means of explanations intra-group (from child to child), the answers started to appear, always in the same direction:

"I go back home."

During the conversation, after those answers, I confirmed my suspicion - which appeared from this and previous conversations – that these children had no notion about what it was to “get lost”. Continuing the subject, I asked:

“How is that you go back home?”

And they answered:

“I always know how to go back home ... I can back home whenever I want to!”

(Reply of one of the children that exemplify the general context)

In this session I observed that the biggest difficulty of this question for the street children was understanding what is to “get lost”. The word “lost” was used in some previous activities, by means of games and interviews. We played, in previous activities, “hidden and seek”, “blind man’s buff” and “Detective” and I also intervened, in individual interviews, with the objective to know how did each of them found the streets and the “Art and Life House”. The word “lost” was domain of these children.

In the beginning of each session, I repeated to every one of them the same question: *What do you do when you get lost?* The children did not answer my question. They couldn’t understand the meaning of “getting lost”.

The typical reaction was:

“Me” getting lost? How is that? – the children said

“When you are lost, I mean!” – I said

I could never loose myself, could I? – they said

Second session

In the second session I developed an activity that involved baking breads – the children worked in pairs in the development of bread mock-ups.



Figure 3

They used the masses of breads to represent the way they found their routes. I chose baking beads because of the necessity of bread in the breakfast. Using the bread mock-ups, I observed some cognitive development and mathematical practises of those children, related to their daily activities. I was looking for a better understanding of the orientation concept inside their culture.

They had shown me a deep knowledge of the urban topography. They had constructed mock-ups with the dough in the baking pan with ideas of orientation, showing significant knowledge of the prepositions “behind”, “in front of”, “in top of”, “below”, “close”, “far”, etc. While they oriented themselves in their own mock-ups, they illustrated its knowledge with references point as telephone booths, bridges, certain building – thus living in the static space but they also demonstrated knowledge on the sun, the moon, the stars and the wind thus living in the dynamic space. Each pair constructed a mock-up under the subject “*what is the way to come back home?*”.

I observed some difficulty, on the part of the children, in the accomplishment of this activity. All – and when I say all I am not generalizing – the children had not represented themselves in the mock-ups. They could not find a way to represent themselves in bread. They indicated the way they would take with the fingers, but they never made a bread puppet of themselves. I would like to point out that I myself did my mock-up and that I made myself a small bread puppet to represent “me”. An example that was not at all followed by any of the children. I even asked why they never made themselves a puppet to represent them, and the answers varied between:

“Ah Mônica... I don’t want to!!”

and

I don’t know how to make it!

Space and individual

To encourage each child to carry through its own potential showed to me that they have much more dynamic conceptions of orientations than static. They could distinguish objects and consider the relations between them, as for example: “The *shelter is between the Angélica Street and the viaduct*”. “All is in movement” seems to be an important property that the objects have, in accordance with them, since they work more

with dynamic references then static. It is impressive to see how easy it is for these children to find their routes, their ways, evidenced through these and other not mentioned activities I developed.

The observation of these activities affirms the idea that the process of transmission of knowledge from generation to generation inside this culture really exists. The older children – in the sense of this culture – do not teach the children only to guide themselves for static objects – like buildings, telephone booths, etc. – but they also teach them to guide by means of the observation of the nature – like the sun, the moon, the stars and the wind.

The activities had motivated, in these two groups of children, the cooperation in the preservation of the public property, once while the children oriented themselves by means of the mock-up they gave meaning to the objects in their routes. Through these activities, the children were able to observe more their own social around because they started to discuss this subject among them. They seem to have a complex e peculiar system that could be used as the subsumed to learning more formal concepts like distance, part/whole, internal/ external and central/peripheral.

Some interrogations concerning the question of the physical space of this culture still remain. I only remind to the readers that all the children refused to represent themselves – with little bread puppet, for example – in the activity of the second session. In the first session, the difficulty of the agreement of the verbal expression “get lost” could be an indication to prevent the auto-perception of the real physical space that they occupy.

The social-geographic space of this culture was marked by the knowledge of the topography and the urban environment that inhabit. They recognize inanimate objects and they recognize the objects of nature as well. It was also marked by the strong interaction inter and intra-groups. The question of the other... the other cultural groups recognition remains.

The cosmological space was found in the deep recognition of the movement of the objects of nature and the relations of these objects with these children own localization.

For all the involvement and complicity of looking at mathematics as a social and cultural construction, of firming the search of the understanding of the mathematics know-making of a culture, of the cultural dynamics of the meetings (of individuals and groups) and of the dynamics of adaptation and reformulation that follows the cycle of the generation, of the intellectual organization, of the social organization and diffusion of the knowledge, I took the freedom to call this study an ethnomathematics study, or either, a study that comes of a research program called Ethnomathematics which evidences the understanding of the adventure of the human being in the search of knowledge and in the adoption of behaviours (D’Ambrósio, 2001a). This program of research brings, therefore, links between the Mathematics, the Ethnography and the

Anthropology, the Cognition and the Linguistics, the History and the Sociology, the Philosophy and the Religion, the Education and the Politics through a systemic analysis. Ethnomathematics promotes all these links with a transdisciplinarity vision.

Inside this transdisciplinarity character of the Ethnomathematics Program, which brings the possibility of the conception of the reality as a whole, the necessity of the insertion in the mathematical culture of the children in street situation, of its continuous observation, of the search of the dialogue in the cultural diversities – minding the differences – and of the description of the inserted mathematical knowledge in this culture appeared.

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