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### Environment mental representation: a study with children 8-9 years old

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#### Abstract

When thinking and representing environment (Mainardi Peron & Falchero, 1994; Axia, 1986; Bruner, 1996), human mind involves perceptive and cognitive (Piaget, 1926; Piaget & Inhelder 1966a/b) as well as social and cultural processes (Moscovici, 2005) that guide and orient human behavior and actions.

The aim of this research is to collect, analyze and describe conceptions about environment that children possess. The sample is composed by children between 8 and 9 years old. The data were collected using both cognitive maps (Giglioli & Collinassi, 2011) and drawings (Cannoni, 2003; Pinto, 2002, 1995; Bombi & Pinto, 1993). Only the contemporaneous presence of physical, *biological and social* elements ensures an envision of environment as a complex system (Bonnes, Bonaiuto & Lee, 2004; Bronfenbrenner, 1979). The research indicates that children, even in primary schools, sometimes have a partial representation of environment.

This is important to know for educators and teachers, in order to support a representation of environment as a whole, in which systematic and reciprocal interactions of different elements happen at different levels. This is one of the emerging tasks in environmental education processes all over the world.

Keywords: environment conceptions, cognitive maps, constructivist approach, primary school;

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## Introduction

Children's representation of environment was mainly treated as a kind of spatial knowledge (Piaget & Inhelder, 1976; Lynch, 1960; Siegel & White, 1975). Other researches are focused on proximal environment such as on the pathways from house to school, or the known city, or about nature as a general topic (Ulker, 2012; Yilmaz, Kubiato & Topal, 2012).

We adopt a perspective in which children's representation of environment are not only a cognitive procedure, but also a social and evaluating process (Mainardi Peron & Falchero, 1994) from which different behaviors can derive. Based on this point of view, our study is aimed to explore how children take into account environment with its physical, biological and social dimensions; in addition we analyzed if they focus their reciprocal interactions or not.

## Sample and survey instruments

The survey was carried out in primary school classes, with children aged 8 and 9 years (Table 1). We used cognitive maps (Giglioli & Collinassi, 2011) and drawings (Cannoni, 2003; Pinto, 2002, 1995; Bombi & Pinto, 1993) to collect the data. Cognitive map is a schematic graphical representation of thoughts on a particular topic. We choose cognitive map, as they are easy to manage also for children with poor competences in written texts. The word-concept "environment" was provided by the researcher and the participants were asked to indicate every possible links and associations between the given word and their ideas. We showed them the way in which a cognitive map can be made and then we gave the following task: "Write down anything appears in your mind thinking about environment".

Drawing can also be considered an approximation to mental contents (Pinto, 2002), useful to collect ideas and knowledge on a given topic (Cannoni, 2003; Pinto, 2002, 1995; Bombi & Pinto, 1993). As a communicative act, it requires the drawer to select the most suitable forms and colors to express his/her point of view (Bombi & Pinto, 1993). We asked the children: "Draw a picture of environment, whatever it is for you". We intentionally gave them a generic indication, trying to avoid any possible influence on them.

Table 1 – The sample

	M	F	Tot.
Number of participants	42	58	100

We asked the children to work individually, first of all writing down the cognitive map and then making a drawing. Both the requests were open ended in order to let the children free to think in a personal way.

## Quanti-qualitative analysis

The data collected were analyzed with a quantitative and qualitative perspective. We put together the words/expressions occurring in the children's cognitive maps and the objects drawn in their pictures. Based on these kind of elements, we identified three categories in which we grouped the presented contents, as we show in the following table (Table 2):

Table 2 – The main categories of elements individuated in maps and drawings

Categories	Description
<b>Physical aspects</b>	Geo-morphological and abiotic elements
<b>Biological aspects</b>	Living organisms, such as plants and animals
<b>Social aspects</b>	Elements that indicate the presence of human beings and / or their action in the environment

Based on the three categories we found that the cognitive maps and the drawings collected contain:

- Only physical elements;
- Only biological elements;
- Only social elements;
- Physical elements plus biological elements;
- Physical elements plus social elements;
- Biological elements plus social elements;
- Physical, biological and social elements.

## Results and discussion

The drawings generally contain such elements as: sky, clouds, sun, atmospheric agents (ex. wind, snow, grasslands, mountains, hills and/or mountains, sea, lakes, rivers, flowers, trees/shrubs, wild animals and/or pets). The reference to the social dimension is due to the presence of buildings (individual houses, urban agglomerations, buildings, hotels, shops, school), allotments and/or cultivated fields, roads, paths, benches, games, umbrellas, bins for waste collection. In some designs there are human figures performing specific actions in the environment (such as moving lawn, taking dog on a leash, leaving house, going down the slide, holding tools used in agriculture); in some cases human beings are simply placed in natural landscape, assuming a static approach, as if they were observing something (Fig. 1, 2, 3).



Fig. 1



Fig. 2



Fig. 3

Figg. 1, 2, 3 - Drawings containing suggestions about environment as a system of physical, biological and social interactions

In some of the drawings and of the cognitive maps there are references to pollution (words such as pollution, clean, garbage, litter, and elements such as baskets and bins for recycling, waste on the ground) (Figg. 4a and 4b).



Fig. 4a



Fig. 4b

Figure 4a and 4b – Physical and biological elements in cognitive maps and drawings

The works in which the environment is purely considered as social (Figg. 5a and 5b), biological (Figg. 6a and 6b), physical and social (Figg. 7a and 7b) are as the following:

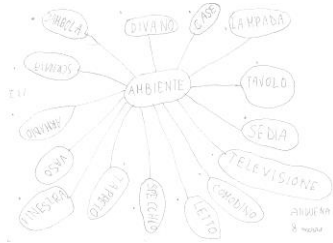


Fig. 5a

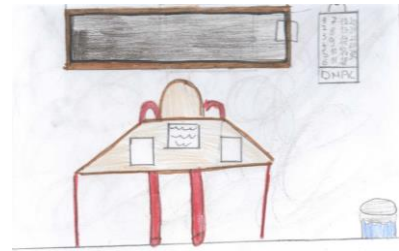


Fig. 5b

Fig. 5a and 5b - Only social elements in cognitive maps and drawings

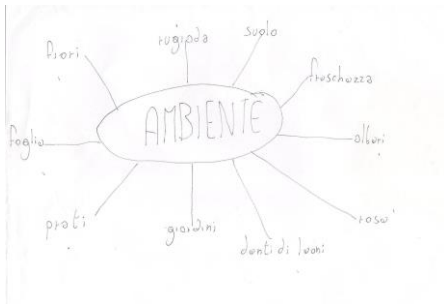


Fig. 6a



Fig. 6b

Fig. 6a and 6b – Only biological elements in cognitive maps and drawings

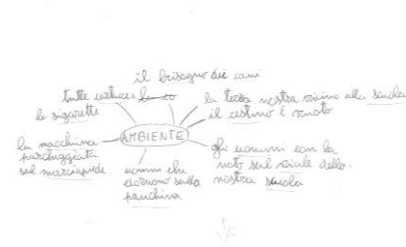


Fig. 7a



Fig. 7b

Fig. 7a and 7b – Physical elements plus social elements in cognitive maps and drawings

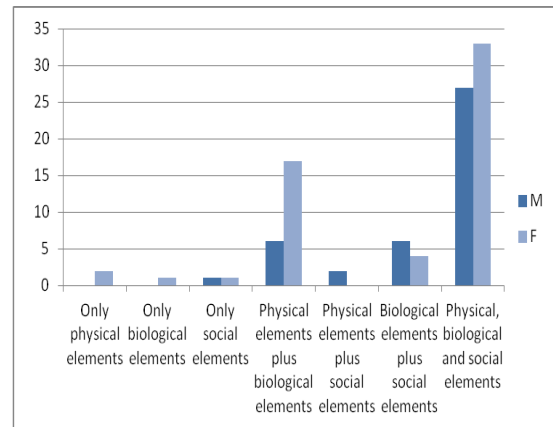
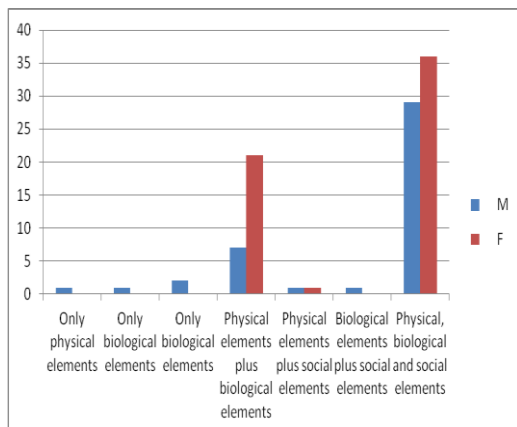
Table 3 – Number of maps codified with the categories identified and their combinations

Categories	M	F	Total number
Only physical elements	0	2	2
Only biological elements	0	1	1
Only social elements	1	1	2
Physical elements plus biological elements	6	17	23
Physical elements plus social elements	2	0	2
Biological elements plus social elements	6	4	10
Physical, biological and social elements	27	33	60
<b>Total number</b>	<b>42</b>	<b>58</b>	<b>100</b>

Table 4 – Number of drawings codified with the categories identified and their combinations

Categories	M	F	Total number
Only physical elements	1	0	1
Only biological elements	1	0	1
Only biological elements	2	0	2
Physical elements plus biological elements	7	21	28
Physical elements plus social elements	1	1	2
Biological elements plus social elements	1	0	1
Physical, biological and social elements	29	36	65
<b>Total number</b>	<b>42</b>	<b>58</b>	<b>100</b>

Figure 8 – Graphs about cognitive maps (fig. 8a) and drawings (fig.8b) for each category



A few children represented a coastal or marine environment, even if it is probably the kind of environment closer to the experience of everyday life as the Italian city in which the survey was

conducted is situated quite on the Adriatic coast. This leads us to propose a hypothesis of interpretation: the children seem to disengage gradually from the perception of the proximal environment to refer to it with a distal and systemic perspective (Nicolini, 1999).

### Final remarks

We found that children aged 8/9 are able to take into account the main elements of which environment is constituted, that is to say physical, biological and socio-cultural dimensions. The three categories through which we could group the contents expressed by the children mirrored a definition of environment as a dynamic system of reciprocal interactions among physical, biological and socio-cultural dimensions (Bonnes, Bonaiuto & Lee, 2004; Birbes, 2006). We found that children mainly used at the same time all kinds of these elements – physical, biological and social – both in their cognitive maps and in their drawings.

These results show that children aged 8-9 mainly can have an overview of environment, also providing some evidences that they understand the reciprocal interactions of physical, biological and social factors. Under this perspective there are not differences between the males and the females in our sample (Tabb. 3 and 4). Their vision seems to embrace a full ecology in spite of a partial ecology. In fact partial ecology focuses the separation between human action and “nature”. On the contrary full ecology includes human action that regulates “the balance/imbalance and continuity/discontinuity in the time of ecosystems” (Bonnes, Carrus & Passafaro, 2006).

This is a very important result for the possibility to develop a deep awareness about environment and the related problems, such as pollution, in the current generation of young people.

For future research we will investigate the influence of some dimensions that can contribute to the formation of environmental representation, such as the different experiences and the socio-cultural factors that regulate the possibility for a child to interact in the environment.

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