CHILDREN'S REPRESENTATION OF THE ROUTE IN A FAMILIAR ENVIRONMENT

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Abstract. Giving route in a familiar environment is an essential component in geographic and spatial cognition. In normally conditions, a person who recognized own neighborhood easily give a route and represent it. In this study it was investigated „how children represent their environment for a route task". In order to provide empirical evidence was conducted drawing activity. Participants are 71 6th grades students in elementary school (34 girls and 37 boys). They were familiar with the route. During the study, children are observed and sometimes ask some questions about the route.

Keywords: representation, spatial cognition, space, cognitive mapping, mental map

Introduction

Knowing the environment is a vital subject for human. Spatial cognition, the internalized reflection and reconstruction of space in thought (Golledge, 2004, p. 443). It is occurred for a person to learn, understand and move in environment via constitute cognitive maps and then using them.

As Hart & Moore (1973) stated, spatial cognition is internal or cognitive representation of the structure, entities and relation of space. Tasks such as finding one's way around an environment, searching for objects, taking

shortcuts, recovering positional knowledge after becoming lost or disoriented, all began receiving attention under this umbrella of spatial cognition.

Mental map is the representation human's opinion about places as a map (Tuan, 1975, p. 206). It is a mental process which is used giving a route to somebody. This may be conceiving of a house, a street, a village, a mountain or hill in the mind. We have some mental maps in our minds. Mental representation is a essential concept used for explaining human behaviors (Blaut & Stea, 1971, p. 387).

The concept of mental or cognitive map was suggested firstly by Tolman (1948). Tolman defined the cognitive map as an internal representation of a specific spatial area. After Tolman, some studies were carried out about representation of hazard's perceptions (Burton & Kates, 1964). On the becoming a popular subject of mental map, Lynch (1960) and Downs & Stea (1973) endeavored very hard. Downs & Stea (1973, p. 9) describe mental maps:

> [Cognitive mapping is a process composed of a series psychological transformation by which an individual acquires, codes, stores, recalls, and decodes information about the relative locations and attributes of phenomena in his everyday spatial environment.]

What do human know about places? Spatial cognition studies investigate this question's answer. Spatial cognition, the acquisition of spatial knowledge, environmental perception and cognitive mapping concepts have been attracted interest for 20 years.

Direct experience of geographic environment is a fundamental factor to form mental maps (Cin, 1999). In measuring the human's cognitive maps, sketch maps method give very interested results. This method is also usable because of having psychological dimension (Golledge, 2006).

The second subject area that play essential role on development of cognitive mapping is representation. This term is used in two meaning. Firstly, mental representation of space: how information is coded in mind. The second, symbolic representation of space: maps or scaled models (Uttal & Tan, 2000, p.148). It is expected that the representation of spatial relation as cartographic maps.

Scientists who are interested in space concept use a variety terms for express cognitive representation: imagery maps (Trowbridge, 1913), cognitive or mental maps (Tolman, 1948), schema, topographic schema (Piaget et al., 1960) and topographic representation (Shemyakin, 1962). Piaget & Inhelder (1967, p. 454), describes „spatial" concept as „fundamental idea of

space" and „spatial representation" as „the symbolic and internalized mental reflection of spatial action".

Shemyakin (1962, p. 193) defines spatial representation as „a mental map of a space, and the mental imagery of interrelation between this space and the others or persons". Although topographic representation is a mental process, it is important to indicate one's spatial knowledge. Spatial locomotion and coordination is effective on the occurrence of children's cognitive maps (Allen et al., 1979).

Shemyakin distinguishes two different types of representation: route maps and survey maps. According to Shemyakin (1962, p. 218), route maps is representation that constructed by mentally tracing the route of locomotion through an area. And survey maps are representation of the general configuration or schema of the mutual disposition of local objects. Route learning is a basic stage of the cognitive mapping process.

Researches on the representation of large-scale environments began in the early years of the 20th century (Gulliver, 1908; Trowbridge, 1913). Reference systems have an essential role in representation of space. Looking for interested literature, it is seen that there are fundamentally two kinds of reference systems: egocentric and allocentric (Klatzky, 1998). Hart & Moore (1973) and others argued that there are three frames of reference: egocentric system of reference, fixed system reference and coordinated (abstract) system of reference.

Egocentric system of reference is refer to positioning of an object with respect to some axis or plane defined entirely with respect to the body or some part of the body of a person (Sonnenfeld, 1982). In fixed system reference, a child has more vast perspective than decentering from own point of view. Child perceives larger spaces. A child in this level begins a relationship with small environments, streets and landmarks (Moore, 1976, p.154). In coordinated (abstract) system of reference, child is highly coordinated and hierarchically integrated with space. The child use lines, angles and metric distances for explain relations between streets. He thinks about space as a coordinate system (Hart & Moore, 1973).

Children are experienced the environment in a variety of situations. That is, children experience different spaces in different ways, and children are affected in a variety ways (Hart, 1979). Space is subdivided into some point of views (Montello, 1993). That's why it is important to understanding different size of space. Scale is an essential element in geographic knowledge acquisition (Bell, 2002). Geographers and the other scientists interested in defining the scale.

In spatial representation studies, many results show that there are differences between males and females (Coluccia & Louse, 2004). In route learning, arrival point-finding tasks, route reversal and orienteering studies, in most cases, males outperformed females (Schmitz, 1997; Moffat et al, 1998; Malinowsky & Gillespie, 2001).

Method

Route

The route is located between bus terminal and Aksemsettin Elementary School. It is located in the centre of Kırıkkale in Turkey. It was approximately 600 meters long. As depicted in Figure 1, it was located outdoors and it included regularly turns.

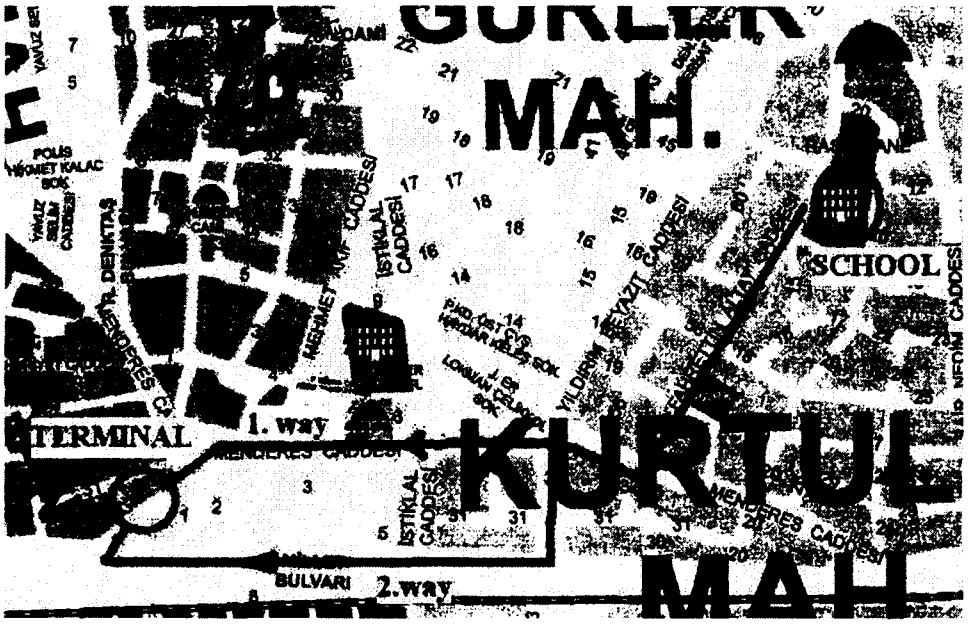


Figure 1. Route from Aksemsettin School to Bus Terminal

Participants

The participants are 71 students in elementary school (34 girls and 37 boys). They were 6th Grades students (mean age approximately 12). They were familiar with the route.

Procedure

In this study it was investigated that „how children represent their environment for a route task". For this goal, it was conducted drawing cognitive maps about the route by children. Drawing activities were conducted in classroom. During the study, children are observed and sometimes ask some questions about the route.

Starting the application we said children to representation of giving route from Aksemsettin Elementary School to Bus Terminal via drawing. Initially they surprised that activity and some ask interesting questions:

- Deniz: Don't you know where there is?
- Ahmet: It's easy, come with me. I can go.
- Burak: Why is necessary fort this?

For children were member of the similar age group (~12), age variable wasn't evaluated. Drawings were examined with respect to drawing-map orientation, frames of reference, accuracy of route, having detail and having scale error. These variables were evaluated according to statistical methods. Also it was examined related to student's sex.

Results

In this study, the participants were comprised 52 % male and 48 % female students from 6th grade. According to drawing task, route definitions from school to terminal, 18 % of drawings are compatible with cartographic maps. Matching drawings with the cartographic map of their own environment, 14 % of student's have a little compatible and 68 % of student's have no matching. It was determined that male students were more successful than female in that task.

The analysis of drawings in respect to used reference systems to define the route, that results were acquired: 23 % of participants used egocentric system of reference, 56 % of students used fixed system reference. We found out 21 % of students used coordinated (abstract) system of reference that it is advanced level of spatial cognition. It is related to student's age group. Although Piaget, Inhelder & Szeminska (1960) argued children having the spatial coordination on 11–12 years old, there aren't absolute age limit to passing abstract space thinking. According to this study, children who have similar age group used different reference systems. To determine interrelation between sex and reference systems used by children, data's were ana-

lyzed with ANOVA. According to results, there were significant differences male-female students ($F_{(1-69)} = 4,06$, $p<.05$). Male students used coordinated reference systems more than female.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,720	1	1,720	4,056	,048
Within Groups	29,266	69	,424		
Total	30,986	70			

Table 1. The results of ANOVA in respect to sex and reference systems used students

The absoluteness of the route in children's representations was analyzed in three different ways: absolute, partly absolute, uncertain. While 15 % of students represented the route as absolutely, 19 % of students represented a partly absolute. A majority of participants had the uncertain route drawings. Before experiment, we asked participants whether they know the route or not, and they answered „yes". On the wrong representation of children, the structure of geographic knowledge has an effective role which is learned in school and used in life. The accuracy of the route male were more successful than female, but there is no significant different between two groups.

Having details on drawings, 18 % of drawings have more details about environment. 43 % of students draw a partly detailed and 39 % of students have less detailed drawings than others. The representations of environmental details in drawings represent advanced spatial cognition. In this experiment there were no differences between male and female.

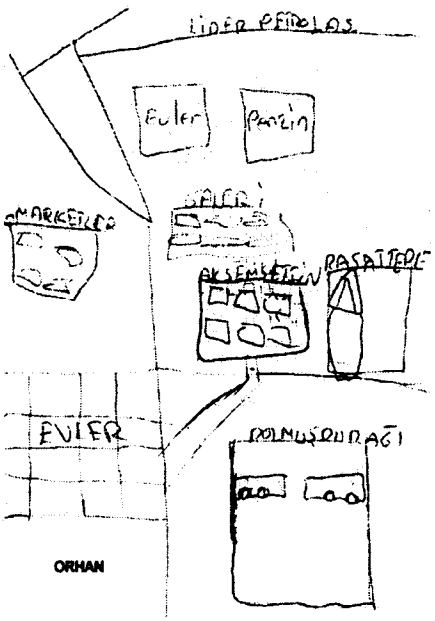
One of the examined subjects is scale error. Were there any scale errors on children's drawings? 37 % of students drew the environment with scale errors. 25 % of drawings had a partly scale error. 38 % of students drew correctly and used convenient scale. When children draw a large space on the plane, they make some error because of not imagery absolutely the general views of space. These errors might be deficient transfer of information from space to the paper, representation of landmarks smaller or larger than as they are and children's locate themselves in spatial environment. Cognitive maps may be uncompleted, distorted, augmented and even there may be individual

differences (Downs & Stea, 1973, p.12). But, in formal operational period, a child could represent the route at least in a familiar environment.

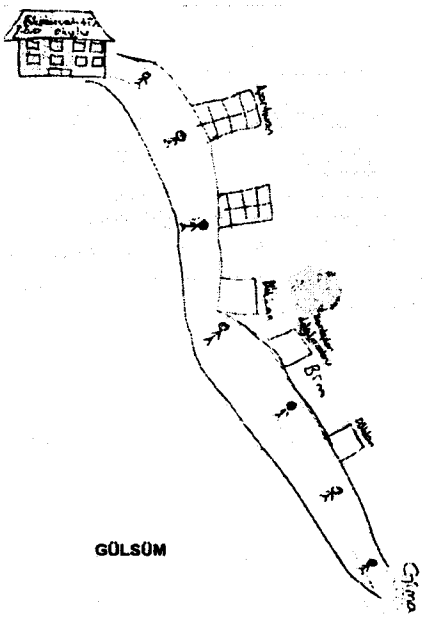
Conclusion

Spatial cognition is a multi-disciplinary area. There is collaboration between geographer, psychologists, cartographer, environmental designer, etc. Especially geography is fundamental science of this area. In school, geography education should be meaningful to children. Children's geographic knowledge construct as if they can use in real life. At that time, children are represent own environment and they like al of space.

Appendix



Drawings 1. There are no relationship between environmental elements



Drawings 2. Egocentric reference systems

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