

## TRIDIMENSIONAL CARTOGRAPHY FOR THE USE AND TRAINING OF THE VISUALLY HANDICAPPED

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### SUMMARY

In the late 80's there arose in Chile, particularly in the Department of Cartography of Universidad Tecnológica Metropolitana, an interest in a new field of research: that of visual impairment and Cartography. The necessity of blind people of moving about in a safer way and with more information led researchers to think about creating a tactile cartography, appropriate to their needs.

In 1994, Chile presented a project to the Panamerican Institute of Geography and History (PIGH-OAS). Its main objective was that of forming an interdisciplinary work team in which other Latin American countries, with similar problems, would participate. Argentina and Brazil engaged in this noble task, appointing as their representatives Mrs María R. Zucchelli and Mrs Regina Vasconcellos, respectively.

### INTRODUCTION

Chile's interest in the subject of visual impairment is based on the fact that it is the only South American country where Cartography is taught at university level. The course of studies consists of five major areas: Geography, Mathematical Cartography, Topographic Cartography, Teledetection, Geographical Information Systems, and Thematic Cartography.

Considering the areas mentioned above and the different types of research carried out at present, Three-dimensional cartography seemed to be the most appropriate to train the visually impaired. As a first step, only a more traditional approach has been considered. In a second stage, the same will be considered from a technological point of view, namely, computers and multimedia will be used.

Researchers from Argentina, Brazil, and Chile agreed on the methodologies to be used. Blind people should be treated taking into account their complex mental frames, be their impairment acquired or genetic.

Working directly with visually handicapped people, trying to understand their graphic means of communication, has progressively allowed them to acquire a better understanding of the more traditional cartographic patterns. In the near future blind people will be able to handle automated systems. Further developments are closely related to the fact that the countries involved in the project are regarded as emerging and therefore, must orient their investigations to their own reality.

The active participation of cartographers, designers, psychologists, geographers, educational therapists, librarians, educators for the disabled and blind teachers themselves, has greatly contributed to enrich the project.

#### **GENERAL OBJECTIVE**

The General Objective of the project is to elaborate cartographic material that will aid the teacher of the subject Orientation and Space Perception. The purpose of this material is to help the visually impaired to get better acquainted with their immediate surroundings and to give them more confidence when moving about.

#### **SPECIFIC OBJECTIVES**

- To enable the blind person to associate elements in the reality with their cartographic representations so that the latter allows him/her to know and understand his/her layout.
- To elaborate relief cartographic material in such a scale that the incorporated elements can be easily recognized by touch.
- To design and elaborate cartographic materials working together with blind people in order to integrate their space perception experience.

## METHODOLOGY

The methodology adopted by the team of researchers is based on the strengths and experiences that each participating country has contributed. Thus, Argentina is responsible for the referential theoretical framework of the project and the support in the formalization of the methodologies to be applied. Brazil is in charge of passing over to the research team their five-year experience in the teaching of Geography with special cartographic material to blind school children. Finally, Chile's contribution consists in elaborating tactile cartography, writing down reports on the results achieved, and coordinating the project as a whole.

During 1994, two interdisciplinary meetings were held. The participants of the research teams of the three countries involved in the project reported and discussed the progress achieved and the work done from April to November.

1. Due to the experience of specialists with blind people, and the complexity of the term "mobility" with respect to cartographic products being elaborated, a change of the general objective from "Orientation and Mobility" to "Orientation and Space Perception" was required.

2. The first cartographical representations were made on the basis of a sample which considered men and women between the ages of 14 and 18 years, who were born blind or had become blind later on. They had had some training and, therefore, were physically independent in their movements.

Even though the results of a preliminary evaluation of products proved satisfactory, it was decided that the research project should begin with a survey of the first learning stages of the visually handicapped. Thus, a new population sample, involving blind and partially blind girls and boys attending the first four levels of elementary school, was taken into consideration.

3. The main cartographic concepts that have been studied and applied are: Orientation, Change in viewpoint, Scale, and Symbolization. The most complex concept being that of "scale" due to the difficulty it offers to people with normal vision.

4. Studying the process for adapting the symbolizations has been of the utmost importance. They are based on the visual variables that allow for tactile representation. The design of the symbolization has been improved to meet the requirements of the student with regard to his/her environment, namely, classroom, downtown area, etc.

5. Resistant materials have been chosen for the elaboration of the cartographic elements. They can be used as originals or as hot-preformed matrixes. Blind users prefer studying with originals since the different textures employed in their construction render them a sense of pleasure, which derives in a faster learning.

6. An evaluation device called "Evaluation test for cartographic material for the visually handicapped" was created. It is divided into four sections:

- The first section is that of "Orientation and Space Perception" addressed to the course evaluator or teacher.

- The second section is concerned with the evaluation of the physical characteristics of cartographic materials: structure, texture, form, and size.

- The third section is addressed to users with previous knowledge in the handling of cartographic material.

- The fourth section is addressed to users with previous knowledge of cartographic concepts.

7. Cartographic material elaborated during the project:

- a) Models of the visually handicapped child's close environment. This included his classroom, school and school surroundings. These representations were constructed with resistant materials so that they could be used and also replicated in hot-preformed material. The use of magnets allowed movement of certain elements of the model.

- b) Acrylic model of the school premises (Escuela de Ciegos Hellen Keller). The symbolization used here had already been tried and assessed.

c) Cartography of bus-stops in downtown Santiago. This representation was also made with resistant material so that it could be manipulated by users and reproduced in hot-preformed material afterwards.

d) Initial stage of an ergonomic/ergonomic model including the representation of four characteristic geographical areas of Chile. In this model blind people will be able to recognize the presence of typical morphologies, those which best represent those environments (salt-mines, lakes, volcanoes, and the like)

## CONCLUSIONS

The most important conclusions are the following:

- An attempt has been made to devise material which closely resembles conventionally standardized symbols so that the material produced may be used by any person with normal vision or not.

- A study on the factors bearing upon visual perception / three / dimensionality, colour, contrast and textures / is of paramount importance to increase the perception of the visually impaired.

- Interdisciplinary study of the factors which make blind people act in specific ways is also fundamental in the research.

## BIBLIOGRAPHY

DODDS, A. 1994. "Mapas Táctiles", Nottingham, University of Nottingham, Translation M. López, Córdoba, Argentina

GODACHEVICH, G. 1994. "Informe sobre la situación de las personas ciegas y limitadas visuales en la República de Argentina". 60ª Conferencia General, IFLA, La Habana, Cuba

KASTNER, M. et al. 1992. "Dificultad en la movilización del ciego en áreas urbanas". Memoria de Título, Departamento de Educación Diferencial, Universidad de Ciencias de la Educación

LEDERMAN, S. "Las texturas en mapas y gráficos táctiles para las personas con deterioro visual", Facultad de Psicología, Queen's University, Canadá

MENARES, E. 1994. "Estado actual del nivel de información en el área de discapacidad visual en un ambiente de investigación" I Jornadas de Cartografía Tridimensional, Mendoza, Argentina

PIKE, e. et al. 1992. "A comparison of two types of tactile maps for blind children", Cartographica vol. 29

VASCONCELLOS, R. 1993. "A Cartografía Táctil e o Deficiente Visual", Ph.D. Thesis, Sao Paulo, Brasil