SIMBOLOGY AND GEOGRAPHICAL ORIENTATION AS ELEMENTS OF LANGUAGE FOR 3D CARTOGRAPHIC REPRESENTATIONS

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The design principles of 2D cartography have been developed for decades and are the basis for the production of maps. However, the recent technological developments, especially inn terms of informatics, enable new ways of representing cartographic information, for example as three-dimensional and interactive models.

However, today, the 3D cartographic representations do not follow a cartographic language, but only the knowledge that is inherited of the design of 2D maps and the good sense of cartographers. Most of the 3D cartographic representations currently available depict the world without making use of symbolization and even then are often called maps.

Today, there is a lack of cartographic principles for generating three-dimensional maps. Therefore it is important to undertake studies about symbology, geographical orientation, cartographic projection and scale to understand the importance and the influence of these elements in the 3D cartographic representations. This paper discusses a study about the symbology and the geographic orientation as elements of the cartographic language for 3D cartographic representations.

For this purpose, a study aiming at the evaluation of these elements was performed using data of a region in the rural area of the state of Rio de Janeiro, in Brazil. The study is based on a qualitative cartographic perception test. Three different models were produced to evaluate the symbology: the first one reminds a common topographic map, the second one resembles a tourist map and the last one uses a more complex symbology that aims to imitate the real world by using satellite images and features with textures extracted from real object.

Another set of three models was created to evaluate the geographic orientation: the first model represents the cardinal points in the edges of the model, the second one uses the wind rose and in the third model the cartographic representation uses a small auxiliary map with a panoramic view of the region and a moving mark that represents the position from the point of view of the user in the 3D model.

The perception test was applied to twenty nine undergraduates and graduates students of Geodesy and Cartography, or similar areas, of two Brazilian universities and one German university. The test was based on cognitive questions that aimed at understanding the perception process of a 3D cartographic representation within an interactive environment. Based on the analysis of the results to the perception test, some guidelines were obtained and some recommendations for future studies were drawn.

The final result shows that some rules of 2D maps design should be kept when producing a 3D cartographic representation, while other rules should be substituted, due to the differences of the presentation media of the cartographic product. In this study, the 3D cartographic representations were produced within the concept of a general topographic map. The result reveals that the 3D

cartographic representation which uses symbols inherited from the tourist map showed to be most suitable.

Considering the methods of geographical orientation, it was verified that the methods that represent the cardinal points in the edges of the model and the one that uses the wind rose are the most suitable for users that are not specialists in Cartography, while the method that uses a small auxiliary map with a panoramic view of the region and a moving mark that represents the position from the point of view of the user in the 3D model is the most suitable for cartography professionals.