

# Spatial regionalization damaged by the change of map orientation and landmarks: an issue related to GESTALT laws

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In geographic context, regionalization is a method for the management of Earth resources and also aids to understand social behavior patterns. Many authors highlight that as an important issue to be studied in environmental and social sciences. They say that the geographers' role is to understand spatial patterns to create foundations on the issue of "spatial regionalization". Geographers created the idea of regions to understand space, and since then, there are several sciences such as Economy, Sociology, History, among others, that use this definition in order to understand spatial phenomena dynamics. However, to define regions individuals use different strategies. Therefore, we have sought to understand how individuals use maps in order to generate regions and if the spatial regionalization is damaged by changes on the orientation and landmarks' symbols on a map. The present work aims to evaluate the performance on creating spatial regions by undergraduates and MSc students in Geography and others professionals graduated in different areas of knowledge. We have used a map with the geographic boundaries of Paraná State (Brazil) to test their mental categorization and to measure their understanding processes while drawing regions. There were 25 subjects divided in 2 groups: (a) experts and frequent map users in geographic regionalization contexts; (b) non-experts; professionals without previous experience on geographic regionalization using maps. The performance measurements were extracted through questionnaires analysis. The task flow was based on the presentation of 3 maps: (1) a world map, (2) a map with planimetric elements and hydrographic features and (3) a map with planimetric elements without hydrographic features. A semi-structured questionnaire was given formed by 9 (nine) questions related to spatial analysis applied to spatial regionalization tasks. The hypothesis to be proven was: an inverted orientation and the modification on visual variables representing landmarks on a map will cause the individuals having lowest performance achievement, compared to those using the same criteria or mental processing used on normal orientation and normal landmarks. The analysis was based on Lakoff (1987), Rosch (1973), MacEachren (1995) studies related to mental categorization processes and also regionalization. We also have used the Peterson's (1987) model of visual information processing. Discussions concerning GESTALT laws were made, relating them to the issues presented by the first approach of regionalization (MacEachren, 1995; Tversky and Hemenway, 1984). Also, we have tried to explain issues related to the subjects' (mis)interpretation/regionalization on tests. First results indicated that all users at experts group were capable to recognize the Paraná State boundary. However, in both groups, there were subjects which pointed the north "region" at the lower part of sheet. This can be explained by users being always presented to maps in

which the north is oriented to the upper part of the sheet. About landmarks, points were used to represent cities, and lines were applied to represent rivers. Subjects used these landmarks to delimitate regions although they were not prevalent in the decision of region orientation. We may conclude that individuals used their cognition to identify the Paraná State boundaries, and orientation perception was a predominant aspect which made users get confused in the map reading task. Features located in the map were used in order to carry the regionalization out, but they were not recognized and prevalent on the region nomination task. This indicates the presence of GESTALT related processes in the map interpretation.

**Keywords:** Landmark, orientation, regionalization, Spatial Categorization