The Cognitively Adequate Construction of Tactile Maps: First Results

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Spatial Knowledge Acquisition with Tactile Maps

A tactile map could be one means to convey spatial knowledge. A cognitively adequate map conveys a mental representation that enables the map reader to successfully solve spatial reasoning tasks with the acquired mental representation. Single parameters and how they contribute to convey or foster survey knowledge will be investigated in terms of how they effect qualitative spatial knowledge acquisition and spatial reasoning.

The concept of cognitive adequacy (Strube, 1992) is introduced and related to the concept of cognitive complexity. Then, a model of cognitive complexity of the usage of tactile maps is presented based on earlier research. It explains which parameters might influence the complexity of map usage – geometric-topological parameters, situational parameters and individual parameters. From the model a research agenda is motivated.

An Experiment with Tactile You-Are-Here Maps

A first experiment with tactile You-Are-Here Maps investigated the performance and user preferences with three different realizations of tactile guide types to the YAH symbol – grid, frame marks, and guiding line. From cognitive principles some predictions could be made, e.g. that the grid was rated worse than the other guide types, but others effects were not as pronounced as expected and even counterintuitive, e.g. that the grid was statistically not worse than the others guide types. In all conditions over 80% of the reproductions showed clear survey knowledge character. The interpretation of these results are used to establish some guidelines for tactile map construction, e.g. grids must be omitted at any cost and any guide type used in tactile maps should be selected on the principle of least similarity.

Future Work

Follow-up experiments will show if late-blind and blindfolded, sighted people perform differently in the experiment, if they use different strategies and if the performance of both groups is qualitatively similar – independent of visual impairment, as suggested by some results.

References

Strube, G. (1992). The role of cognitive science in knowledge engineering. In *Contemporary Knowledge Engineering and Cognition*, Lectures Notes in Computer Science (Vol. 622, pp. 159-174). Berlin/Heidelberg : Springer.