

Spatial scaling is an essential cognitive skill that is involved in a number of daily activities, from interpreting maps of a building (small-scaled) to understanding the model of a cell (large-scaled). This ability involves understanding how distances in two different-sized spaces relate to each other and is a crucial prerequisite for coping with several sciences. Given this importance, it seems timely to increase our knowledge about the mental processes involved in spatial scaling; however, several methodological preconditions have to be fulfilled to systematically investigate this skill. As of today, only a few studies have addressed the methodological constraints and revealed heterogeneous findings. In the present project, we incorporate these methodological preconditions and qualify previous research by investigating the cognitive processes involved when scaling up (small-scaled spatial stimulus) and scaling down (large-scaled spatial stimulus), which probe the flexibility of the scaling process. Furthermore, we aim to extend the knowledge about scaling in the visual domain to the haptic domain and examine in which ways scaling differs between these perceptual modalities. These questions are investigated in samples of children aged 6, 7, and 8 years as well as adults, which are enable to detect developmental continuity of spatial-scaling abilities in general and effects of perceptual modalities and scaling directions in particular. Using a state-of-the-art methodology, in each of these experiments, children and adults are presented with two convex graphics (so-called tactile graphics). One graphic (i.e., the map) includes a convex target location and the other one (i.e., the referent space) is empty. Sizes of the maps differ in accordance to different scaling factors and directions whereas the referent space is constant in size. Participants are instructed to visually, haptically, or bimodally explore the map and to remember the target location. Immediately afterwards, they are asked to indicate the same location in the referent space from memory. The tactile exploration of maps and scaling of spatial information are additionally investigated in samples of blind individuals who did collect a varying extent of visual experience in their previous life (congenitally blind and late blind individuals). Investigating the influence of visual experience on spatial-scaling abilities inform debates discussing whether humans need visual input to generate and transform mental object representations. Furthermore, our results may inform interventions designed to improve blind individuals' usage of tactile graphics or be implemented to orientation and mobility training. As a final goal, we aim to investigate associations between spatial-scaling abilities and cognitive style, which is a general heuristic of how individuals perceive, structure, and remember information. Investigating this relationship helps to understand how spatial-scaling abilities differ as a function of cognitive styles, which is central for creating effective training studies and inform theoretical frameworks. Findings from our studies make an important contribution to various interdisciplinary fields such as psychology, philosophy, educational sciences, and computer sciences.