

## 3D-Shape-Perception Studied Exemplarily with Tetrahedron and Icosahedron as Prototypes of the Polarities Sharp versus Round

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**Abstract :** Introduction and significance of the study: This study examines if three-dimensional shapes elicit distinct patterns of perceptions. If so, it is relevant for all fields of design, especially for the design of the built environment. Description of basic methodologies: The five platonic solids are the geometrical base for all other three-dimensional shapes, among which tetrahedron and icosahedron provide the clearest representation of the qualities sharp and round. The component pair of attributes 'sharp versus round' has already been examined in various surveys in a psychology of perception and in neuroscience by means of graphics, images of products of daily use, as well as by photographs and walk-through-videos of landscapes and architecture. To verify a transfer of outcomes of the existing surveys to the perception of three-dimensional shapes, walk-in models (total height 2.2m) of tetrahedron and icosahedron were set up in a public park in Frankfurt am Main, Germany. Preferences of park visitors were tested by questionnaire; also they were asked to write down associations in a free text. In summer 2015, the tetrahedron was assembled eight times, the icosahedron seven times. In total 288 participants took part in the study; 116 rated the tetrahedron, 172 rated the icosahedron. Findings: Preliminary analyses of the collected data using Wilcoxon Rank-Sum tests show that the perceptions of the two solids differ in respect to several attributes and that each of the tested model show significance for specific attributes. Conclusion: These findings confirm the assumptions and provide first evidence that the perception of three-dimensional shapes are associated to characteristic attributes and to which. In order to enable conscious choices for spatial arrangements in design processes for the built environment, future studies should examine attributes for the other three basic bodies - Octahedron, Cube, and Dodecahedron. Additionally, similarities and differences between the perceptions of two- and three-dimensional shapes as well as shapes that are more complex need further research.

**Keywords :** 3D shapes, architecture, geometrical features, space perception, walk-in models

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