

# Introducing the third dimension on Space Syntax: Application on the historical Istanbul

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Yasushi Asami<sup>1</sup>, Ayse Sema Kubat<sup>2</sup>, Kensuke Kitagawa<sup>1</sup> and Shin-ichi Iida<sup>3</sup>

<sup>1</sup> University of Tokyo, Japan

<sup>2</sup> Istanbul Technical University, Turkey

<sup>3</sup> University College London, UK

## Abstract

This paper presents the two aspects of the extended version of space syntactic idea in order to analyse urban forms with their topographical characteristics. The historical core of Istanbul that has topography rich in height variation is selected as a sample. Axial lines are extended to incorporate the height change by introducing “extended axial lines”. Moreover, a weighting function is introduced to represent the overlapping nature of inter-visible points between two neighbouring axial lines. Space syntactic indices related to local centredness are calculated and compared to indices representing actual urban activities. The results indicate that the extension of space syntactic indices to the third dimension are strongly related with the concept of the amount of buildings and commercial activities along roads, whilst they have weak relations with the concept of experts’ indication of local centres. The space syntax approach emphasises the mutual visibility, which may not be the principal factor in forming traditional cities, such as Islamic cities. This result, therefore, suggests that another principal factor should be sought in the building of a powerful analyzing tool for such traditional cities. Compared to the extension to the third dimension, the introduction of the weighting function for intersecting angles of extended axial lines does not contribute significantly to the improvement of this analysis.

Our purpose with this paper is to contribute space syntax studies by

- creating a new field of spatial analysis for urban area studies by adopting “space syntax” and correlating it with “GIS”;
- clarifying quantitatively the special characteristics of the spatial structure of an historical urban area with its selected sample city from Turkey, Istanbul;
- developing a new method by adding third dimension for analyzing urban structure which is important to understand the formation of the cities.

## Keywords:

Urban Planning,  
Geographic Information  
Systems, Istanbul,  
Urban Morphology,  
Space Syntax

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asami@csis.u-tokyo.ac.jp  
kubat@itu.edu.tr