

## The AJAX Project: New Theory and New Software for Space Syntax

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### Abstract

This paper will present an extended and generalized view of relational-graph analysis of urban morphology. We will argue that urban systems must be articulated as relationships between at least two distinct sets of objects, probably many more, but once this assumption is adopted, this means that any relational analysis between these sets of objects implies at least primal and dual problem conceptions. We illustrate this approach using the elements that comprise space syntax - lines or street segments and their intersections or junctions - which we frame as either a problem of measuring the relationships between streets and streets in terms of junctions - the traditional analysis - or the relationships between junctions and junctions in terms of streets. These constitute the respective primal and dual conceptions of the problem and they are intimately related. This conception can be easily extended into many chains of relationships, for example between junctions and streets, streets and land parcels, land parcels and buildings and back to streets through buildings and many graph theoretic relationships can be spun off from such conceptions. We stick here to space syntax and then show how such analysis can be enriched and linked to mainstream through these ideas. We also introduce some very fast open source software which enables end users with little knowledge of the intricacies of graph theory to compute measures of accessibility between streets - the primal - or measures of accessibility at junctions - the dual. This software is called AJAX - Analysis of Junctions and AXial lines which is available from: [www.casa.ucl.ac.uk/AJAX/](http://www.casa.ucl.ac.uk/AJAX/).