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Introduction

To make comparative inferences on the social role of space or how we inhabit the built form of cities, a careful balancing of information to include and standardise is required. In my assessment, space syntax's treatment of urban space is ultimately a topological reduction based on the geometrical characteristics of ground level configurations. This abstraction results from basic interactional and socio-spatial theory. Numerical output from analytical measures applied to mappings is then correlatively linked to principally behavioural and economic observations. While initially this approach was born from and for the benefit of urban design practice, space syntax has been positioning itself progressively as an 'empirical theory' of the city. The latter has a cross-disciplinary appeal which has seen space syntax used for other purposes, such as social explanation and interpretation of urban built environments. In the foundation of space syntax, however, the Euclidean basis for spatial topology and the associated social ideas not only have put restrictions on the variety of configurations that can be measured effectively, but also have reduced the richness of comparative understanding to be gained on the processes of developing and inhabiting built form. I propose that explicitly incorporating the material properties that shape spaces made for inhabitation will open up wider and richer comparative research potential for our social analyses of space.

Material Properties

Space syntax never had the intention to spirit away the matter of built form. Yet, in the implementation of its principles and tools, the materiality of its object of study has a tendency to disappear into the background. Archaeology, the discipline whose very existence depends on the material that human life produces, has not shied away from adopting and adapting space syntax analysis for interpretive purposes. Despite several social scientific disciplines undergoing a (re)discovery of 'materiality' as a research focus, an archaeological perspective arguably remains best placed to work towards incorporation of the material properties of urban form in analyses of its morphology. Ab initio, it would mean something like re-envisioning the morphology of urban space as interlinked spatial artefacts and deriving social inference from their material properties.

Developing a richer and optimally comparative approach to analysing the space of urban built environments to approach archaeological and contemporary cities equally was the objective of my PhD research in geography (AUTHOR, 2013). This laid the foundations for a new method called Boundary Line Type (BLT) Mapping (e.g. AUTHOR, 2014). While this development is not exclusively of value to archaeology, its conception revealed the contribution of a material-based archaeological perspective to analysing urban space.

It should be noted that base plans such as those used in space syntax and urban morphological methods are, of course, derived from built form conceived of as matter. However, the elements of analytical operationalisation in space syntax focus on urban space as a (single) surface, the subdivision of which depends on the geometry of the shapes carved out by built volumes. The topology that thus emerges could be seen as a representation of specific characteristics of the surface geometry. Such abstraction denies the material properties (of designed and built matter),

composing distinctly structured and experienced spaces, an active role in social inference.

Without material properties (of our bodies and our world), we cannot manipulate our life-world to construct and transform it for inhabitation; a process of which cities are the prevailing culmination. Successfully incorporating material properties in urban morphological analysis, so they can attain the active role they play in social life and spatial development, should therefore at least lead to a fuller understanding and broadening of analytical abilities on several fronts. It would enable, inter alia, advanced diachronic analysis: tracing of material development over time for detailed and dynamic diachronic analysis and explanation; explicating and articulating historical urban morphological processes or cycles and their developmental rhythms by focusing on the roles of built elements. It would also improve spatially situated comparisons: variegating the understanding of how spatial-material characteristics structure and position any built space in social life; revealing the relative significance and disturbance of subsequent manipulation of extant spatial-material configurations. Furthermore, because material properties offer structural links to physical data, its incorporation would work towards contextualising social and experiential interpretation with the investments in building and the sunk cost effects of introducing built form, and exploring the roles and significance of stylistic and aesthetic differences in built form.

Introducing a Substantive Perspective

There are without doubt multiple ways in which socio-spatial abstractions incorporating material properties can be given an active role in social inference from built environment data. How data should be treated appropriately depends on the substantive perspective on the object of study. To explain the relevance of incorporating a materially aware outlook on the social analysis of urban space, I will introduce the vantage point that led to Boundary Line Type (BLT) Mapping.

When asking how space makes a difference in cities viewed as composite configurations for the purpose of inhabitation, it becomes clear this comes down to how material properties allow us to differentiate between spaces. Then, studying the morphology and topology of the configuration of urban space comes to rely on specifying the 'significance of material presence' to inhabitation processes. This is like shifting analytical scope from an exclusively Euclidean top-down 'god's perspective' to a mediation of the empirical reality of the 'inhabitant's perspective'.

Remaining on the ground level of traversing urban space, it can be recognised that the material properties which differentiate spaces play a rudimentary role. Social and emplaced experience teaches us that material properties accommodate the connections (and access) between one space and the next (e.g. walls, doors, gates, open, surface texture, etc.). A continuous series of such differentiations circumscribes us wherever we are in a space. Together those differentiations create a specific (empirically real and comprehensible) context with(in) which we interact. We can change this context by moving from spatial subdivision to spatial subdivision. The significance of material presence to inhabitation therefore consists of the specific empirical characteristics of interconnectivity that shape each occupiable subdivision. Anywhere in urban space, this structures our interaction opportunities both by how it affords and

affects our connections and ability to change position and situation, as well as how it affords us to manipulate material properties to (re)develop space. This applies to any urban built environment and thus enables comparative research.

The Difference Material Makes

At this stage we can look back to the (single) surface treatment of urban space in space syntax and begin to appreciate what is potentially missed. The geometric representation of urban space as a shaped surface does not account for the affordances that are present in empirical reality caused by spatial-material differentiations which connect built spaces. These differentiations are found along the edges and not along the surface of spaces. Anywhere along a surface we occupy a position structured by the boundary circumscription of that surface, a line which varies according to the material articulations connecting it to the next occupiable surface. This logic applies completely alongside and irrespective of the space syntactic principles of convexity and axiality (or, alternatively, centre lines). The social lived experience of built boundaries creating contexts for interaction does not adhere to the topology created by convexity and axiality, but creates its own topology by tracing the outline morphology. This is not to say that looking at the edges of spaces as socially significant boundaries should challenge or replace the advancements made by space syntax. Instead, it demonstrates that by focusing on material properties we can treat built environment data differently to expose an alternative 'social logic of space'.

There are, however, some practical advantages to treating urban space by mapping boundaries. The data structure that is created introduces a new and highly diverse topology, while the basic outline morphology remains intact. Tracing the outline morphology to construct a topology also implies there is no requirement for regularity in urban layout. Similarly, there is no requirement for socio-cultural spatial categories (such as street, church, house, park, etc.), because rudimentary material properties disaggregate seemingly homogeneous spatial units. Any distinct space emerges from the series of socio-spatial differentiations encountered along its (materially articulated) boundary. Furthermore, the diversity of built boundaries allows this spatial data conveying differentiations to be attributed with material or associated information which expands correlative analytical possibilities (e.g. the physical data referred to above). At the same time, all spatial information required for space syntax analysis is still also accessible. Vice versa, preparation of an axial map will not allow boundary mapping, because it simplifies outline input and removes the outline morphology. It is worth acknowledging that methodological developments in space syntax have been working to mitigate the initial limitations of axial topology by integrating, for example, street constitutedness, types of entranceways, building volumes, etc. Yet, I believe a host of advancements could be achieved simultaneously by redevising our treatments of urban space from rigorous materially aware perspectives.

An Encouragement

This brief exposition of ideas serves to elicit the exploration of new directions affiliated to space syntax, following on from the appreciation that the material of our life-world is inseparably emergent from socio-spatial and temporal processes of reality (cf. Wallace, 2011). Such viewpoints are strongest represented in archaeological discourse. My argument here is that by explicitly incorporating material properties into our studies of urban morphology we can expand our theories and, consequentially, work through the methodological implications of affordance, affect, constitutive phenomenology, environmental perception, time-geography, etc.

In this way we can better account for the materially emergent properties of the spaces we create and encounter in social life, and emphasise spatial integrality and constitution rather than assumed wholeness or uniformity. Certainly the perspective of 'the significance of material presence' to inhabitation processes results in alternative theoretical and methodological development. This suggests that innovations from positions external, yet heavily related to space syntax and urban morphological research in general, are within reach of those questioning the empirical foundations of what we do.

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Benjamin Vis read archaeology at Leiden University (BA, MPhil) with a specialisation in the Americas. He took his PhD in Human Geography at the University of Leeds (2013) and published Built Environments, Constructed Societies (Sidestone Press, 2009). This initial theoretical work informed the development of a new method for comparative built environment analysis: Boundary Line Type (BLT) Mapping, as originating in his PhD research. Currently, as Research Fellow in archaeology at the University of Kent he continues to develop urban research methods combining archaeology and geography with a special interest in the contemporary relevance of ancient tropical (Maya) urbanism.