549

A configurational approach to cultural heritage attractors

Diachronic space syntax analysis in the historic urban area of Rome

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ABSTRACT

Globally renowned cultural heritage artefacts perform as movement attractors of flows especially in historic urban areas. While extensive research on heritage studies has been stimulated to identify the values and criteria associated with the heritage artefacts per se, there are few studies that investigate the spatial parameters of the urban network which may impact the valorization of heritage artefacts and enable culture-led mobility. This research takes the historic urban area of Rome as the case study and explores the past and present spatial configuration of the street network in relation to heritage artefacts. A diachronic space syntax analysis is performed by dividing Rome's urban development in three important historical periods and by linking the position of the current most popular heritage attractors to their former uses. On one hand, this research aims to investigate whether and how the location of heritage attractors in the urban network may influence their popularity enabling culture-led pedestrian flows. It also aims to set a methodological framework for urban designers to study culture-led movement in street spaces of historic urban areas.

KEYWORDS

Cultural heritage, historic urban areas, diachronic space syntax, natural movement theory, artefacts

1 INTRODUCTION

Cultural heritage artefacts across popular tourism destinations perform as attractors of movement especially in historic urban areas. The phenomenon of increased fluxes in historic urban areas and particularly in locations where important artefacts are present have drawn attention of disciplines such as tourism studies, economics, sociology and urban planning which tried to assess, monitor, and develop policies and models to mitigate the negative externalities of visitor flows (Amore et al., 2020; Liu and Chen, 2015).

At the same time, diverse approaches have been used to tackle pedestrian movement in urban design, ranging from street network configuration, land use patterns and points of interest (López Baeza et al., 2021) to agent – based modelling (ABM) (Kirova and Markopoulou, 2021) and digital twin solutions (Novacek et al., 2021) but only few of these studies have explored the link between these heritage artefacts – here cultural heritage attractors[1] - and pedestrian movement in urban space (Kong and Karimi, 2019).

Through applications of space syntax approaches and natural movement theory, this research aims to investigate the association between past and present configurational patterns and cultural heritage attractors in the historic urban area of Rome.

2 THEORY

2.1 Natural movement theory applied in cultural heritage attractors

According to natural movement theory, “spatial configuration is the primary cause of both attraction and movement in cities” (Hillier et al., 1993). The theory of natural movement is based on the hypothesis that configuration influences attractors, but attractors cannot influence spatial configuration. The same concept applies for movement; while movement does not have agency on spatial configuration, spatial configuration has the potential to impact movement.

[1] We define as global heritage attractors the most popular attraction points in renowned metropolitan tourism destinations. For the present study, the 100 most popular attraction sites in Rome are considered with data from TripAdvisor (https://www.tripadvisor.com/Attractions-g187791-Activities-Rome_Lazio.html, last accessed 01.01.22)

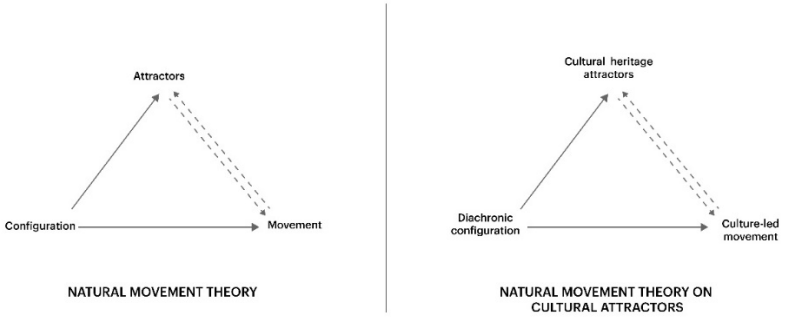

Figure 1: The theory of natural movement first introduced by Hillier et al., 1993 and the application in relation to cultural heritage attractors

The natural movement theory has been widely applied in urban studies during the past years. These applications include research on natural movement theory in correlation to commercial land use patterns (van Nes, 2021) and economic activity, patterns of urban growth (Gunaydin and Tascioglu, 2021) densification strategies (Koning et al., 2020) and historic research (Van Nes, 2011). The concept of attractors within natural movement theory has been strongly linked to economic attractors with multiple empirical studies in urban areas showing the association between street integration, the availability of commercial land uses and the associated pedestrian movement (Omer and Goldblatt, 2016; Scoppa and Peponis, 2015).

The syntax theory of movement is not explicitly limited to economic attractors but may as well include different use patterns. An expansion of such concept could involve other significant sites such as places of worship and administrative buildings (Vaughan and Sailer, 2017). This study extends the natural movement theory from commercial attractors and tests its applicability on cultural heritage attractors and culture – led movement (see Figure 1).

Cultural heritage attractors are defined, for the purpose of this research, as built heritage artefacts including architectural elements, monuments, or landmarks, which perform as attraction points of pedestrian movement flows within an urban area.

2.2 Space syntax theory and methods in cultural heritage studies

Studies across urban contexts have emerged with the aim of exploring the relationship between urban transformation and social activity but there is more room to empirical studies in contemporary issues of urban heritage (Griffiths, 2012; Griffiths and Vaughan, 2020).

Over the past decades, terms such as “heritage urbanism” (Obad Šćitaroc et al., 2019), and “landscape-based approaches” (Veldpaus et al., 2013) have been identified, calling for integrative approaches that connect cultural heritage management to urban studies (Bandarin, 2019; Pereira Roders, 2019). Space syntax being both a theory and a cluster of approaches to the analysis of spatial relations (Hillier, 1999; Hillier and Hanson, 1986; Pafka et al., 2020) could give

quantitative description to place-specific aspects of cultural value (Palaiologou and Griffiths, 2019).

3 DATASETS AND METHODS

The case study explored here is the historic urban area of Rome, a city which has "produced" a rich and conflicting cultural heritage counting today with more than 340 architectural and historical assets and 188 archaeological sites (Aureli, 2010; Gemmiti, 2019). The area of study contains a large amount of the historical, architectural and archaeological assets and is limited to the urban area within the Aurelian walls.

To understand today's cultural heritage attractors in the city of Rome implies to understand the evolutionary processes that have generated these attractors across time and investigate their use patterns in each of the different periods. As the time span of cultural heritage attractors goes back to the Roman empire, we perform the space syntax analysis influenced by Mario Sanfilippo's division of the city in three timeframes, representative of the most important episodes which marked also the spatial pattern of the city (Sanfilippo, 1992).

These are following:
(t1) – Ancient Rome
(t2) – Renaissance Rome
(t3) – Contemporary historic urban area

The axial maps for each timeframe were produced based on data present in

i) the cartographic representation made by Giuseppe Lugli and Italo Gismondi of the ancient street system and the historic spaces for (t1) (Lugli and Gismondi, 1949)
ii) the well-known representation of Rome by Gianbattista Nolli in 1748 (Nolli, 1748) for (t2) and
iii) i) the OSM database to obtain the contemporary representation of the street network *(https://www.openstreetmap.org, last accessed 05.10.21) for* (t3) – Contemporary historic urban area

The space syntax methodological framework allowed us to analyze using the same tool urban street patterns that have emerged under different time periods and regimes (Omer and Goldblatt, 2016) and observe the position of what today are the city´s cultural heritage attractors in relation to each of the street networks in time.

To obtain the data on cultural heritage attractors, we use the dataset and ranking by TripAdvisor on the 100 most popular attractions in the historic urban area of Rome

(https://www.tripadvisor.com/, last accessed 02/11/2021). Since the method and the scale explored here is limited to cultural heritage attractors as point systems (based on TripAdvisor categorization of architectural buildings, churches & cathedrals, historic sites, landmarks, monuments and statues, ancient ruins) historic urban areas and the cultural heritage attractors that were located outside of the study area were excluded. After this process, the remaining sample included 75 attractors within the historic urban area of Rome. We categorized the data based on two main parameters: popularity ranking (from 1-100) and broader chronological time span of appearance (t1, t2, t3).

In Figure 3 the three axial maps for (t1), (t2), (t3) are shown and the results on global integration are presented through maps. The axial maps were generated using the DepthmapX software based on each historic period´s street network and manually calibrated. Global integration indicates the to-movement potential of a given axial line in the axial map (Omer and Goldblatt, 2016).

4 RESULTS

The maps on the three distinct time periods in the city´s evolution highlight different areas within the historic center as the ones with the highest degree of integration. To interpret these outcomes, we contextualize the results of the spatial analysis with historic data based on each period. A classification of the drawn axial maps (see Figure 2) to reduce the illustration to the top 5% most integrated streets allows for initial observations on the link between today´s heritage attractors and their former use, the patterns of urban evolution and the street network configuration.

Figure 2: axial integration (Radius – n) and 5% of the most integrated street network (axial integration Radius – n) and the position of today's cultural heritage attractors in the historic urban area of Rome for (t1), (t2), (t3) – Christian Rome, Renaissance Rome and the Contemporary historic urban area

The classification revealed a different concentration of the highest integration patterns in each of the three time periods. In the streets with the highest integration are located near the area of the Roman Forum (t1), align with the historic documentations which depict the Roman Forum as the center of daily life in ancient Rome (Taylor et al., 2017).

While in the first timeframe (t1), the highest integration is spotted around the Roman Forum, in the second timeframe (t2), the concentration of the highest street integration shifts towards the

northern part of the historic city. This again aligns with historical records who confirm an intentional shift of the city's centrality towards Campo Marzio and a reconstruction of the city restating its importance as head of Western Christianity (Aureli, 2010). The project of restoring the ancient road Via Lata, Via del Corso as part of pope Nicholas agenda started as a series of interventions that reached a peak when pope Sixtus V based his plan on the patterns of movement between the city's seven churches. Following the new axes, the placement of four obelisks in important intersections as landmarks established visual connections and oriented movement between the focus points of the city, including the new central area of Piazza del Popolo (Çelik et al., 1994). While to some extend pope Sixtus V design on the new street axis was based on treating the context as "tabula rasa", there was an underlying objective of connecting the basilicas with roads.

Linking the aforementioned historical information to the theory of natural movement, following observation occurs: the street design was followed by the placement of landmarks – the obelisks, supporting the order described in the natural movement theory, that attractors follow configuration.

However, considering that the new street layout followed the pre-existing basilicas system (heritage attractors) aiming to connect and create movement routes for pilgrimage, the following question arises: can also attraction inform configuration, in other words, forecast street expansion?

Revisiting the theoretical framework of natural movement theory, the concept of movement economy becomes relevant (Hillier, 1999). This concept performs as an extension to the natural movement theory arguing that not only configuration can impact the presence of attractors but that once this relation is established, the expansion of the street network can also be influenced by attractors. Especially in patterns of urban evolution over a long timeframe which include important heritage attractors, seemingly important heritage attractors can become the starting point to direct future street network expansion and connectivity (hereby called movement culture).

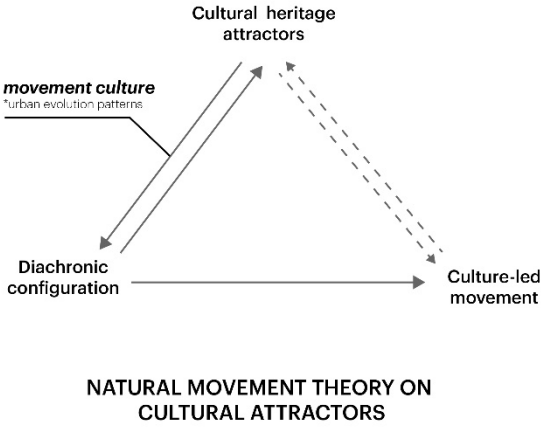

Figure 3: The natural movement theory on cultural attractors revisited

5 CONCLUSIONS

Returning to the initial question, the application of natural movement theory and space syntax analysis may indicate a worth to investigate link between spatial configuration and cultural attractors. When studying cultural attractors and their position in an urban setting, a diachronic spatial analysis is key as it reveals both the link between spatial configuration and attraction when these were established as active parts of the city. At the same time, it provides us with insights on present spatial configuration and their location in the contemporary urban setting.

To further verify the theory of natural movement, an analysis of pedestrian movement in relation to cultural heritage attractors and spatial configuration would be necessary. In addition, comparative research across historic urban areas of cities could provide important insights to refine the methods suggested here. Applying the theory of natural movement to cultural attractions we believe can offer a systematic framework to analyze the position of popular monuments and landmarks in historic urban areas and bridge heritage related studies into the disciplines urban design and planning.

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