CHAPTER 7

Not the same landscape. Rediscussing digital approaches to premodern spatial knowledge systems

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Abstract

This chapter examines the status of the digital study of premodern spatial documents understood as expressions of local knowledge systems. It investigates the tension between the prevalently Cartesian perception of the world underlying modern efforts of mapping and spatial analysis, and the contrasting multiplicity of premodern spatial epistemologies, which reveal deep, multi-layered forms of representation.

The first part summarizes the dynamics in the development of spatial knowledge and offers a gallery of examples showing the complexity of premodern spatial descriptions. The second part evaluates current trends in Digital Humanities and examines the ways in which this complexity is (or is not) addressed. The conclusion emphasizes the main issues that still affect the study of premodern spatial perception and proposes some recommendations.

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Abstract (Italiano)

Questo capitolo esamina la situazione corrente nell'ambito dei metodi digitali applicati allo studio di fonti sulla percezione dello spazio in età premoderna, intese come testimonianze di specifici 'knowledge systems'. Si analizza la tensione fra la percezione del mondo prevalentemente Cartesiana su cui si basano i metodi moderni di mappatura e analisi spaziale, e la contrastante molteplicità di epistemologie premoderne, che rivelano forme di rappresentazione complesse e sfaccettate.

La prima parte sintetizza le dinamiche di sviluppo della percezione spaziale e offre una galleria di esempi per dimostrare la complessità delle rappresentazioni premoderne. La seconda parte analizza le più recenti tendenze nelle Digital Humanities e valuta i metodi di (non) affrontare questa complessità. Nella conclusione si sottolineano le problematiche più importanti ancora rilevabili nello studio della percezione premoderna dello spazio, e si propongono alcune raccomandazioni.

1. Introduction: Not the Same Landscape

It is very difficult to imagine a world without maps.[1] The ways most of us interact with our spaces daily are almost inescapably mediated by certain predominant representational frameworks, such as the Mercator projection and the Cartesian grid, and by navigational technologies, such as GPS and Web maps.

The foundation of this system relies on a set of ideas, which originated in some European countries and expanded globally through economic and territorial colonialism. We will refer to this system as the 'Cartesian paradigm'. The word 'Cartesian' derives from the name of the French philosopher René Descartes (1596–1650), and it implies a process of representing information through a geometrical framework, the horizontal plane, defined by axes: as such, it is inherently representational and positivist, as it implies a rigid definition of what is 'mappable' and 'scientific', vs. what is 'unmappable' and 'unscientific' (Dunn 2019).

However, human societies did not always understand space in this way.[2] Throughout most of Antiquity and the Middle Ages, diagrammatic representations

[1] This chapter was developed from a talk given for the *Digital Humanities and Materiality Seminar Series* (University of London – Babes-Bolyai University) in 2022. Many people contributed to the thoughts expressed here: in particular, I would like to thank Valeria Vitale, Karen Allen, Julie Velásquez Runk, Ute Dieckmann and Øyvind Eide. I am also grateful to Ruth Mostern, whose inspiring and thoughtful feedback made this chapter so much better.

[2] It is unclear when a map-based navigational practice was born. It is generally assumed that by the 16th century cartography and navigational

were not the primary mediator of the human relationship with the environment. To explain why the ancient Greeks and Romans did not seem to use maps to find their way, Pietro Janni (1984) utilized the notion of 'hodological space', coined by German psychologist Kurt Levin: a pragmatic understanding expressed through narrative (rather than vision), structured as a linear sequence of features seen through an egocentric perspective, and opposed to a Euclidean, 'bird's eye' cartographic cognition. Although the two notions were never rigidly separated in practice, maps were approached with skepticism as tools to represent the material world, and this carried important implications for the development of spatial cognition: while cartography could be one way of representing the world philosophically through geometry and mathematics, other tools were used to conceptualize the human relationship with it.

The predominance of the Cartesian paradigm—a set of concepts that inevitably and somehow unconsciously frame the perception of the world for most people today—created a form of hierarchy of spatial knowledge, according to which non-cartographic representations were regarded as primitive, underdeveloped, or not sufficiently 'objective'. Cartography, interpreted as the only truly scientific means to understand space, could be used to illustrate non-cartographic information by placing it within a 'real-world' context.

In recent times, however, it has been acknowledged that Western cartography and technology are not neutral tools that can be applied to any notion of space, but carry certain epistemological implications. This process has created the conditions to deconstruct and decenter the Cartesian paradigm, and to support a more nuanced inquiry into other modes of representation. Most importantly, however, it generated a reconsideration of spatial cognition in different human groups as an organic knowledge system, where ideas, concepts and material features interact and provide autonomous and effective representations. There are ways of interpreting, or seeing (or hearing, or tasting, or touching) the spaces we inhabit, that are completely different from our own. We all look at the same space, but do not see the same landscape.[3]

The purpose of this chapter is to examine documents from societies located before or outside of the expansion of map-based culture, and to provide a per-

technologies were sufficiently efficient to mark that shift in a good part of the world, although European colonialism is responsible for the expansion of this practice in the Americas and the Pacific, where evidence suggests that navigational knowledge was still working through different systems.

[3] The meaning of the word "landscape" is very complex. Its use has been criticized as strongly connected with Western representational models and techniques, but there is no agreed-upon terminology to describe the same group of ideas. In the context of this discussion, the term is to be understood as the manifestation of "the world as it is known to those who dwell in it" (Ingold 2000: 193), and as the conglomerate of discourses and concepts describing the human relationship with the environment (Olwig 2019: 13–16).

spective on how they challenge the Cartesian paradigm. Then, I will examine the implications of this situation for research, particularly in the domain of Digital and Spatial Humanities, two fields literally born out of, and inextricably connected to, Western technological epistemology, but that have an unprecedented potential of simulation and reconstruction. Can digital methods provide an opportunity to go beyond the Cartesian paradigm? To what extent are they generalizable to different knowledge systems? What ethical implications lie in their application? What models, if any, could offer new ways to look at the problem?

2. Humans and the World

The starting point to understand human conceptualization of space is the idea of embodied experience (Tuan 1977): the mediation of human perception constructs meaning on the environment and turns it into something that can be represented, re-expressed, and re-encoded in different media.

The body and its interaction with the physical world are the primary mediators through which we experience our surroundings. The second crucial element is the substrate of knowledge, or navigational skillset, which informs how to recognize and engage with environmental features. Such knowledge will be different depending on culture, on the nature of the ecosystem, and even on individual experience.

The embodied experience of the environment is *multi-sensorial* and *interactive*. All our senses participate in it and convey information, and the very act of moving generates intuitive and physical input that is used to navigate across the territory: we interact with the material characteristics of the environment to gather information from it and construct an image of it.

An additional mediation is provided by culture, language, or, more broadly, the cognitive frameworks that help us process spatial information. These are sometimes referred to as mental models, cognitive representations of space that mediate between the phenomenological world and its semiotic expressions (Thiering 2014). These models, however, are not pre-constituted signifiers that humans impose on space: they are affected by the environment and the way it is experienced. So, while they work as a knowledge filter, through which a person can make sense of the world, they are constructed and modified based on that experience. This knowledge is then translated into various forms of spatial communication, in a transmedial process, through which a community fixates and reflects upon the experience, selects what to communicate and how, and transmits it in a systematic way (Figure 7.1).

However, spatial communication is not a mere description of the landscape: it is a codification of this whole process in all its complexity and, in turn, provides a frame of conceptualization for it. Spatial knowledge is the result of a 'feedback loop', where the material embodied experience informs a representation

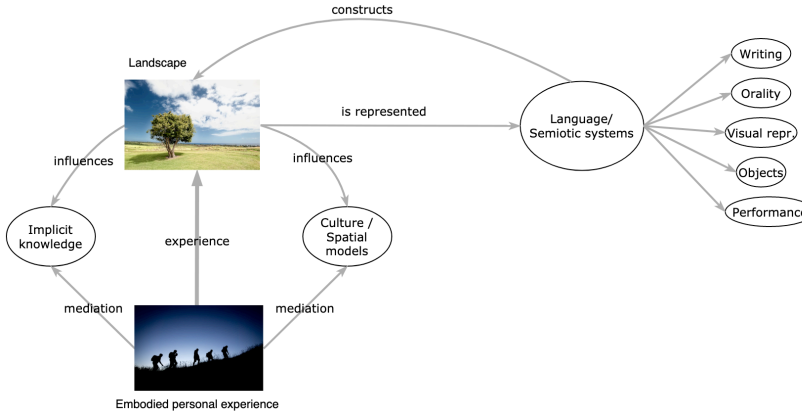

Figure 7.1: A diagram illustrating the passage from landscape to representation. Photo Credit: Jeff King and Tobias Mrzyk (Public Domain).

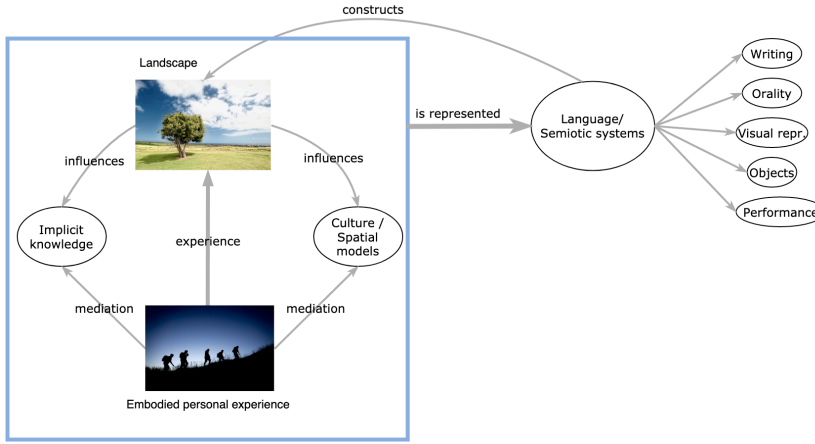

Figure 7.2: The diagram in Figure 1, modified. Photo Credit: Jeff King and Tobias Mrzyk (Public Domain).

of the world, which in turn gets codified in a new semiotic system, which then provides conceptual reference points to move through the environment (Figure 7.2). Spatial knowledge is not the result of an arbitrary set of ordering parameters imposed on a disordered sensory input, but of the dynamic interaction of body, culture and environment in the act of moving and dwelling in the world (Gibson 1979; Ingold 2000; Merleau-Ponty 1945). The product of this interaction is constituted by the material evidence of spatial communication: visual, oral, performative or written sources. These are the (inevitably

fragmentary) traces we use to reconstruct an experience that is geographically, temporally and culturally distant from us.

3. The World and Premodern Civilizations: First Gallery

The material environment (whether 'natural' features or infrastructure marking human presence) can shape spatial cognition and communication in very distinctive ways. In ancient Greece, one of the most typical forms of spatial communication were the *periploi* (from περιπλέω, 'I sail around'), the conventional name for a type of sea travel description that, despite being mostly a literary product, took navigational information from real-world accounts. When describing navigation, this narrative structure is paradigmatic and hodological, articulated through a linear sequence of features on the coastal line, connected by various kinds of spatial and conceptual relations. For this reason, *periploi* sparked debate among scholars, who questioned the effectiveness of this system at providing support for navigation: some believe that a big part of the Greek navigational skillset was transmitted orally (Medas 2008), while others, combining archaeological evidence, believe that Greek seafaring was just primitive and approximate (Janni 1996). But the shape of the *periploi* is a result of the material circumstances under which navigation happened: Ancient Greek seafaring originated from coastal navigation in a closed sea during the Colonization (7th c. BCE) and from the subsequent establishment of habitual routes of communication across coastal centers (Dueck 2012: 111-ff.). Therefore, the system of spatial communication generated from it was as accurate as it needed to be, given the material environment in which it was designed to function.

Sometimes, the process would be reversed: human conceptualization of the landscape may foreground its material modifications, creating deeply integrated forms of spatial discourse. In the Roman Empire, spatial conceptualization was predominantly expressed through the appropriation and centralization of infrastructure, of which the most prominent example was the road network.

One of the structural elements of the Roman roads were the milestones (*miliaria*), epigraphic monuments placed at specific endpoints, providing the distance, mile by mile, to the beginning of the road, and intended to function as authoritative reference points for travelers (Figure 7.3). Everything about the *miliaria* is functional to spatial discourse: their physical location and shape were as important as the information they conveyed, and their linguistic component was structured topologically as a linear sequence of intervals, an obvious effect of the travel infrastructure. On the other hand, they clearly marked the landscape as Roman, functioning as ideological manifestations of power (Kolb 2016).

Figure 7.3: Roman milestone of the ancient Via Traiana. From Cerignola, Facciata di Palazzo Ducale. Public Domain. https://commons.wikimedia.org/w/index.php?curid=5040277.

The milestones are hardly works of art. Yet, this form of spatial discourse was so pervasive that it was replicated, both in form and language, in non-functional and artistic objects: for example, it is reproduced in monuments of propaganda like the large-scale milestone pillar called *Stadiasmus Patarensis* (45–46 BCE), or in small-scale personal objects like the Vicarello Goblets (50–150 CE), literally mini-milestones that utilized the same language to display a personal, memory space for private use.

Beyond the materiality of the landscape, spatial representation could also be framed by cosmological preoccupations, with a deeper sense of a more-than-human surrounding reality. For example, Early Chinese perception of space was based on the cosmographic tension between the primeval undifferentiated chaos and the principle of order: as the creation of the world was structured as an ordered sequential separation of things emerging from chaos, the principles of division and order were substantial to spatial understanding (Lewis 2012). Accordingly, spatial knowledge was not descriptive and representational, but prescriptive and operational (Henderson 2009): the practice

of ordering the world was at the same time administrative and cosmological, reflecting the supreme goal of Chinese statecraft.

The main metaphor used to organize space was based on the same principles of order and separation: the square was the main unit of division, displayed in various arrangements, such as the grid, used to organize the territory in the Nine Provinces system (Lewis 2012). The grid, however, was also pervasive in visual and architectural arrangements:[4] a chief example was the 'Bright Hall' (*Ming Tang*), the central hall of the imperial palace described in Han texts. The Bright Hall was structured through a geometrical, grid-like arrangement: the ritual passage of the ruler across the various chambers symbolized both the annual cycle and the ordering power of the state. As such, the Bright Hall was a symbolic representation of the entire ancient Chinese cosmos and social order (Tang 2020), but it also functioned as a diagram, representing the universe through forms and patterns. The same fund of ideas that generated the Bright Hall also served as a model for personal objects with ritual and divinatory value, such as diviner's boards, TLV mirrors (Figure 7.4), and *liu bo* game boards, which used geometrical diagrams to represent the cosmos and reduced the world to an object that one could hold in the palm of the hand and allowed access to a realm of cosmological totality (Hung 2007). Immaterial space, therefore, was represented through carefully crafted material objects.

In other civilizations, local history and mythology provided a conceptual filter through which the deeper meanings of the landscape could be constructed, creating multi-dimensional narratives about space. In pre-colonial and early colonial times, Mesoamerican spatial knowledge was based on a conceptual, totalistic association between the landscape and the community, which was expressed through multi-scalar communication that manifested through depth rather than arrangement of features. Moreover, because Mesoamerican time perception was cyclical, there is no linear progression in spatial storytelling. A well-known example is offered by the Mixtec Codex Zouche-Nuttall, which merges recognizable geographic features with foundational-mythical stories, to create a deeper, culturally meaningful representation of a recognizable landscape (Mundy 1998). Even the basic spatial unit of Mexica administration, the *altepetl*, represented as pictograms enriched by toponymic glyphs, resembles multi-dimensional 'deep maps', where multiple aspects are joined together in such a way that it is impossible to make a clear demarcation. Finally, the material features of manuscripts, like color and composition, were used as spatial metaphors to reflect environmental and cultural characteristics (Murrieta-Flores, Favila-Vázquez & Flores-Morán 2022).

[4] It is debated at what point in time this geometrical ordering of space led to the development of the cartographic grid as a representational standard. The grid is traditionally dated back to Pei Xiu (3rd century CE), but it is unattested in maps until at least the 12th century.

Figure 7.4: Cast bronze mirror with TLV design. China, Eastern Han dynasty, 25–220. Los Angeles County Museum of Art. Public Domain. https://commons.wikimedia.org/w/index.php?curid=27215358.

One of the most complex manifestations of a holistic perception of space is the Aboriginal Songline tradition, also called Dreaming or Dreamtime. The name, popularized by Bruce Chatwin's bestseller (1987), broadly refers to the tracks, or footprints, with which the Ancestral Beings marked the landscape while they were living in it, making it what it is today. In the Songlines, the spiritual and the material dimension of the landscape overlap exactly: they merge recognizable features of the landscape with the images and stories of the Ancestral Beings, at the same time functioning as orientation devices (Norris & Harney 2014) and as memoryscapes, where every single feature of the landscape is meaningfully connected (Turnbull & Watson 1989).

The Songlines, however, are also inextricably connected to the material circumstances of their production: they are primarily ritual songs, made to be recited in particular contexts, while their designs are transferable across media.

Especially in the Classical tradition,[5] their visual manifestations were drawn on ephemeral materials, ranging from the famous bark paintings to bowls and weapons, sometimes even to be destroyed during ceremonies. The most prominent exceptions are ancient exemplars inscribed on rocks, which are regarded as produced by the Ancestors themselves, and therefore precluded from access and reproduction (Sutton 1998). This ritual aspect underlies forms of secrecy also at the local and individual level, with profound differences across communities: a Songline and its corresponding patterns and interpretation may be regarded as personal to the individual or clan, therefore its disclosure or reproduction are forbidden.[6]

Hopefully, these examples have shown the variety and complexity of the processes considered under the notion of 'spatial knowledge'. Spatial documents reflect the complexity of the human-environment interaction, and therefore are multi-layered. This merging of dimensions happens in two ways: conceptually, through the overlapping and mixing of cosmological, religious, topographic, political and cultural categories, and transmedially, through the integration of different types of media, material and immaterial elements.

This complex system works as a framework to the landscape so that the elements that are important *conceptually* also become prominent *materially*. Spatial representations served as mnemonic devices for the community, often at times when communication was predominantly oral: through the overlap of conceptual and material features, they really created the landscape, with no clear-cut distinction between environmental features and their deeper meanings. So, a promontory placed at a certain angle, a particularly shaped stone, a mountain at the horizon, may not mean anything to a foreign navigator: in fact, it may not be distinguishable from the rest of the environment at all. However, because of its role in local knowledge, it becomes instantly visible to a member of the community.

Finally, one should consider the added complexity, specific to premodern sources, of the distance in time, space, difference in media, and various forms of secrecy and uncertainty, which inevitably affect the completeness of the evidence, while the very landscape that they were supposed to represent has drastically changed or disappeared. This is the challenge that is posed to

[5] The term 'Classical tradition', which is usually indicated in English as 'Aboriginal art', indicates the Aboriginal cultural practices at the time of the arrival of the first non-Aboriginal people in Australia: some of these still survive, while most of the current production is defined as 'post-colonial' (Sutton 1998).

[6] The research on this part has been conducted on images of Songlines that are published on the web with adequate permission and are available for anyone to see. However, since the author has not obtained direct permission for publication in this volume, no figures of Songlines or clear links to them are included here.

research, and specifically to a field that defined the investigation of spatial knowledge as its chief objective: the Spatial Humanities.

4. Challenging the Spatial Humanities

The Spatial Humanities flourished at the intersection between humanistic place and machine-actionable models of representation. The term appears for the first time in the volume *The Spatial Humanities: the Future of GIS in Humanities Scholarship* (Bodenhamer, Corrigan & Harris 2010), and it was broadly adopted to define an area of research that utilized computational methods to investigate spatial documents. The Spatial Humanities emerged during a period defined by the spatial turn, which placed a renewed emphasis on the social and cultural aspects of space.

From the start, the Spatial Humanities were clearly associated with the Cartesian paradigm: they made massive use of technologies designed to facilitate the digital representation of places, including Geographic Information Systems (GIS), Web maps (such as Google Earth or OpenStreetMap), GPS navigators, and Semantic Web standards like the Keyhole Markup Language (KML). These technologies defined the fundamental toolkit used by any scholar who wanted to apply computational methods to study spatial information.

By adopting these methods, the Spatial Humanities also inherited their tensions. The discipline placed itself at the tail end of a long tradition of critique of the Cartesian paradigm, which started within geography and cartography. By emphasizing the humanistic value of notions of place, geographers already indicated the limitations of the Cartesian paradigm to represent the complexity of spatial knowledge (Harley 1989; Kitchin & Dodge 2007; Pickles 2012; Tuan 1977). GIScience specialists pushed for a deeper understanding of the concept of 'map' as a creative/expressive project, as opposed to an always-there, always-true representational paradigm (Wilson 2017). The Cartesian paradigm, in other words, is just one of the many possible representational frameworks.

Still, the challenge is far from resolved. Scholars have emphasized how the generalized use of GIS and Web mapping systems tends to rework or even reinforce established power structures within more traditional practices (Haklay 2013; Massey 1991; Wainwright & Bryan 2009). Moreover, there are important ethical implications when researching or disseminating the geographical knowledge of indigenous populations, from ethical and epistemological standpoints (Wickens Pearce & Louis 2008), but also from the very concrete perspective of access and reproduction, which may be strongly regulated by the communities themselves, or even tied to the necessity of hiding the location of natural resources.

This issue calls into question the entire array of digital technologies and standards used to accomplish spatial analysis. The Spatial Humanities remains

a discipline that applies a methodological toolkit deeply ingrained in Western epistemology, to the understanding of cultures that did not even remotely use the same tools in their own cognitive and communication processes. It is important, therefore, to ask ourselves to what extent these methods of representation are effective tools of inquiry into other knowledge systems, how we may further problematize our assumptions, and what new solutions may be attempted.

5. Spatial Knowledge and Spatial Humanities: Second Gallery

The mapping of the premodern world immediately stimulated reflection on the complexities of spatial representation. The largest gazetteer of the premodern world, Pleiades,[7] established a richer and more nuanced digital representation of 'place,' understood not just as a set of GIS coordinates, but as a bundle of associations to information of different kinds, including names, attestations, cultural heritage data, chronologies, semantic categories, and so on (Elliott & Gillies 2009).

Recently, Linked Open Data (LOD) infrastructures like Pelagios[8] introduced a framework to connect a multiplicity of resources, including text, images, place data, but also material objects and cultural heritage information, with a strong focus on places as a connecting element (Vitale et al. 2021): ideally, this would facilitate the integration of online resources for the creation of complex, multi-layered digital representations.

The Digital Periegesis[9] and ToposText,[10] although with different research goals, provide intensely annotated digital editions of ancient Greek texts and use LOD to connect place references to external information on significant sites and cultural heritage objects. In this way, Greek texts function almost as 'ancient travel guides' to the geography of the Mediterranean (and beyond), and the resulting datasets reinforce a sense of interaction between the narrative of the written document, real-world geography, and the material and cultural dimension of space (Figure 7.5).

Of course, there are limitations: somehow against the notion of a 'travel guide', the resulting visualizations privilege a cartographic, bird's eye view, and do not allow for a hodological perspective.[11] An additional issue is the general

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[7] Which derived nonetheless from a traditional print atlas, the *Barrington Atlas of the Greek and Roman World* (Talbert 2000).

[8] Pelagios Project: https://pelagios.org/.

[9] Digital Periegesis: https://www.periegesis.org/.

[10] ToposText: https://topostext.org/.

[11] The Digital Periegesis is experimenting with alternative visualizations: see https://gis.periegesis.org/.

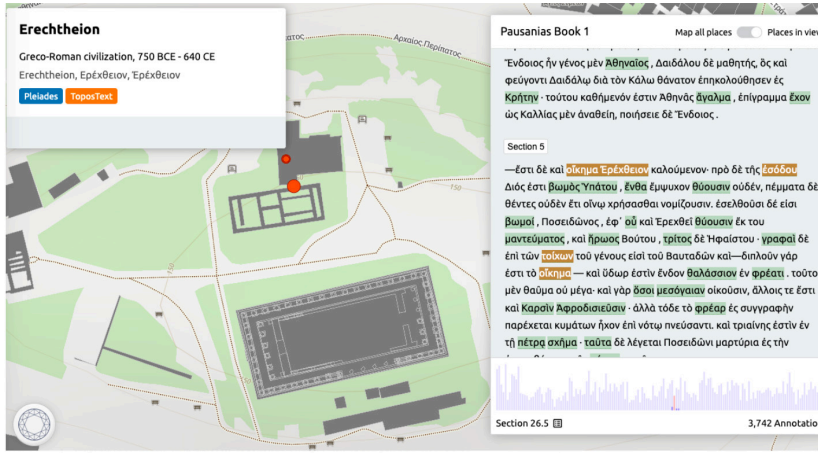

Figure 7.5: A screenshot from the Digital Periegesis illustrating various linked resources around a text mentioning the Erechtheion in Athens. Published in: Elton Barker, Early Steps in Digitally Mapping Pausanias's Description of Greece. Pelagios Blog, 2021. URL: https://medium.com/pelagios/early-steps-in-digitally-mapping-pausaniass-description-of-greece-548301b2a54d. Reproduced with permission of the Author.

inability of current technologies to visualize narrative and topographical distortion, such as the non-linear juxtaposition of stories belonging to different periods, or the alterations used to assign prominence to locations with specific mythistorical characteristics (for example, in Pausanias: Hutton 2005).

Another big issue is the lack of strategies to represent semantic depth of spatial information. Despite the enormous flexibility of semantic annotation, one of the most successful methods for the collection of data from narrative sources, two main elements are missing: generalizable ontologies and standards to encode semantic information, and suitable workflows to represent the overlap of different conceptual dimensions (culture, religion, mythology, poetry and geography) that is characteristic of spatial documents (Foka et al. 2021). As we will see, these two problems are common.

Another LOD-based project, Digging into Early Colonial Mexico (DECM),[12] uses a similar workflow to analyze the complex stratification of the *Relaciones Geográficas de la Nueva España*, a 16th-century corpus documenting Mexican precolonial and early colonial spatial knowledge. The corpus was georeferenced and annotated with large-scale computer-assisted methods, enriching place data through supervised text mining and machine learning to show various

[12] DECM Project. Digging into Early Colonial Mexico: https://www.lancaster.ac.uk/digging-ecm/.

types of contextual information. Even though still within a GIS framework, annotation provides a certain level of depth, as the spaces described are associated to cultural and semantic categories that contribute to define their role in local knowledge.

The biggest challenge, however, is to integrate the maps (or, more broadly, visual documents) included in the *Relaciones*, which provide important evidence to indigenous spatial understanding, expressed through a multi-dimensional narrative where environmental and cultural realities overlap, and where features like arrangement, color and style have specific meaning. Such images cannot be annotated automatically and are also extremely challenging to model as data (Murrieta-Flores, Favila-Vásquez & Flores-Morán 2022). Even though there is no lack of technologies for image annotation,[13] what is missing is, once again, the operational and methodological framework to work with such multi-layered spatial manifestations: it is a challenge to understand how to collect the information from the source and how to represent—and differentiate across—its various constituents. Therefore, the creation of a comprehensive digital representation of Mexican spatial knowledge is still very much a work in progress.

The most intense experimentation in new data models has happened precisely in the digitization of cultural and mythological sources: semantic annotation, applied with increasingly philological rigor, is often combined with ad-hoc ontologies that are created from the data, rather than imposed top-down. The Norse World gazetteer,[14] which models spatial information from manuscript sources of Medieval Sweden and Denmark, combines a philological approach of manual annotation and data entry with a tailored database structure and uses GIS as a management and exchange tool, rather than for visualization (Petrulevich 2023).

The Manto project[15] is an original attempt to model ancient Greek mythologies through their references to places and people, creating a 'map' that combines LOD and relational databases. Even though the purpose of this project is not to investigate space, but rather mythology as a knowledge system, it is a useful point of comparison. The project places itself within a longstanding history of relational models, such as graphs and networks, for the representation of space (Barker, Isaksen & Ogden 2016). In this framework, spatial knowledge is fundamentally understood as a conglomerate of relations (Palladino 2021): between features, concepts, or even words. Relational models provide a way to

[13] The IIIF standard provides an important starting point within the LOD framework, as Baba indicates (Chapter 3 in this volume). An alternative approach is proposed by Woodward, Offner & Blackwell (Chapter 6 in this volume), using the CITE infrastructure already adopted in the Homer Multitext.

[14] Norse World: https://norseworld.nordiska.uu.se/.

[15] Manto: https://www.manto-myth.org/.

complement traditional GIS maps and at the same time empower research beyond the map's constraints. They are, therefore, particularly suitable for projects that deal with non-Cartesian notions of space: mythological places, in this case, are obviously not easily mappable according to Cartesian criteria. Therefore, they are considered as nodes in a network rather than georeferenced locations, and their relations are of multiple kinds: spatial, but also cultural, familial, narrative, religious, temporal, and conceptual. The resulting ontology, represented through a relational database, is created through a careful and well-documented bottom-up process of annotation and data modeling. What is still missing in this large and multi-layered network is the integration with non-textual data, such as annotated depictions of mythological characters in cultural heritage objects (even though artifacts are included in the database as sources), or information about archaeological sites, which could potentially be integrated through the underlying Linked Data structure.

The success of Linked Open Data shows that data exchange can improve our understanding of spatial documents. Yet, this potential does not seem to be fully exploited: even though the interlinked structure facilitates the exploration across datasets, very few projects actively engage in this process.

On the other hand, in Archaeology there are numerous efforts to model spatial knowledge and practice through the interaction of different media. For example, various combinations of agent-based modeling, 3D and Virtual Reality simulations are used to place humans in virtual spaces and analyze their interaction with the environment, to study how different material circumstances could alter the perception and use of certain places in the ancient world: this is the case of the Virtual Pompeii Project (Frederick & Vennarucci 2021)[16] and of the 3D Babylon model (Pedersén 2021).[17] The BEMA project simulates the experience of attending Athenian assemblies on the Pnyx, measuring reactions to various environmental changes, such as the number of assembly men, perspective of the viewer, or sound changes (Kyungyoon et al. 2015). In their experiment of digital reconstruction of funeral processions at the Roman Forum, Favro and Johnason (2010) show an application of 3D digital immersive models by testing various reconstructions of the forum, and by including human variables in each scenario, showing how digital models can contribute different perspectives to the study of spatial perception. Finally, Collar and Eve (2020) recently illustrated a very powerful combination of AR technologies and sensory input in the reconstruction of the route to access Mount Kasios, a very important site in Neolithic, Hittite and Ancient Greek cultures. The reconstruction was deployed to test user behavior in the simulation of various spatial

[16] Virtual Pompeii: http://tesseract.uark.edu/virtual-pompeii/.

[17] Digital Model of Babylon: https://www.lingfil.uu.se/research/assyriology/babylon/.

scenarios, suggesting emotional responses through the change of atmosphere, movement, and arrangement of features.

These kinds of immersive experiences have many advantages: they recreate spaces that would be impossible to access otherwise, and significantly expand access to cultural heritage sites. However, they often suggest a phenomenological approach, which maintains that experiencing place through embodiment can reveal insights into the spatial cognition of other civilizations. In so doing, they make certain assumptions on the nature of that experience, which can be problematic (Barrett & Ko 2009), as they must blur the boundary between the documentary evidence used and the inevitable reconstruction of data that is not there. Elsewhere in this volume, Vitale[18] warns against a conceptualization of 3D reconstructions as representations of the 'real' ancient artifact, and recommends instead considering them as representations of the reception, or localized knowledge of it. In other words, reconstructive models are needed, that are conceived to leave more space to conflicting interpretation, alternative reconstruction and diversity of scenarios.

A separate class of methods use popular gaming platforms to recreate parts of ancient spaces and experiences. These tools often have significantly lower access barriers than expensive Virtual Reality platforms and, differently from these, allow for conflictual interpretations through multi-user engagement, rather than imposing one view for the sake of realistic reconstruction. Moreover, depending on context, many of these platforms (such as The Sims and Minecraft) are not chiefly preoccupied with verisimilitude or accuracy, but rather with recreating spatial dynamics embedded in the material conditions of living (Morgan 2009).

Walking simulators have recently emerged for their powerful integration of storytelling and immersive reality: in these types of games, a story is developed alongside an immersive environment that allows the user to follow and interact directly with both the narrative and the place where things happen, through first-person navigation, exploration, and an interactive environment that triggers specific physical and emotional inputs (Whistance-Smith 2021). A very similar principle is employed by Danelon & Zielinski (2023), who propose a non-photorealistic reconstruction of the ancient site of Memphis through a combination of 3D landscape reconstruction and 2D maps, integrated with a VR experience where the user can explore hotspots and at the same time read excerpts of original source texts that talk about them. This project, a novel effort in Digital Egyptology,[19] attempts an original integration of material experience, spatial simulation, and cultural understanding through primary sources (Figure 7.6).

A question that remains is the potential of simulation models to represent spaces that are 'beyond the material.' Current simulation systems are primarily based on the reconstruction of visible features, but spatial knowledge integrates

[18] See Chapter 1 in this volume.

[19] See also Lucarelli (Chapter 8 in this volume).

Figure 7.6: An overview of the Memphis App in Oculus Go. In the center, a schematic model of the temple of Ptah, with satellite view showing the modern area at the southern entrance. On the left, Herodotus' description of the colossi of Ramses II that could be found here. Published in Danelon & Zielinski (2023). Reproduced with permission of the Authors.

the visible with the non-visible, non-human, into the landscape. Moreover, spatial knowledge and storytelling can alter the physical aspect of the landscape to emphasize cultural or conceptual importance of certain features. While gaming engines and 3D show a lot of potential for non-realistic simulations, so far there have been no attempts to engage with these questions.

6. Conclusion

In the past few years, there has been much emphasis on the hermeneutic value of digitization practices, where the study of a document in the digital space is seen more as an exploratory way to engage with it, rather than as a representation (Krämer 2023). This is reflected in a prevalent heuristic approach to spatial analysis, where the production of GIS maps and other visualizations is often presented as the starting point to ask new questions, rather than the final product (Barker, Isaksen & Ogden 2016). At the core of Digital Humanities research there is a necessary transformation of the object of investigation through the lenses of technology: this process implies an exploratory mode where the outputs are revised iteratively, and the methodologies rediscussed, until the result is deemed somehow satisfactory.

However, representation and exploration are not the same thing. While digital models certainly help us understand our sources in different ways, they are, nonetheless, representations that we put out in the world, which have implications for how these sources exist in the digital space, and for what types of things are emphasized or hidden about them (Drucker 2011).

Technologies like Linked Open Data prioritize interoperability across datasets and mappability according to existing authorities. Interoperability and mappability, however, do not come without drawbacks: as Kahn and Simon have shown elsewhere in this volume, mass-digitized repositories may include artifacts or sites that were meant to have certain access barriers. Moreover, the *operational* step of mapping to an authority determines an almost automatic *epistemological* shift, where it becomes necessary to make preliminary distinctions between what is 'mappable' and what is not. Consequently, the following questions gravitate around the problem of perceived outliers: is Hyperborea a 'real place?' (Foka et al. 2021), where 'real place' is already a predetermined category.

Then, there is the problem of structure. There is, currently, no codified standard to digitally represent and model knowledge systems with the same stability and flexibility that there is in other domains.[20] The results are a set of recurring issues, such as the lack of integration with other media and the scarcity of semantic depth in available technologies. Cartesian representations, while being convenient for groundtruthing and data management, do not provide that structure, and are not meant to. We seem to be going in a direction where no general models are provided, but many different structures are created to accommodate different types of datasets.

This means that, when it comes to premodern spatial knowledge, interoperability and generalization may be more limited. However, this should not discourage multidisciplinary approaches. The projects described above offer a glimpse into what could be achieved with a combination of material and textual approaches, that goes beyond data exchange but prioritizes *methodological* integration. Virtual reconstructions can overcome some limitations of Cartesian mapping by providing a space for distortions, alternative perspectives and immersion; at the same time, a more conscious integration with primary sources may contribute better context, emphasizing cultural and immaterial aspects that can only be expressed through narrative.

In light of these tendencies, the first recommendation is unsurprising: when adopting certain standards of representation, extremely careful documentation must be a priority.[21] Documentation should actively engage with the epistemological side of the models adopted, emphasizing how technology imposes a certain way of conceiving and talking about the data. In the same vein, perceived outliers must be treated not as exceptions but as evidence of existing technological limitations.

A second recommendation, however, is less banal. Many scholars from multiple backgrounds have recently advocated for more inclusive approaches to digital representation and for a deeper engagement with local bodies of knowledge (Hacıgüzeller, Taylor & Perry 2021; Sletto 2009; Wickens Pearce & Louis

[20] See also Filosa, Gad & Bodard (Chapter 3 in this volume).

[21] See also Vitale (Chapter 1 in this volume), Filosa, Gad & Bodard (Chapter 3), and Elagina (Chapter 5).

2008).[22] This process may help uncover ethical and political implications in our models, providing the tools to enact a productive tension and challenge our own assumptions. In other words, it can help us uncover the inner workings and ideas behind our technologies.

Engaging with local epistemologies could also be an opportunity to actively enrich, or even reverse, our approaches. Elsewhere in this volume, Okorie[23] advocates for an active involvement of local communities in the processes of restitution of the Nigerian cultural heritage, to better understand how the local perception of artifacts, their preservation, access and reproduction may guide efforts in digitization. This is a necessary decolonization practice: rather than just be used as tools to deconstruct our own systems, local epistemologies could provide *the operational starting point* to develop new ones. What would a digital project look like, that started from the question of how a spatial document represented the landscape, rather than how technology may represent the document? What if instead of mapping onto an existing model, local knowledge became the starting point to imagine new ways of representation?

It is certainly important to be transparent about the implications of digital technologies. However, integrated approaches are not just useful to uncover inner tensions. The world is more than a Web map: despite its omnipresence and undeniable impact, the Cartesian paradigm is not the only way modern humans conceptualize the world. Prioritizing local spatial knowledge as a system may help reconfigure existing dynamics of spatial understanding and recover different ways of seeing the world. In other words, it can create the conditions for a multiplicity of imaginations (Massey 2005).

7. References

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[22] See also Bianchini (Chapter 4 in this volume).

[23] See Chapter 11 in this volume.

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