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VISITOR MOVEMENT AND TRACKING TECHNIQUES. A VISITOR-SOURCED METHODOLOGY FOR THE INTERPRETATION OF ARCHAEOLOGICAL SITES

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ABSTRACT:

This paper describes on-going research investigating movement and behaviour patterns of visitors in archaeological sites as a way of informing interpretive planning. A critical point of this study was the development of a hybrid methodology for collecting and assessing data on visitor movement around archaeological sites and of the things that visitors value the most during their visit. This paper demonstrates the methodology developed mainly at Gournia, a Minoan archaeological site of eastern Crete in Greece. Apart from recognised forms of observation and the collection of qualitative data, technologies such as Geographical Positioning System body tracking, geo-tagging and applications of Geographical Information Systems were employed. The interpretation of the processed data provided a better insight and an overview of the site's affordances for movement and as well as the weaknesses of the current interpretation infrastructure. Additionally, the methodology extends to a visitor-sourced approach to reveal the site's 'hot spots' by combining hotspot analysis with a thematic analysis of the geo-tagged images captured by visitors.

1. INTRODUCTION

1.1 Establishing a visitor observation methodology for archaeological sites

Considering that heritage is 'inherently a spatial phenomenon' (Graham et al. 2000: 4), heritage interpretation occurs at certain spaces whether at a museum, a historic urban centre or an archaeological site. The importance of observing visitors' interaction with cultural heritage spaces and exhibits was early on acknowledged in museum studies as a valid methodological tool used to inform and assess interpretive design (Bitgood & Patterson 1986a, Bitgood & Patterson 1986b, Bitgood, Patterson, & Benefield 1988, Klein 1993). So far, a variety of methodologies have been developed and employed to understand the visitor perception in the museum context. In parallel to this, considerable theoretical work exists on 'the visitor perception' in the context of cultural heritage studies. However, there is little work on the development and effective use of sophisticated methodologies for understanding the interaction of visitors with cultural heritage sites.

Building on previous theoretical frameworks and methods used in similar contexts, this work examines visitors' interaction with archaeological sites and considers the possibilities that open up from this investigation for informing interpretive planning. A critical point of this study was the development of a hybrid methodology to assess movement and spatial behaviour patterns of visitors in archaeological sites. Additionally, the methodology aims to reveal the 'hot spots' of such sites according to visitors' views. This work therefore, seeks to establish a sound methodology for collecting data on the visitor experience and interaction with archaeological sites. The methodology considers both qualitative and quantitative data on movement around archaeological sites and on the things that

visitors value the most during their visit and utilises a variety of digital applications for the collection and analysis of data. This paper presents the methodology developed at the Minoan archaeological site of Gournia. However, the methodology has been designed to apply to different archaeological and heritage sites. The paper focuses on the presentation of the methodology rather than the results which will be published at a later stage of this research.

1.2 From general principles to theory and practice: investigating the visitor perception for assessing interpretive planning

The interpretation and presentation of cultural heritage sites entail a series of steps from on-going research, publications, assessments and interventions (Icomos 2007). Intervening at a site - whatever the state of its preservation - is 'an unavoidable reality' (Ganiatsas 1996) according to the established Western view of heritage site management (Lekakis 2009); a view closely associated to the demands of cultural tourism since heritage is appreciated both as a cultural and economic commodity (Boniface & Fowler 1993, Graham et al. 2000:5).

The desire to justify public funding for archaeological research and the notion that 'appreciating cultural heritage sites is a universal right' as stated in the Ename Charter (Icomos 2007, principle 1) are prevalent to the recognition that 'visitable' archaeologies are more liable to deteriorations and damages (Hall & McArthur 1998: 107, Doughty & Orbasli 2007: 44). This existing antithesis in heritage site management is what makes interventions an unavoidable reality today and assigns heritage site interpreters the crucial task of leveraging the impact of on-site visitation in order to satisfy both the preservation requirements of heritage sites and visitors' accessibility to cultural heritage. One of the modes for

intervening to cultural heritage sites (Ganiatsas 1996, p.102) is planning for on-site accessibility and circulation of the visitors. Designing and implementing archaeological walks constitutes a critical part of broader visitor and site management strategies complementing the preventive conservation and enhancement of archaeological sites (Dimakopoulos 2000). In other words, this intervention aims to protect the site and enhance its values and the visitor experience (McArthur and Hall 1993: 242, ICOMOS 2007, Chrysanthi & Earl 2010) and it is planned as a site specific task according to the requirements of each site and the individual agendas of the interpretation specialists.

At once, relatively recent theoretical approaches in heritage studies have pointed out the importance of 'the visitor's perception' for the interpretation of archaeological sites (Urry 1990, Uzzel 1998, Solomon 2008, Lekakis 2009, Massung 2012). According to this approach, interpretive planning should accommodate the 'things we value' from our past (Giaccardi 2011) and those things derive from our personal interests, our diverse and complex way of perceiving and inquiring the remains of the past. It should not be a one off and one way process where interpretation is provided by experts for the visitors to consume. The 'visitor perception' approach also, raises some questions about the authority of curatorship and the authority of the stakeholders over cultural heritage. It is therefore imperative for CH interpreters to acknowledge that people enter these sites with certain cultural and cognitive baggage as well as certain expectations as to what they are about to experience or learn. All the above, along with the information that the site provides, form the visitor experience. However, the 'visitor perception' approach is usually left aside in interpretive planning as a factor that cannot be 'scientifically measured' (Lekakis 2009, Chrysanthi & Earl 2010).

Nevertheless, it has been ascertained that methods such as unobtrusively observing the visitor behaviour and/or engaging visitors in discussions can significantly inform interpretation planning as it provides insights about what visitors value the most and how they interact with and move within heritage spaces (Ciolfi & McLoughlin 2011). Other methods focus on tracking visitor movement and employ a variety of technologies and analytic methodologies to assess the circulation and orientation of visitors in heritage parks and historic urban centers (Shoval & Isaacson 2010, Russo et al. 2010).

A common question in such visitor centred approaches in cultural heritage interpretation is whether to engage with a qualitative or quantitative oriented research. How effective is it to measure experience and movement behaviour in such spaces and use the results to inform interpretation? On the other hand, theoretical and experiential approaches as compelling as they may be in their attempt to explore detailed individual accounts, do not seem to be enough in practical terms. Convincing other researchers and policymakers for the significance of the collected data and results entails more than presenting a few evocative narrations of the visitors' experience.
Evidently, different opinions on this matter have lead researchers to adopt a variety of approaches in evaluating visitors' interaction with heritage spaces. Often, mixed-method approaches which integrate both qualitative and quantitative analysis of data are suggested in order to validate experiential and observed findings (Bernard 2005, Creswell 2009).

2. CASE STUDY AND DATA COLLECTION

2.1 The case study

The archaeological site of Gournia is located on a small hill, a few hundred metres from the sea in the Gulf of Mirabello, in eastern Crete, an area particularly rich in Minoan archaeology.
Gournia is a typical medium sized settlement, dated to the period of the peak of the Minoan culture (Late Minoan I period: 1550-1450 B.C.). It is called the "Pompeii of Minoan Crete" because of the good state of preservation. In 1901 - 1904 Harriet Boyd Hawes excavated part of this Minoan town, revealing a system of cobbled streets, houses, a central building with court considered by some to be a small palace and a cemetery (Davaras 1989). The archaeological site today is open to the public and of all sites in the Aegean region it gives the visitor a nice idea of how a Minoan town looked like. There is also an on-going excavation led by Buffalo University and conservation works at the northern part of the site. The reason we chose Gournia for developing and testing the visitor-centred methodology for assessing the archaeological site is that apart from its well preserved ancient path system and structures, it presents a case with minimum interventions and a subtle interpretative infrastructure mainly limited but well-designed information boards.

2.2 Questionnaires and interviews

At the first data collection stage a variety of qualitative methodologies were employed such as observations, interviews and questionnaires used traditionally in ethnomethodological studies. This process revealed some of the issues that these sites face in terms of visitor management and the areas which attracted remarkable activities and interaction with the archaeological site. Apart from observations, visitors and guards were often engaged in informal conversations. It is worth noting at this point that it is truly remarkable what you can learn from such discussions about the site through the different lens of interpretation and personalised experiences. This process really enhanced our perception of what interest people from these archaeological sites, a perception based on our own biases as heritage professionals. Additionally, web image repositories (e.g. flickr and panoramio) were used to gather comments that visitors of these sites posted.
At the end of their visit, visitors were asked to fill in a questionnaire which was designed specifically for the purposes of this study. The questionnaire's structure was influenced by the Spaceshaper, a tool developed by the Commission for Architecture and the Built Environment (CABE) which works as a participatory platform for assessing and redesigning existing public spaces with the necessary adjustments based on established related surveys in the field of Archaeological Heritage Management (AHM). Apart from structured questions which include the demographics section, the questionnaire was designed to allow people express their opinion on what they valued the most during their visit or disliked the most about the archaeological site. In total, one hundred visitors took part in this first stage and provided their assessment and views on 4 basic domains:
A. The on-site accessibility
B. The spatial perception and awareness of the site's layout as they walked around; the ease or difficulty in identifying the remains
C. The aesthetics of the site; for example they had the opportunity to assess the preservation state, conservation and maintenance of the site; the contemporary structures and plantation.

D. Finally, visitors assessed the existing interpretative infrastructure and commented on what more they would like to see in a future implementation.

2.3 Spatiotemporal and image data collection

Apart from observations and the collection of qualitative-quantitative data about visitors' views of the site, tracking and recording technologies such as GPS body tracking and camera recordings were employed. Each visitor was asked to carry a small lightweight wearable GPS device. Usually visitors hung them around their necks or placed them in their pockets. Additionally, visitors were given a synchronised small digital camera and were instructed to take pictures during their visit, as they would normally do with their own camera. This data collection method was proved unobtrusive to the visiting experience and often visitors reported that they were not always conscious of taking part in an 'experiment' or that they were 'assigned a specific task'. In total, 36 GPS tracks and 644 images were collected. In terms of the GPS data quality, the open rural site, the good weather conditions and the lack of high vegetation provided an optimum accuracy reading of 3m all around the site. Additionally, the record interval was set to 'time' and the track value which was set to record every 2 seconds resulted in the collection of high resolution GPS data.

It is worth mentioning that the visitor-sourced data collection could be implemented with the use of visitors' personal mobile devices through existing geotagging applications. However, only a few visitors carry with them smartphones and most of them do not make use of them while on vacation due to the excessive roaming rates. The European Commission's strategy articulates the message that Information and Communication technologies should be treated as goods - accessible and affordable for the common wealth of societies- above and beyond the notion of 'profit'. Also, Europe's Digital Agenda includes further investments in digitizing its cultural heritage and low roaming tariffs a fact that will facilitate immensely cross-regional accessibility to heritage content and thus, data collection *via* personal mobile phones.

3.   DATA VISUALISATION AND ANALYSIS

3.1   Density analysis of GPS data

In terms of processing the obtained data, a line density analysis of the visitors' itineraries was carried out in ArchGIS (fig.1). The interpretation of the processed data provided a better insight and an overview of the site's affordances for movement as well as the areas with increased accessibility. Also, some areas of the site seem to have been inaccessible to the visitors. Leaving aside the properties of the landscape itself, within an archaeological site some of the preserved features of its architectural character can afford movement such as ancient paved paths, well maintained structural features such as walls, fences and other features. Other areas leave an open and flexible option as to where the visitor can move that could be either part of the ancient planning like public open spaces (e.g. the Minoan Palaces' courts). Movement decisions are initiated from a moment of stillness; people decide to stop and observe particular structures closer and continue their interpretive exploration. Therefore, it could be argued that the environment affords stillness as well. Further time-space analysis of the captured logs can also indicate these areas.

Additionally, the interpretation of combined data from the existing interpretive infrastructure can provide an effective

assessment of the use and positioning of such interpretive media. Interpretive panels play an important role in the way people move around archaeological sites, functioning as Points Of Interest (POIs) and as direction aiding tools. The analysis of the data can provide significant information about whether visitors passed by interpretation boards without reading the information, if they did how much time they spend reading them or whether the position of existing interpretive boards is the optimum for visitors and the presentation of the site. Such observations can be brought to the forefront at the stage of site assessment via this analysis and visualisation and can aid significantly future interpretive agendas.

Figure 1. Aerial image of Gournia overlaid with the density analysis results. Background image © University of California Press 1992

3.2 Hotspot analysis with Rendering and thematic classification of images

A major step towards making better sense of the collected image data was the hotspot analysis carried out in ArcGIS with the aggregated and integrated points of image locations captured by visitors (fig.2). The analysis indicated the areas that visitors recorded the most and provided another yet important interpretation of the site. In ArcGIS ModelBuilder was used to create a simple model containing a number of geoprocessing tools including Copy Features, Integrate, Collect Events, and Hot Spot Analysis with Rendering.

The analysis generated 72 unique locations the 'hotspots' which represent weighted clusters of image data. The results are

visualised according to the ICOUNT field, the sum of all incidents – in this case the images captured - at each location. The red dots indicate the areas that visitors captured the most and following the colour range from warm to cold, the blue areas indicate fewer recordings. Considering that people take photographs of instances or the things they want to remember from their visit, this experiment reveals the hotspots of the site as visitors assessed them.
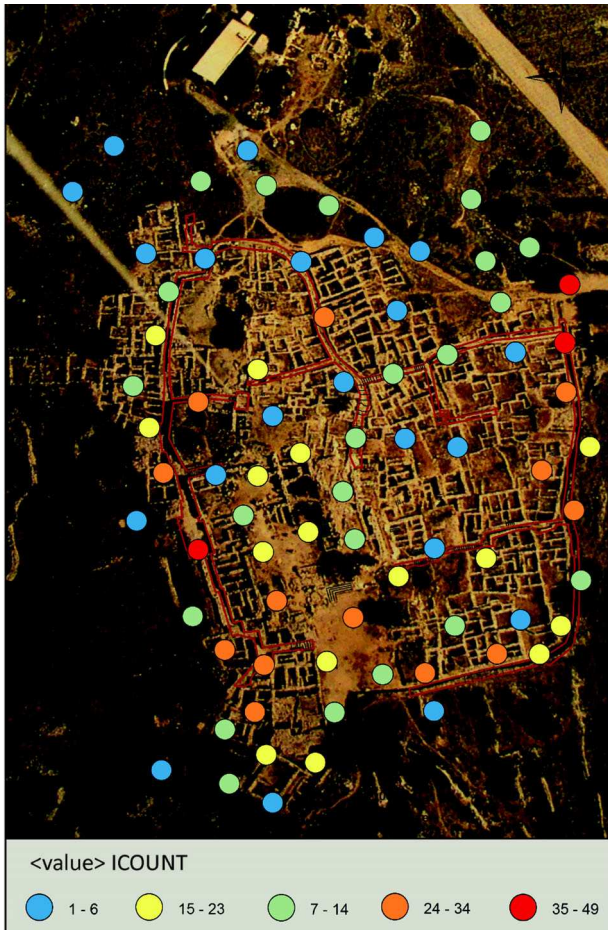

Figure 2. Aerial image of Gournia overlaid with the hotspot analysis results. Background image © University of California Press 1992

In order to identify recurrent patterns and themes in the data a thematic analysis for each hotspot was conducted according to two main questions: 1. From which spots are visitors capturing general views of the site or views of the surroundings? 2. What attracted their attention the most from the artefacts, structures and contemporary features within the site? In applied thematic analysis, codes are then typically developed to represent the identified themes. The coding system here is designed to allow a cross-site examination of the recurrent themes in each location. In the example presented in fig. the theme of the stone basins appears by 14% in the hotspot 69 and 4.5% throughout the site. Although, stone basins are spotted by the visitors throughout the site there was no information board explaining what those findings are. The main information panel by the entrance of the site which mentioned that the site was named after these stone basins was removed and has not been replaced yet.

3.3 Geotagging and spatiotemporal - visual narratives

The image data were geotagged in GeoSetter, a freeware tool for displaying, arranging and editing geo data and the metadata of image files. Both GPS tracks and image files along with other geo data were also exported in Google Earth (GE), an environment which furthered allowed the exploration of aggregated data in layers. Another benefit of displaying such data in GE, is that one can 'replay' visitors' walks and the images they chose to capture and, by combining qualitative data to construct narratives about visitors' choices of movement.

3.4 Future Work

In terms of future work, further time-space analysis is required to fully explore the acquired data. Additionally, the combination of the hotspot results and the thematic analysis with the qualitative analysis will finalise the interpretation of the data. Finally, the methodology is going to be applied at several archaeological sites which present different cases in terms of existing interpretive infrastructures and visiting modes to assess and validate the methodology.

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