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# Digital Palace of Nestor: Assessing Mycenaean Palatial Complex Construction of Socio-Political Status and Navigation Through Architecture

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Digital Palace of Nestor: Assessing Mycenaean Palatial Complex Construction of Socio-Political Status and Navigation Through Architecture

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Abstract:

Because architecture necessitates the conscious planning of space, its consequences for navigation and socio-political status are equally deliberate and have indirect effects. This research combines experiential and spatial syntax techniques to gain a deeper understanding of how Mycenaeans shaped space to construct status and navigation in the Palace of Nestor at Pylos. Using a digital reconstruction of the palace ensured the most accurate experiential data by utilizing a whole, albeit virtual, version of the site. Without employing a digital reconstruction, the only experiences with the site would occur in the ruinous, actual site preventing complete experiences with how the site's architecture affects the individual. Additionally, the spatial analytics provides the ability to cross-verify, quantify, and in the future compare, the results with other Bronze Age Palaces. While the quantitative methods discern how the architecture interacts with itself and agents in an idealized, objective environment, the phenomenological data elucidates if and how people actually experience the palace and what explicitly or implicitly affects their navigation. The latter ensures the interpretations of all the data maintains plausibility in the real world and not just statistical simulations. Together, the results indicate the palace's left side has easy local access with little ability to travel across. Conversely, the right side has an overall easy ability to access anywhere in the palace but is difficult to enter. Similarly, court, megaron, and vestibule possess the highest status in the complex with increasingly restricted access into the latter two rooms.

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# Chapter 1: Introduction

Mycenaean palatial complexes dotted the Greek landscape in the Mediterranean Late Bronze Age. These structures served as administrative and economic hubs as well as residences for the regional king, the *wanax* (Samuel, 1966; Palmer 1965). Further, building layouts shape inhabitants' movement based around, and reinforcing, status (Letesson and Klaas, 2006; Smith 2011). For the Mycenaeans, moving through a typical palace layout reinforced the *wanax*'s administrative and economic power. In contrast, their predecessors, the Minoans, did the opposite. Minoan palaces expressed an economic, not administrative, focus (Schoep, 2010). For instance, most the of Minoan palaces have multiple workshops throughout and lack of royal residences or megarons (Schoep, 2010). In fact, the only Minoan palatial megaron more likely appeared during Mycenaean usurpation (Castleden, 1990). The absence of traditional administrative rooms and abundance of workshops highlight the Minoan economic focus within their palatial complexes. Because these complexes are in ruins, however, interpretations about their navigational qualities and spatial construction are limited. In fact, research on how architectural remains affect navigation either negates or distorts human experience yielding restricted information at best and faulty at worst. Quantitative techniques, like the spatial analytics used in this research, assess the architecture from an idealized, non-human perspective negating human experiences. Qualitative techniques, historically, have occurred on the extant, ruinous site distorting personal experiences thereby decreasing accuracy of the interpretations.

Archaeology can now go beyond the ruins with three-dimensional architectural models, as this thesis does, and apply simulated movement to gain a deeper, more accurate understanding of architectural influences on navigation and status. This research reconstructs the Palace of Nestor in Pylos, Greece (Figure 1) using the Unity game engine and archaeological evidence to assess, with agent-based experiential analysis, how the architecture of Mycenaean palatial complexes affected movement between rooms while reiterating socio-political statuses. Further, it quantifies these results using spatial analytic measurements of network connectivity. Thus, this research combines subjective, phenomenological approaches with objective, statistical ones to gain a fuller understanding of the ways this archaeological site constructed socio-political status by designing navigation. The interpretations derived from these experiments yield information previously unobtainable in the archaeological world. Further, it provides evidence from two separate accumulation techniques to strengthen the theories and draw comparisons to other sites.

The key question is how a Mycenaean palatial complex, specifically the Palace of Nestor in Pylos, reinforced socio-political statuses in architecture by constricting navigation. This chapter discusses the necessity and benefits of the techniques used: digital reconstructions, phenomenology, and spatial analytics; while the next provides historical context; followed by the uses and architecture of the Bronze Age Palaces; then methods are elaborated, ending with results, discussion, and conclusions.

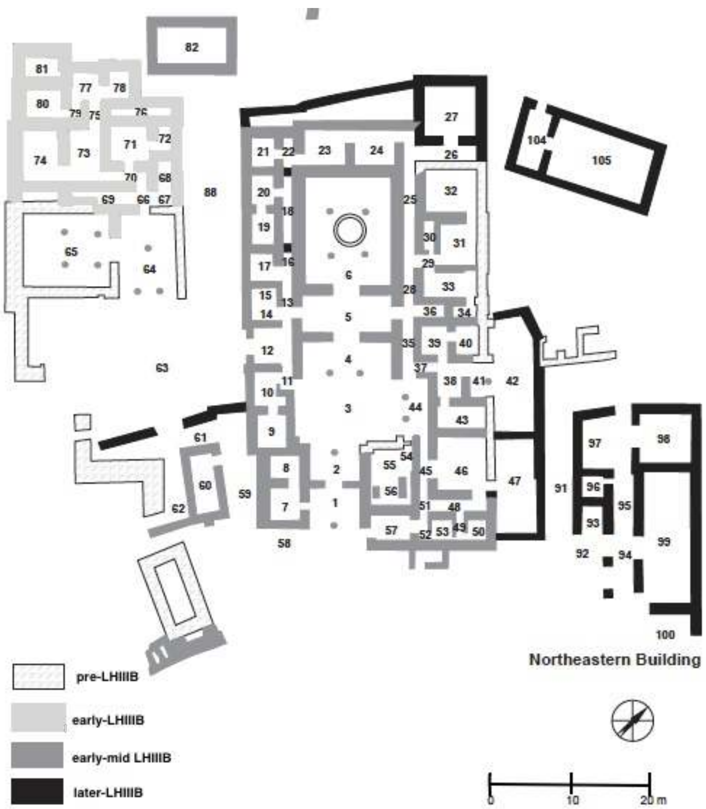



Figure 1: Architectural Map of the Palace of Nestor from Lis 2016 edited to show the age of the southwestern complex.

Because the Minoans were first to construct palatial sites and economically control the entire Grecian Mediterranean, they influenced a developing Mycenaean culture. So, understanding Mycenaean palatial form and function requires the same understanding for their Minoan predecessors. For instance, despite their sprawling nature, Minoans utilized a palatial construction based on a uniform design and layout (Preziosi, 1983). Each room had planned uses, navigational routes, and symbolized status. Thus, status and navigation were reinforced by design, not accident. The Mycenaeans, then, adapted this structure to their own socio-political hierarchy and administrative needs (Graham, 1960; Parkinson and Galaty, 2007). One of the predominate changes in the structures are the central megarons the Mycenaeans incorporated. The centrality of these throne-rooms, along with its existence at the terminus of a central axis (Figure 1), express the shift to an administrative, status focus among the Mycenaeans. Where the Minoans did not include any overt administrative rooms, the Mycenaeans *wanax* possessed an overwhelmingly administrative room at the center of the palatial complex. In the next section, an elaboration of both Minoan and Mycenaean Bronze Age palatial styles provides a greater context for Mycenaean complex uses. Contrasting the two also emphasizes how the Mycenaeans altered the palatial complexes specifically for their own authoritarian benefit.

By recreating the Palace of Nestor in Pylos, Greece within a virtual environment, using first-person navigation, and space syntax, this research discerns how the complex constructs space to fit physical needs and reflects socio-economic position. Socio-economic and political status are known to frequently affect the way space is navigated in the built environment (Smith 2011). However, experiential studies can be seen as too subjective while strictly analytical methods too sterile (Fleming, 2006; McEwen and Millican, 2012). Since experiences on a site vary person to person, the data collected using phenomenological techniques heralded by

Christopher Tilley are frequently unreliable. Either the sample size is one and only the researcher's experiences or the conditions affecting experience, i.e. weather and time of day inhibit larger samples. Yet, only this methodology ensures humans interpret the site like the data suggests albeit on a ruinous version of the site. Conversely, quantifiable techniques measure the environment without regarding human perception. For instance, spatial analytics, which assesses inter-architectural relationships and agent interactions/movement with the architecture in an environment, can only measure using the idealized settings and rational movements. This excludes how sight and social restrictions in the environment could affect agent behavior. Using both research methodologies though produces quantifiable interpretations through objective measurements while the retaining human rationale from experiential studies (McEwen and Millican, 2012). However, as occurs in the majority of phenomenological studies, the specific cultural influences on movement are lost. Instead, this experiential analysis must focus specifically on base human perceptions of space, movement, and status. Still, combining approaches provides a human-verified understanding about how and why an environment functions in a measurable way. Thus, employing both experiential and empirical techniques on a fully reconstructed Mycenaean palatial complex provides a novel, more complete interpretation of architectural and navigational effects on status in the Palace of Nestor.

Although the Palace of Nestor is the best preserved of the Mycenaean palatial complexes, it is far from a complete structure. So, to create the complex from antiquity, the project relied heavily on excavation reports, artistic reconstructions from excavation, and information from similar sites. The majority of information for understanding and creating the Palace of Nestor at Pylos came from comprehensive site report published by Carl Blegen and Marion Rawson (1966). The book synthesized what, where, and how material remains were found and possible uses for each room from Blegen and Rawson's twenty-year field research in Pylos and the Palace of Nestor. However, the architecture within the reconstruction came from the map (Figure 1, above) published in BartŁomiej Lis' *A Foreign Potter in The Pylian Kingdom* (2016). Lis published the architectural plan for the Palace of Nestor at a higher resolution than the Blegen and Rawson reports and added rough time codes. It should be noted, the figure was edited by the project to split the the Early-Middle Helladic IIIB, roughly 1800s BCE category into the Early and Early-Middle Helladic IIIB at the close of the Middle Bronze Age. This delineates the Southwest Building which was constructed prior to the main complex (Blegen and Rawson, 1966). While the same architecture, the higher resolution version provided a base more capable of creating spatially accurate walls and columns. The process of using the map to create the digital model is described further in the Methods section as well as using a DEM to create the surrounding landscape model. After developing the base architecture, information from Blegen and Rawson reports were used to assign the appropriate textures, decoration, and materials to each room in the complex; this process is also expanded upon in Methods. So, although multiple sources were used to understand the Mycenaean and Minoan palaces and historical contexts, the information for the Palace of Nestor comes primarily from the principal site archaeologists, Carl Blegen and Marion Rawson.

Even though the archaeological record provides the base for the model and elaborates the detail of what could have been in the room, it, like most archaeological records, is an incomplete description. The first floor architecture and associated artifacts explain room use, but the exact location for most art and some artifacts are theoretical or missing due to the state of preservation. As the walls and ceilings collapsed, the art and all second story artifacts would be scattered across the lower levels. For example, the majority of art in the megaron, or throne room, has been found albeit in fragmented pieces and reconstructed with mostly theorized wall placement (Blegen and Rawson 1966). Digitally, the reconstructed murals can be placed in their appropriate, palatial complex locations producing a justified, hypothetical understanding of how the decoration would look in the room and what thematic consequences it could have within the complex. Unfortunately, evidence can sometimes indicate the existence of decoration, and even the approximate content, without enough information or time to reconstruct the piece. In this instance, information from other palaces and contemporary locations, provides complementary datasets for the reconstruction creating a fully authentic experience and site. Unfortunately, only a handful of palaces still exist with Pylos having the best preservation. Thus, because not all the information to fully reconstruct a site is present in the archaeological record, digital models must balance authenticity and accuracy.

While using separate archaeological remains for the reconstruction is problematic, the benefit in producing a more realistic feeling (i.e., authentic environment) balances its inaccuracy to some degree (Fredrick, 2013). A similar situation would arise if a Roman wall is known to have a gladiatorial mural on it but the mural no longer exists outside the written, archaeological record (Fredrick, 2013). A mural of the same motif and culture, but from a different site, creates a more authentic reconstruction producing a more genuine player experience despite slightly reducing accuracy (Fredrick, 2013). Though using outside evidence, it creates a more authentic scene by better replicating the environment. Further, the design to use the reconstruction for phenomenological analysis necessitates full authenticity even at the behest of total accuracy. While avoiding blatant artistic inaccuracies, such as incorporating a Roman portrait in a Mycenaean scene, I use other Minoan and Mycenaean art of similar motifs where necessary. It should be noted, though, the time ranges for the art vary more significantly for the Mycenaean palatial construction than a Pompeiian. To alleviate these necessary lapses in accuracy, tags were placed on the outside evidence to indicate which artifacts come from other locations. Should the reconstruction be opened to the public, then the viewer would know which pieces are from the site and which are not. Any future public model could also elaborate the actual location and period the art comes from as these distractions would not impact any study. A special caveat is made for pottery which, for time constraints and project focus, necessitated a premade, blank form for the majority of artifacts; the process is elaborated in methods. Again, though, the ability to place decorations evident in the archaeological record on non-ruinous walls provides a full version of the palace, grounded in the archaeological record but designed for authenticity. This generates a platform for more accurate experiential testing and a method to disseminate ideas about how these sites looked. Of note, décor and art were not added in locations not mentioned in the archaeological record.

The heuristic potential of these techniques derive from their ability to answer questions of varying theoretical perspective with little modification. Once created, digital models can be easily altered to assess other theories and incorporate new features as evidence is uncovered (Cargill, 2009). For instance, this project has created and used the reconstruction to evaluate architecture and its behavioral effects: spatial delineations of administrative and economic zones, how people of varying socio-political status could navigate these spheres, and to test theories about the palace. Yet, this does not preclude using the model as a base for another study with little to no modifications. Where this model is built for a navigational, experiential approach, an art historian can alter it for another project focus without needing to construct an entire digital model. Further, the digital nature of the three-dimensional reconstructions allows researchers to more fully disseminate their interpretations for sites and artifacts in the academic world for peerreview (Cargill, 2009). Reconstructions provide a means for others to replicate the experiential study or reconstruction details perfectly, by using the same model, allowing for more in-depth critiques of any derived models or theories unlike other spatially limited platforms. Since digital models allow for more authenticity and replication than their predecessors, artistic reconstruction and images, they provide a better medium for understanding archaeological sites and discussing ideas of visualized space. Of note, this research distinguishes authenticity and accuracy based on, and for, creating the most similar experiences between the digital and historic environments. More authenticity means creating an environment most reminiscent to how the Palace of Nestor could have looked and better replicates experiences increasing interpretational accuracy. Should this project have focused instead on a fully accurate model, the majority of art and decoration in the complex would be absent or worn lessening the realism of derived experiences and obstructing proper data collection. Thus, creating this hypothetical digital Palace of Nestor, the project can more accurately understand how humans perceive the environment and its effects on status and navigation.

Broadly speaking, experiential archaeology can provide vital information about how humans interact with and understand the environment. Experiential archaeology, as the name suggests, has the unique ability to disclose the human logic behind behavior through site experience (Tilley, 1994; McEwen and Millican, 2012). While other methods show only the most rational paths to use or status locations, only experiential archaeology assesses whether a human placed in that environment would feel the same. Thus, to understand how the Palace of Nestor shapes status-based socio-political behavior, phenomenology is a vital method. As introduced by Tilley (1994), phenomenology, or experiential archaeology, records and interprets human experiences on a site. This reveals how specific environments affect human behaviors and perception (Tilley, 1994). The "play-throughs," or navigational simulations, then, provide a means to understand how humans interact with the ancient environment, understand logic behind how a person would move through the complex, and why certain rooms seem to hold higher socio-political status. Archaeologically, however, these techniques usually only yield limited or faulty data due to the preservation of most sites. Digital reconstructions, though, maintain a high level of accuracy and authenticity while alleviating the ruinous nature of sites (Fredrick, 2013; Cargill 2009). In turn, this ensures the accuracy of experiences, and therefore interpretations, derived within the site. By using a digital model, the project ensures a higher level of accuracy in the experiences shaping navigation in the Palace of Nestor through employing a fully constructed model, as opposed to archaeological remains, just as the use of phenomenology provides a humanistic understanding of its architectural affects. These findings are then corroborated with more traditional means of understanding architecture and archaeological sites to quantify the interpretations.

Notably, the elements of the palace affecting social influence, primarily the visual effects, should appear in the reconstruction of this project (Opitz, 2017). The extent of the economic and administrative importance in the region meant the palaces were, at least semi-intentionally, a microcosm of the region's socio-political and economic spheres (Vermeule, 1963). Thus, the architecture should reflect at least some class differentiation between the elites and the workers who recorded, produced, stored, or traded within the complex beyond physical separations in the complex. This project tries to discern the level to which the palatial architecture reaffirmed these economic, social, and political differentiations through the way they shaped movement in and around the palatial complex. In theory, the intentional design of the palace should constrict movement on the same principles among contemporary agents as it did in antiquity. Thus, the phenomenological survey, shown in Appendix A and elaborated in Methods, should reveal how and why the complex shapes movement and reaffirms the relative perceived status of rooms. In theory, the more restricted access a room possesses, the higher its status especially if the same room has easy access to the rest of the complex. Conversely, if a room is easily entered but has difficulty accessing the rest of the complex, it should have a lower socio-political status, and thus, reiterating the social inability to use other rooms physically. The spatial analytics, in turn, should corroborate these interpretations while also providing greater detail about intentionality within the design through connectivity and access differentials.

To complement and quantify the subjective, experiential results, this study utilizes spatial analytics. As a subset of network analysis, spatial analytics focuses on the differential connectedness of each room to measure ease of access and likely pathways in a system. Four measures (Table 1) are designed to trace how information most likely travels from one node to another (Weilguni, 2011; Estrada and Knight, 2015). In the project's terms, they replicate how an agent, the information, would navigate an environment based on how each room, the nodes, connects in the palatial complex providing idealized scenarios and access determinations. For instance, and according to prior thought, those with lower socio-political status would be less likely to access some of the right side of the complex, like the bath or queen's megaron, and almost never access the central megaron. If this were true, the architecture would make it more difficult, in the task-based, to access these higher statuses right and central rooms. To understand the variety of ways the palace constructs movement while reiterating socio-political status in the architecture, four centrality measurements were employed: *betweenness, eigenvector, closeness*, and *eccentricity*. Each of the measurements evaluates a different aspect of how the architecture creates navigational patterns (Bafna, 2003; Estrada and Knight, 2015). Each of the tests examines a different connection and pattern between the rooms

revealing the socio-political status and travel possibilities.

Table 1: The definitions of the four centrality measurements used for the spatial analysis taken from Estrada and Knight, 2015 and Wu et al., 2012.

| Term | Definition |
|---|---|
| Betweenness | the measurement calculating the number of times a node could be accessed to travel from one location to another |
| Eigenvector | A measurement evaluating the relative strength of a nodes connections regardless of number of connections |
| Closeness | Assess the relative proximity of the node to the rest of the system. |
| Eccentricity | The reciprocal of the longest path length divided by the length of all other possible paths |

The first measurement used, *betweenness*, indicates which rooms acted as travel-heavy zones and pathways (those with high values) to the more likely destination rooms (those with low). Betweenness evaluates this through calculating how many times a node must be passed through to travel from one location to another (Estrada and Knight, 2015). Because high betweenness values provide access to multiple other rooms, hallways frequently possess the highest betweenness value in buildings. Conversely, rooms that would not or could not be used to travel between nodes, like a modern bathroom or the Mycenaean megaron, should have the lowest values. Further, this value suggests which nodes act as an integral part of cross complex travel and which have access restrictions. High valued rooms, through easily connecting one or more rooms, may be frequently used or avoided depending on how much an agent wants, or is told, to avoid others. Betweenness values, then, provide a means to display which rooms could be most and least frequently accessed in the Palace of Nestor.

The next centrality, *eigenvector*, indicates the relative power of each room. It evaluates differential access levels between entering the room and connections to the system once inside

(Brughmans, 2013; Estrada and Knight, 2015). The eigenvector value, in this way it "takes the overall network structure into account…[and] provides a more accurate measure of complex flow processes" (Brughmans, 2013). It measures the connectedness of a node's links against the number of connections (Estrada and Knight, 2015). For instance, a room whose sole connection provides the easy access to anywhere else in the system would have a high eigenvector while a node with many shallow connections would be low. Because the first room itself is hard to access, through a single connection, but its contact allows passage anywhere when leaving, the differential access emphasizes its power dynamic within a design. Essentially, eigenvector measures the depth value of the connections, i.e. the value of contacts instead of the number. The restrictedness of the access implies a certain status requirement to enter while providing ease of admission to other locations for those able to access the node. In a palatial system example, the megaron is expected to have the highest eigenvalue. The room has restricted access through two courtyards, only one with a direct entrance to the megaron, but the courtyard's access hallways lead to everywhere else in the palace. The hallways, on the other hand, are very readily accessible and should have a low eigenvector value despite connecting to all rooms. Essentially, this measures the quality of the connections not the quantity. Instead, the higher quality with lower quantity increases the perceived status of a room.

The other two centralities, *closeness* and *eccentricity*, assess ability to navigate through the system. Closeness determines the proximity, path wise, of a targeted node to the rest of the nodes in the system (Estrada and Knight, 2015). This measurement shows how easily paths in the system access each specific node through the depth of the connection: is the connection/node long and requires a lot of travel or short and easily crossed (Estrada and Knight, 2015)? Closeness reveals how quickly someone could travel through the node into another and the rest of the system, i.e. how linked a node is into the entire system. (Estrada and Knight, 2015). Like betweenness, this helps to establish the routes people could take or avoid within the palace during their daily life. The final measurement used, eccentricity, most directly assesses the type of paths possible for each room. Eccentricity measures path lengths between a node and all others then determines the reciprocal of the longest distance to other available paths (Wu et al., 2012). The smaller the number, then, the more difficulty in accessing the opposite side of the environment from the given location. Conversely, the higher the number, the easier the ability to travel from a given location. Thus, eccentricity shows relative social power through ease of access to the rest of the system as well as which rooms are most likely to be part of a well travelled path. In concert, these centralities help establish which rooms create the best pathways through the complex and differentiate the varying power through access levels of each room.

In concert, these measures should show the power dynamics within a system. The rooms that are most difficult to access while being able to easily access the most other rooms exhibit the highest degree of power through their access differential. This would be akin to a v.i.p section in a building. Though the inhabitants can presumably access the entire building, only specific people are allowed in the v.i.p section itself. Using and combining these measurements on the Palace of Nestor, then, will reveal the socio-political status and relationship of the rooms and sections in the complex. Further, these measurements occur using a quantifiable, though relative, means allowing objective interpretations and even comparison to other palatial power dynamics. However, because these measurements occur through statistical means, there is no guarantee humans within the environment will actually interpret and behave accordingly.

Using the spatial analytics, then, corroborates the data collected from the experiential survey, giving it a quantified form. In turn, the experiential survey provides a better understanding to why and how these room values affect navigation through room status through recording actual human perceptions of the environment. The experiential survey could detail why an agent does not travel along the most rational path indicated in the analytical data. Thus, the combined approach elaborates how the architecture of the palace constructs navigation in a way to reaffirm socio-political status from both a human, subjective perspective and a rational, quantifiable evaluation.

## Chapter 2: Aegean Bronze Age Political History

Before developing palatial states and trade empires, the Minoans and Mycenaeans first needed to sustain themselves economically and politically. Luckily, the environment eased the former of these concerns. Bronze Age Mycenaean and Egyptian flax and linen records suggest the Mediterranean climate has not changed drastically save one or two periods of change and reversion through the modern period (Robkin, 1979; Moody, 2009). The Mycenaean ability to continuously grow flax indicates a temperate climate with abundant moisture existed much like its modern counterpart (Robkin, 1979). Despite its mountainous terrain, then, the Greek Mainland proved as capable of subsistence as it does now (Robkin, 1979). Because they had a temperate climate from the Bronze Age through the modern period, the Minoans and Mycenaeans could subsist on the landscape as well as their modern successors, barring of course the use of modern technology. Mediterranean Bronze Age civilizations, then, could subsist on their landscape. Further, even the changes that did occur climatically, shown in pollen and soil core data, oscillate between minor warmer and cooler periods until the end of the Bronze Age which wrought a major warm period and drought before reverting (Moody, 2009). The paleo-climatic evidence reveals the Bronze Age Greek environment's ability to sustain societies with enough stability to allow regional cultural expansion. As with most cultures, subsistence and surplus act as fundamental criteria for developing centralized government and interregional trade. Early Bronze Age Minoans could, then, cultivate interregional trade with Egypt, Syria, and Asia Minor resulting in their influence in the growth of Minoan society and Aegean economic control (Parkinson and Galaty, 2007; Bengston and Bloedow, 1988). Thus, the stability and fertility of the environment allowed for trade outside the Greek Mediterranean causing influences on the developing Minoans and, indirectly, the Mycenaeans.

Before establishing their own trade-empire, the Mycenaeans began developing a class structure and government under Minoan economic rule. As the only foreign trade contact for the pre-Mycenaean peoples prior to the 17th century BCE, the Minoans virtually ruled the Greek Mainland through economic control (Vermeule, 1963; Parkinson and Galaty, 2007). This led the Minoans to become one of the biggest influences on the developing Mycenaean culture and architecture (Neer, 2012; Parkinson and Galaty, 2007; Vermeule, 1963). In turn, the Mycenaean government, much like the Minoan through its foreign influence, developed at an exponential rate and eventually overtook economic control of the Greek Mediterranean (Parkinson and Galaty, 2007). Hastening this developing class and economic structure, the Mycenaeans adapted Minoan economic and governmental structures into their own system during their period of subjugation (Parkinson and Galaty, 2007). Predominate among these subsumed symbols of administrative and economic dominance were the Minoan palatial structures (Graham, 1960; Parkinson and Galaty, 2007). By incorporating Minoan architecture and styles, the Mycenaeans associated themselves with preexisting symbols of regional control. This affirmed Mycenaean control by linking the main economic and political structure, already associated with economic control throughout the region, to themselves. The already unified culture on the Greek Mainland with familiar but modified Minoan palatial structure allowed Mycenaeans to amass an econo-political empire quicker than their Minoan predecessors as the Mycenaean built the first mainland palaces. Since the development of the Mycenaeans and their palatial states is heavily influenced by the Minoans, though, a brief discussion of the Aegean Bronze Age is helpful. Further, since the two Bronze Age histories overlap and are designated as separate classifications, the remainder of this section details Minoan and Mycenaean history concurrently as shown in figure 2.

| PERIOD | LOW DATES | HIGH DATES | CRETE | MAINLAND |
|---|---|---|---|---|
| Early Bronze Age | before 3000–c. 2000 | | Early Minoan I (EM I) | Early Helladic (EH I) |
| | | | Early Minoan II (EM II) | Early Helladic (EH II) |
| | | | Early Minoan III (EM III) | Early Helladic (EH III) |
| Middle Bronze Age | c. 2000–c. 1625 | c. 2000–c. 1725 | Middle Minoan IA (MM IA) | Middle Helladic I–III (MH I–III) |
| | | | Middle Minoan IB (MM IB) | |
| | | | Middle Minoan IIA (MM IIA) | |
| | | | Middle Minoan IIB (MM IIB) | |
| | | | Middle Minoan IIIA (MM IIIA) | |
| | | | Middle Minoan IIIB (MM IIIB) | |
| Late Bronze Age | c. 1625–c. 1525 | c. 1725–c. 1600 | Late Minoan IA (LM IA) | Late Helladic I (LH I) |
| | c. 1525–c. 1450 | c. 1620–c. 1450 | Late Minoan IB (LM IB) | Late Helladic IIA (LH IIA) |
| | c. 1450–c. 1420 | | Late Minoan II (LM II) | Late Helladic IIB (LH IIB) |
| | c. 1420–c. 1300 | | Late Minoan IIIA (LM IIIA) | Late Helladic IIIA (LH IIIA) |
| | c. 1300–c. 1200 | | Late Minoan IIIB (LM IIIB) | Late Helladic IIIB (LH IIIB) |

Figure 2: A chart showing the Bronze Age classifications and approximate dates from Neer 2012. The Helladic period, particularly III, denotes Mycenaean

The earliest archaeological evidence for human habitation on Crete, the main island of the Minoan 'empire,' dates to around 7000 BCE and sparked an almost continuous inhabitance into the modern era (Fitton, 2002). Only at the close of the Neolithic and start of the Bronze Age, however, did large settlements begin to develop with the largest around 5.6 hectares on Phaistos (Fitton, 2002). While evidence of inter-settlement contact exists, the burials and material goods suggests these settlements were not part of a singular culture (Fitton, 2002). Further, the lack of grave goods for the period suggests Minoans were mostly egalitarian and focused on localized family units, not individual status (Castleden, 1990). The culture that developed retained this egalitarian focus maintaining low stratification levels throughout the Early Minoan period, roughly 3000 to 2000 BCE (Castleden, 1990). The lack of cultural unity and large socio-economic differences emphasizes the egalitarian foundations of the Minoans. By lacking traditional self-aggrandizing practices, the absence of grave goods implies an equal absence of socio-political hierarchy or prestige desire. As the independent communities continued trading with one another, they also began developing a more uniform, connected culture (Fitton, 2002). Starting in this period, then, trade became a foundation for Minoan culture and its spread. Though the Minoans had not developed a unified, or centralized, government at the start of the Bronze Age, they had already established a foundation as a trade empire more inclined to group leadership.

After the Minoans developed a unified culture in the third millennium BCE, their political and economic contacts with the Near East, Asia, and Egypt strengthened as Minoan colonies began developing an elite class and establishing trade control with the Greek mainland (Baike, 1910; Branigan, 1981). As mentioned, this exchange of cultural and structural ideas with foreign contacts aided in the development of a political system and Minoan economic dominance throughout Greece (Baikie, 1910; Neimeier, 2004). Since the contacted cultures had already established centralized forms of state government, the exchanges expedited the Minoan's own development process. The Minoans could incorporate knowledge gained through economic envoys to these foreign political structures into their own developing government while using the trade contact to gain economic control in the Aegean (Parkinson and Galaty, 2007). For instance, this phase initiated the use of writing/seals for economic control and records, a technique already established in Egypt and abroad, in Minoan culture (Neer, 2012). Additionally, the increase in craft specialization reveals the separation of an elite class from the rest of society (Fitton, 2002). Because individuals were able to shift from full-time agriculturalists to craftsmen, it suggests an ability of a class to support workers not associated with food production. The appearance of craft specialization, with little grave good material, suggests a creation of an elite class who supported the craftsmen with accumulated surplus though not emphasizing a socio-economic superiority by prestige goods. The seals and records allowed these new elites to document the production of their lands, craftsmen, and other economic exploits and establish a group concerned with monitoring or regulating the economy (Blegen and Rawson, 1966; Shear 2004). Thus, they were able to exert economic dominance over the non-elite class in their societies.

However, the burials of the period remain in large familial groupings indicating hereditary status without emphasizing individual prestige (Parkinson and Galaty, 2007). This, coupled with a lack of self-aggrandizing, likely impeded the creation of an individual ruler in lieu of a ruling class (Parkinson and Galaty, 2007). Even though an elite ruling class developed in the period, then, there remains no evidence for an individual heading the government. Architecturally, this appears in the absence of throne rooms in most Minoan palaces. Even though elites did exist and began controlling the economy, they did not heavily emphasize individual or class differences. Instead, as the continuations of family burials suggests, the elite class focused on political power via group, not individual, economic control while continuing the spread of Minoan culture through trade. However, this is largely theoretical since Linear A, the Minoan writing system, has yet to be deciphered and there are relatively scant archaeological remains.

This instigated a Minoan Empire from the Early through Middle Bronze Age via cultural spread and economic control in the region. More modern theories attribute dramatic population increases to an establishment of economically driven colonies spreading the culture and domineering foreign trade on the mainland driving a Minoan economic empire (Castleden, 1990; Branigan, 1981). An increase in population pressure, along with maintaining easy trade access, forced settlers out of the traditional Minoan islands and into settlements and colonies on the Greek Mainland and other regional areas. Because of the foreign trade opportunities, this type of colonization, immigration not military conquest, lead to Minoan community colonies throughout the Mediterranean without much resistance (Branigan, 1981). Continued access to Minoan goods and trade allowed the Minoans to effectively rule the areas without using their military (Branigan, 1981). Colonizers were accepted to increase trade subsequently diffusing Minoan culture in the area. These Minoan socio-economic pressures and control appear tangibly in Minoan lead trade weights and goods spread throughout the Greek mainland (Branigan, 1981). Minoans were seen, signified by the weights, as regulators of the economy and, through the amount of exported goods, as a dominant culture. The spread of these items throughout Greece indicates the level of Minoan economic control. So, by controlling the economy and exporting their culture, the Minoans created an economically based empire.

Despite sharing a culture at the beginning of the Bronze Age, the Greek Mainland had not begun to unify or explore foreign trade (Taylor, 1983). Minoans had a virtual trade monopoly as the only foreign trade contacts for pre-Mycenaean Greeks (Vermeule, 1963). Pre-Mycenaean exchange varied with differential access to Minoan trade among the small settlements scattered throughout the Greek Mainland (Neer, 2012). Even so, pre-Mycenaean Greeks were not moderately egalitarian societies like their Minoan counterparts and never adopted the Minoan language maintaining their pre-Greek, Helladic language. Instead, evidence of a distinctive elite class accumulating prestige goods, usually Minoan products, for self-aggrandizement appear in grave circles, shaft graves, and as grave goods (Shear, 1936; Palmer, 1965, Neer, 2012). Even before the establishment of a centralized government by the Mycenaeans, then, the Mainland Greeks emphasized self-aggrandizement through wealth and economic power accumulation (Parkinson and Galaty, 2007; Shear, 2004). This shared culture and self-aggrandizing laid the foundation for the strong social hierarchy found in the Mycenaean government. The differential access to Minoan trade allowed elites of the period to increase their socio-economic prestige through Minoan and foreign goods access. It also foreshadows an individual ruler distinguished from the elite class through self-aggrandizement and economic control. Of note, though an elite class existed in this Early Helladic period, no burial definitively points to a singular ruler yet (Shear, 1936). Thus, the elite class likely shared power much like the Minoans prior to the Mycenaean period. While an elite class did exist before the Mycenaeans, though, they still needed to centralize the government under a single ruler before consolidating their empire.

While the Minoans dominated the economy of Aegean Greece, the same Minoan trade restriction and cultural spread accelerated development of Mycenaean centralized government (Parkinson and Galaty, 2007). Over time this created kingships as each generation, starting in the early-middle periods, continually amassed wealth and land (Shear, 1936). Restricted economic access enabled the elites to constantly separate themselves from non-elites. Eventually a "baron-esque" style landownership developed, indicated in the Linear B tablets, giving a *wanax* regional power (Palmer, 1965; Neer, 2012). Where the Minoans established an elite class through the ability to support craftsmen and external trade, the Mainland elite used Minoan trade to accumulate wealth, land, and power. Over time, this gave the elite class greater access to prestige goods, foreign trade, and the majority of land ownership which only further restricted the economy to their benefit. By restricting Minoan trade and a tendency to self-aggrandize, then, Greek Mainland elites cyclically amassed more and more influence on their localized economy. The elites, who already controlled large sectors of the economy could then use their influence and wealth to accumulate political power culminating in a single ruler, the *wanax*. Thus, over just a few generations, compared to Minoan centuries, the Mycenaean centralized government possessed a socio-economic hierarchy with titular head who owned the majority of land and production. In turn, the local *wanaxes* began to circumvent and weaken Minoan foreign trade monopoly and economic control.

One of the ways the Mycenaeans signified their rule was by adapting the Minoan palatial form with significant alterations. Palatial connotations of control and cultural dominance appropriated from Minoan rule reaffirmed Mycenaean's administrative and economic control (Parkinson and Galaty, 2007). Though the Minoan palaces served as a mostly economic production and redistribution center, the Mycenaean version emphasized the administrative functions and control of the complexes (Shear, 2004; Vermeule, 1963). By incorporating the Minoan symbol of control into their own governmental architecture, the king could assert political dominance while affirming the role as head of the economy. The Mycenaean palace, then, confirmed elite status in both the socio-political and economic spheres. Thus, the palaces were designed to display the economic and political status of the individuals within it. Further, once the Mycenaeans had successfully established power within their local regions, they could begin to turn toward outward expansion. Despite the cultural and political influences, the Minoans had, however, the Mycenaeans retained their own, separate identity. Predominately, the Mycenaeans never adopted the Minoan language instead relying on Linear B. Linear B, unlike the Minoan Linear A, directly evolves into the Ancient and, thus modern, Greek language.

During the eighteenth century BCE, the Mycenaeans expanded their economic and political territory (Parkinson and Galaty, 2007; Samuel, 1966). Although the Minoans likely expanded due to population pressures, the Mycenaeans colonized for political and economic power accumulation following their need to self-aggrandizement and display prestige. As the Mycenaeans began to amass power outside their own settlements, their culture also spread in the region through colonization and increased exportation of cultural goods (Palmer, 1965; Neer, 2012). Like most cultures, as the Mycenaeans developed a greater influence and political-economic control in the region, their culture spread with it. Evidence for Mycenaean domination during the Middle to Late Bronze Age comes from a distinct shift from Mycenaean importation of Minoan art and artifacts to the Minoans importation and replication of Mycenaean styles (Neer, 2012). As the perceived prestige of cultural goods shifts, so does regional and cultural dominance. Initially, Mycenaeans displayed status and Minoan socio-economic dominance through importing Minoan goods. Later as the trade patterns switched, the Minoans displayed wealth and Mycenaean socio-economic dominance through importing Mycenaean goods. Further, once the Minoans began importing Mycenaean goods, they stopped producing traditional Minoan artifacts, like rhytons (Neer, 2012). The loss of traditional goods demarcates a shift in cultural influence from the exportation of their own culture to the importation of the Mycenaean and along with it, the dawn of Mycenaean economic and political power. Thus, as the Mycenaeans expanded, they usurped economic control from the Minoans and accumulated more political power toward the end of the Middle Bronze Age.

By the Late Bronze Age, Mycenaeans gained nearly full control of the Aegean economy and colonization as Minoan palatial complexes were burned and abandoned (Neer, 2012). One theory suggests the Mycenaeans began to completely overtake the Minoans after they were weakened from a series of earthquakes and volcanic eruptions like that on Thera in 1475 BCE (Taylour, 1983). These eruptions and earthquakes destabilized the Minoan economic base and weakened their hold in the Mediterranean (Knapp and Manning, 2016). For the Minoans, only the palace at Knossos on Crete was spared from the widespread collapse, and it was overtaken by Mycenaeans (Palmer, 1965; Neer, 2012). Based on a minor Minoan cultural resurgence, however, a possible Minoan revolt against Mycenaean dominance could have destroyed the Minoan palaces instead. It seems likely Mycenaeans initially utilized the other palaces, like Knossos, instead of destroying them outright meaning the Minoans could have destroyed the palace to end the Mycenaean's usage (Palmer, 1965). The Mycenaean takeover of Knossos, then, reflects the near total transfer of economic and political power and Minoan collapse.

Concurrently, the Mycenaeans achieved the height of their power and maintained rapid expansion. The Mycenaean expansion efforts also differed from the Minoans in its quicker growth. Where Minoan dominance was based almost solely in economic control, the Mycenaeans also employed military power to create and sustain their empire (Taylour, 1983; Neer, 2012). For example, Mycenaean warrior graves and housing styles indicate a military presence on Crete, the location of the Mycenaean-run Knossos (Taylour, 1983). While still an economically driven empire, the use of the military to expand and maintain power differentiates Mycenaeans from Minoans. Further, it indicates a more bellicose drive to attain economic power. This, coupled with their need to continuously aggrandize and display wealth to maintain status and power, would later hasten the Mycenaean decline.

The height of Mycenaean power occurred immediately before their decline when natural disaster and economic retraction instigated imperial collapse (Parkinson and Galaty, 2007; Neer, 2012; Vermeule, 1963). Just as the environment allowed the development of the palatial states and trade empires, it accelerated their decline and destruction. The same paleo-climatic evidence showing relative stability indicates an abrupt climate change sparking drought and famine toward the end of the Bronze Age (Knapp and Manning, 2016). Before this change, though, the Mycenaeans took over Minoan trade and achieved complete regional control (Knapp and Manning, 2016; Parkinson and Galaty, 2007). Thus began the Minoan decline spiraling into complete collapse.

Instead of immediately devastating the Mycenaeans, though, this change instigated a retraction in both economic and colonization efforts (Knapp and Manning, 2016; Neer, 2012). To the Minoans, the Mycenaean retraction forced the collapse of Knossos around 1400 BCE, destroying the only remaining symbol of Minoan culture (Vermeule, 1963). For Mycenaeans, it inhibited their dominance of foreign trade, reducing wealth and prestige among elites through a lack of imported goods (Neer, 2012; Samuel 1966). The need to import foreign goods to retain political and economic power, then, instigated inter-palatial raids to prevent declines in elite power (Parkinson and Galaty, 2007; Samuel 1966). The increase in water cisterns during the period indicates a need for both water storage and garrisoning ability (Neer, 2012; Blegen and Rawson 1966). After the rulers lost control of foreign trade, raids on their neighboring communities increased to maintain an influx of non-local goods. In concert with the warmer, drier climate this initiated a relatively quick decline for the Mycenaeans. Due to the climatic change, the elites lost their ability to control extra-regional trade, diminished their ability to maintain local dominance, and forced raids on other Mycenaean palaces to retain power.

Following a few generations of this rapid deterioration, the Mycenaeans were attacked by outsiders, Sea Peoples, who could have devastated the remainder of the settlements and ended the Mycenaean empire (Knapp and Manning, 2016; Parkinson and Galaty, 2007; Samuel, 1966).

Despite their attempts to survive and maintain dominance in the face of climatic change, the attacks by the Sea Peoples destroyed the majority of palatial sites on the Greek Mainland effectively ending the Mycenaean period around 1200 BCE.

When the environment reduced the ability to continue producing surpluses through volcanic eruptions and drier climates, the large Bronze Age societies were forced to change. In turn, this caused a retraction among Mycenaeans, increased internal strife, and opened them up to outside invaders. Thus, once the environment changed drastically, the Mycenaean civilizations could no longer cope and were forced to disperse or return to their smaller settlements throughout the Greek Mainland. Though their reign lasted only a couple centuries, the Mycenaean economic control and colonization efforts made them a political powerhouse in the Mediterranean that paved the way for later Greek cultures.

Germane to this project, the Palace of Nestor likely fell at the beginning or prior to this climatic change and raids starting around 1278 BCE. Pylos lacks the large, late water cisterns and walls indicative of the Mycenaean city-state conflicts and raids rampant during the closing of the Bronze Age (Neer, 2012; Blegen and Rawson, 1963). By lacking these key defensive features, the Palace of Nestor is theorized to have collapsed relatively quickly after or just before the drought began (Blegen and Rawson, 1963). Thus, the rise of the Palace of Nestor coincided with the height of the Mycenaean trade-empire during the Bronze Age, and collapsed at the beginning of the decline. Of course, some towns and elites probably survived and maintained the culture through time, but it was not on the scale, nor had the influence, of the Bronze Age empires. Further, reconstructing the place at the height of the Mycenaean period permits mimicking an idealized, average weather pattern. Instead of using weather at the tumultuous end of the Bronze

Age, the Palace of Nestor reconstruction creates an environment reminiscent of the modern and Bronze Age to maintain an authentic landscape for the palace.

## Chapter 3: Palatial Design and Use

The Minoans first constructed palatial complexes around 2100 BCE after Crete and its surrounding islands had developed a unified culture, stratified government, and expanded economic influence. They accomplished this before developing their standardized palatial plan (Bengston, 1988; Dickinson, 1994; Bengston and Bloedow, 1988). Further, the artifacts and architecture associated with the complexes indicate the primary focus was as Minoan economic centers, not ruling class residences (Neer, 2012; Schoep, 2010). Even so, the palaces housed most Minoan administrative activities (Dickinson, 1994). In fact, the majority of these political tasks likely took place in the central courts within the palaces (Rooms 20 and 4 in figure 3; Castleden, 1990). While they did not have a specific room, relegating administrative tasks to the open courts ensured the administrative class and the political presence/power were visible to the public. The predominately economic role of these structures, though, emphasizes the economic importance in Minoan culture and power. Since palaces were predominately economic in function, each possessing a network of production workshops, storerooms, and markets, they mirrored Minoan ideology of administration through economic control (Bloedow, 1988). These major Minoan structures focused on economic functions with administrative tasks taking a secondary, but very present, role. Creating regional nuclei for the economy and performing administrative duties in the complex, reiterates the Minoan control on it, and thus, the region.

In addition to the use patterns, the architecture continues to reflect this econo-centric means of control and socio-political importance. For instance, only one Minoan palace has a megaron off a terminus of the central axis within the complex. In fact, only Knossos possesses a megaron and it probably appeared as a consequence of Mycenaean influence and conquest and not to display administrative power (Driessen, 2003; Castleden, 1990; Figure 3). Instead, Minoans likely used the central courts for administration as mentioned above. Instead of revealing a Minoan king, then, this megaron existence reaffirms the importance of an individual ruler to Mycenaean culture and their absence in Minoan culture. Even if the room were Minoan, having one room off the central axis dedicated to the individual or group underscores the secondary, but important, function of administration in the complex and society. However, by not occurring on a central


Figure 3: Palace at Knossos with Throne room marked in blue.

axis for the building or having administration appear in open courts, their importance and role becomes secondary to the overwhelmingly economic focus in the architecture. The public nature of the administration, or location off a central axis, privatizes the importance of the ruling class either through letting the public access the tasks as easily as the rulers and/or through lessening their architectural significance.

The megaron at Knossos more likely appeared during the Mycenaean invasion of the palace. The art of this megaron is Mycenaean in style with griffins behind the throne like in the Palace of Nestor (Castleden, 1990). Again, this is also the only megaron found in Minoan palaces. The absence for Minoans and creation by Mycenaeans emphasizes cultural differences in administrative hierarchy and impacts on architecture. The Minoans, by not distinguishing an individual ruler, had no need for a throne room, using courts to conduct administration. Later, the Mycenaeans, to display dominance and control, created a megaron from a preexisting room at Knossos so the Minoan palace better reflected Mycenaean socio-political hierarchies. The new *wanax* could accentuate their control over Knossos and Minoans by creating and using this new megaron.

The Mycenaean palatial complexes, on the other hand, began around 1300 BCE as they overtook Minoan regional control (Samuel, 1966; Blegen and Rawson, 1966). Mycenaeans constructed modified versions of Minoan economic and political structures, namely the palaces, to establish administrative priority and royal residences (Neer, 2012; Parkinson and Galaty, 2007). The palace, as a center for economic and political control, associated the Mycenaeans with the prestige and abilities accumulated under Minoan use. Then, their modified design with royal residences, central megarons, and a separated workshops emphasized Mycenaean rule and elite power on the Greek Mainland and in the Mediterranean. The Mycenaeans symbolized their rule through the occupant of the centralized megaron in the palace, the *wanax.* Though still meeting the economic and storage needs of the people, the palatial complexes emphasized the higher status of the ruling person or class within the society through their architecture.

While the palaces had storerooms in or nearby, the main complex often lacks the workshops of Minoan design. Pylian workshops, for instance, occur in a separate building near but across a gutter from the main complex (Blegen and Rawson, 1966; Figure 4). Although Mycenaean palaces had production

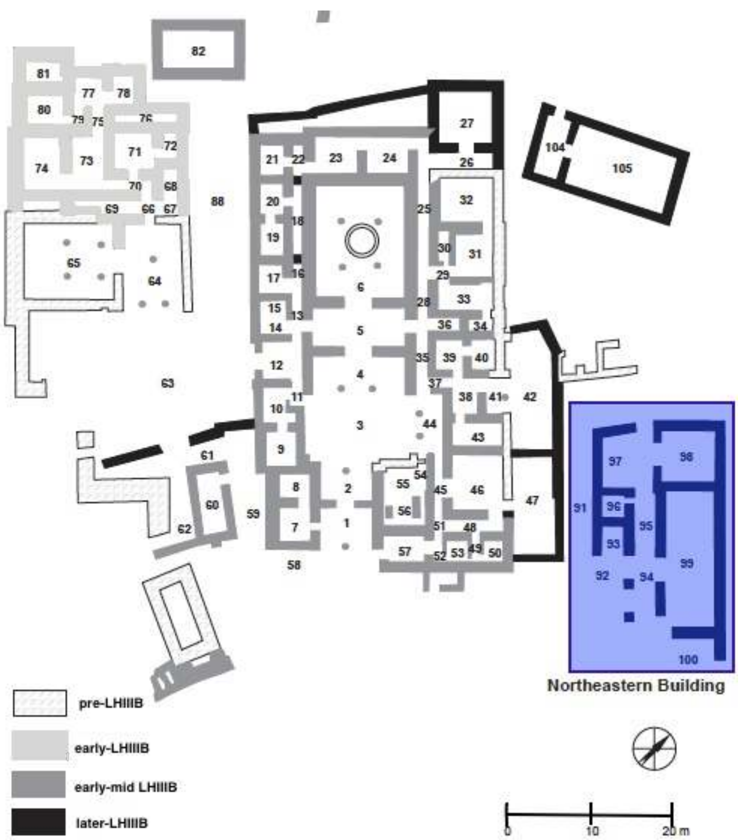



Figure 4: Palace of Nestor with the Workshop building highlighted in blue. A gutter appears in section 91 (Blegen and Rawson, 1966).

capabilities, they are deemphasized within the complex. Rather, the main complex accentuates the importance of administrative functions and people within. Further, this layout physically separates administrators in the Mycenaean period from the producers in the economy. By removing the workshops and markets from the main complex, the Mycenaeans architecturally separate and distinguish themselves as non-producing administrators who control the economy. In contrast, the Minoan palaces do not separate administrators from producers. Instead, the Minoan form mixes sections of production, administration, and commerce (Castleden, 1990). This difference alone begins to elaborate how Mycenaean palatial architecture reaffirms and constructs political status. Where Minoans integrate economic production, the Mycenaeans separate their elite from palatial production zones. Instead, the Mycenaean palaces emphasize administration and physically separate those with administrative status from producers.

The centralized megaron in virtually all Mycenaean palaces further increases the focus on administrative function and social status in the complexes. Unlike the Minoan palaces, the Mycenaean version possess and locate megarons at the terminus of central axes. This emphasizes the social importance of the room through visually and physically leading a person to the section, whether or not their status allows access. The visibility of the megarons in the Mycenaean palaces further reiterates the ability, or inability, to access the room and participate in governance. Where the Minoans rarely had central megarons and used the palace for mostly economic purposes, the Mycenaeans, through the central location, emphasized the palatial use and the socio-political status of those inside. Using these as regional political centers, the Mycenaean rulers subsumed the iconography of Minoan leadership to validate their own burgeoning empire (Parkinson and Galaty, 2007). By incorporating an established control structure into their settlements, the Mycenaean elites, and indeed the *wanax*, signaled their elite status through association with pre-established prestige of the palaces. Thus, the architectural differences begin to differentiate the socio-political systems of the two cultures, showing the importance and association of status with specific rooms. While following Minoan palatial design, the Mycenaean version could complete relatively similar functions while accentuating the dominance of the *wanax*. However, it displays varying status throughout the complex to reiterate socio-political status to the individuals within. The various sections of the palace should display various levels of status indicative of those most likely to access the portion. For example, the outer, left side, which is predominately small storage areas, should display lower status or little reason to navigate. The two mainly differ in the centrality of the megaron and unattached workshops. The Mycenaean culture places greater emphasis on the *wanax* through a central, visible yet highly exclusive megaron. Plus, their palaces, especially at Pylos, separates elites from production zones to accentuate their purely administrative role.

The Mycenaeans intentionally constructed palaces in a way that shaped movement and reiterated statuses. The most apropos, and germane, example is the intentionality inherent in locating the Palace of Nestor (Blegen and Rawson, 1966). It sits on the Epano Englianos, a hill taller than most in the surrounding terrain, and is also only about nine kilometers from the nearest point on shore (Blegen and Rawson, 1966). Further, the ground of the palace, in addition to its height and proximity to the sea, denotes intentional placement. An area on the Epano Englianos was deliberately leveled prior to construction of the approximately 75 by 85-meter complex (Blegen and Rawson, 1966). The Mycenaeans, then, chose a location for the perceived advantages, fortifying the landscape despite lack of walls, before reshaping the land, an extensive feat itself, to construct their palace. One of the prominent advantages, the proximity to the bay, let the Mycenaeans govern their ports while providing relative safety from sea-based attacks

(Blegen and Rawson 1966; Samuel, 1966). The economic and defensive advantages of this location were not accidental. The height and location meant residents of the palace could monitor the entire landscape's production amid safety from a relatively secure location.

Mycenaean elite power came from their economic influence. The *wanax* and his second-in-command owned the vast majority of land in the region (Shear, 2004; Palmer, 1965). Thus, the *wanax* would want to ensure the landscape's production. By choosing the tallest point in the region, the palace overlooked most, if not all, of their territory (Samuel, 1966; Shear, 2004). Not only does the height of the palace provide a protective view of the region, then, it provided the elite landowners a means to watch over the landscape ensuring its production as well as safety. Much like the view and proximity to the coast, this view allowed the ruler to protect his economic interests and, thus, socio-political power and status.

Additionally, the Palace of Nestor's architecture shows anticipation of climatic or economic surplus. For example, the wine magazine, a separate building at the northeast complex, and the oil magazines within the complex reveals an ability for the storage of certain goods within the palace (Blegen and Rawson, 1966). The palace complexes also acted as production zones and trading center for prestige goods in the region with workshops at the southeastern end in the Palace of Nestor (Vermeule, 1963; Blegen and Rawson, 1966; Figure 4). Within the workshop, certain rooms were dedicated to the manufacture of flax into linen which could then be controllably sold by the ruler of the territory (Robkin, 1979; Blegen and Rawson, 1966). At the same time, the scribe's office, archives room, and the central and smaller, queen's megarons exemplify the level of economic monitoring used by the administration to track or maintain surplus (Blegen and Rawson, 1966). In both of these architectural suites, the palaces acted as a major economic hub and power for the region. In the first, it acted as a storage, production, and trade facility for daily goods while the second maintains a record to prevent, or at least anticipate, shortages. In fact, the majority of Linear B tablets are economic, not administrative, records. The palaces physically separated the production zones from the administrative while emphasizing elite control and economic supervision.

The multifaceted uses of the palaces enabled the Mycenaeans to produce, consume, and store goods in an area central to the administrative function of the society. This, in addition to sustaining the economy and political power, increased the importance of the palaces to the region. They were not just locations where elites lived and governed, they were hubs of economic and commercial activity replicating the larger world (Vermeule, 1963). Thus, the palaces and their architecture reiterate the socio-political and economic status of all associated individuals as they navigate the area. Creating a digital reconstruction, employing experiential analysis, and conducting spatial statistics, then, elucidates how the Palace of Nestor and Mycenaeans utilized architecture to reiterate these statuses throughout daily life.

## Chapter 4: Methods

The project employed three phases to understand Mycenaean spatial and navigational design based on socio-political status within the palatial complexes. The first phase focuses on digitally reconstructing the Palace of Nestor in a Unity Technologies' game engine. This provides the most accurate platform for the next phase, experiential testing, and allows comparisons to spatial analysis data, the final phase. Using a game engine permits a complete recreation of the archaeological record in a non-ruinous environment and a mode to virtually navigate the landscape in a first person perspective (Cargill, 2009; Opitz, 2017). Digitally reconstructed sites, then, affect navigation and interpretations through sight as in the real world

(Optiz, 2017). Though the experiences in the real world may be slightly different because of the obvious virtual setting, the same basic constraints on movement exist in both. Further, since the virtual environment allows for a complete version of the palace, the walls and decoration in the virtual setting are more likely to affect movement in a way similar to the historic palace than the modern remains. Figure 5, which shows the view from the courtyard's remains now and in the reconstruction, display the inability for the modern remains to shape movement as it would in the past. Similarly, the reconstruction, though virtual, causes the player to navigate the complex comparable to how a person would in antiquity. To corroborate the results from the experiential tests, the project employed a more empirical spatial analytics assessment.

Each of the three phases provides a different use and data set for the project. The digital reconstruction, as mentioned, provides the most adequate environment for performing a phenomenological analysis. To reconstruct the site, architectural plans were recreated within a Unity game engine and then decorated based on the archaeological evidence. Next, the phenomenological survey occurred by randomly assigning participants to a task-based or free-roam simulation, have them fill out a survey (Appendix A), and repeat the process with the other

Figure 5: The view from the main entrance in the modern site, left, and the same view in the reconstruction, right. Clearly, the modern remains are incapable of constraining movement the same way they could in the past, unlike the reconstructive (Dellonte, 2018).

simulation. Because this reconstructed environment has controlled variables, like weather and light, is authentic to the archaeological record, and is fully constructed, it provided the most realistic, and therefore, accurate navigational experiences to participants. Their surveys, then, reveal how people would navigate the complex and perceive status in a way and depth impossible using the real site. Finally, the spatial analytics provides a separate, objective assessment of how the architecture interacts with itself and agents yielding a quantified value for the socio-political power dynamic in the complex. Together, these two methods cross-verify the data ensuring the power structure measured in the spatial analytics and perceived in the phenomenology are both accurate representations of how the environment constructs status and movement. Further, if the datasets concur, it provides a quantified, yet humanistic understanding of how the environment creates status through constructing navigation. These values, in the future, could then be used to compare how this site and others construct space to affect status.

The Palace of Nestor exists as roughly meter high wall foundations and broken floors. Thus, the actual site cannot constrain movement the way it would during its use, and necessitating a reconstruction to understand how the site would force navigation in antiquity. To create the model, the project utilized the professional version of the Unity game engine with access through Tesseract Studios at the University of Arkansas. This software provided a user-friendly development system and pre-made physics based environment. Unity was chosen for its active developer community allowing the use of assets, or preset code packages. These were primarily employed for creating non-standard objects or using more precise tools in the reconstruction. For example, one primary asset employed was the first-person character allowing the user to navigate the palatial complex in a first person perspective. This enabled the project to employ a first person view for experiential analysis without necessitating the coding of all aspects, like height, gait, sound, speed, and visual scope of a character and camera. Every utilized asset enabled a more efficient and accurate construction of the palace with the intent for experiential analysis. Without downloading the assets, the same reconstruction could exist; it would just require an extensive amount of time, coding, and spatial measuring. Additional comparisons, like that in figure 5, can be found in Appendix C.

The main tool asset, Unity ProBuilder, allowed the highest level of spatial accuracy within the scope and time-frame of the project through a more detailed method of wall and object construction. To construct the first-floor architecture, for instance, a map of the palace from Lis' publication (Figure 6) was placed in Unity and resized for spatial accuracy using map and software scales. Then, using the ProBuilder Unity asset, the architecture was constructed to fit the archaeological blueprint. The meter grid on all blocks from the ProBuilder asset enabled the proportions of each wall section to be sized and situated to fit perfectly onto Lis' basemap and creating walls of the exact height suggested in Blegen and Rawson's text.

Of note, because little to no evidence exists about the layout of upper stories or the number of stories, the reconstruction inhibits access to these and utilizes a conservative, two-story reconstruction. Because the archaeological record indicates the existence of a second story

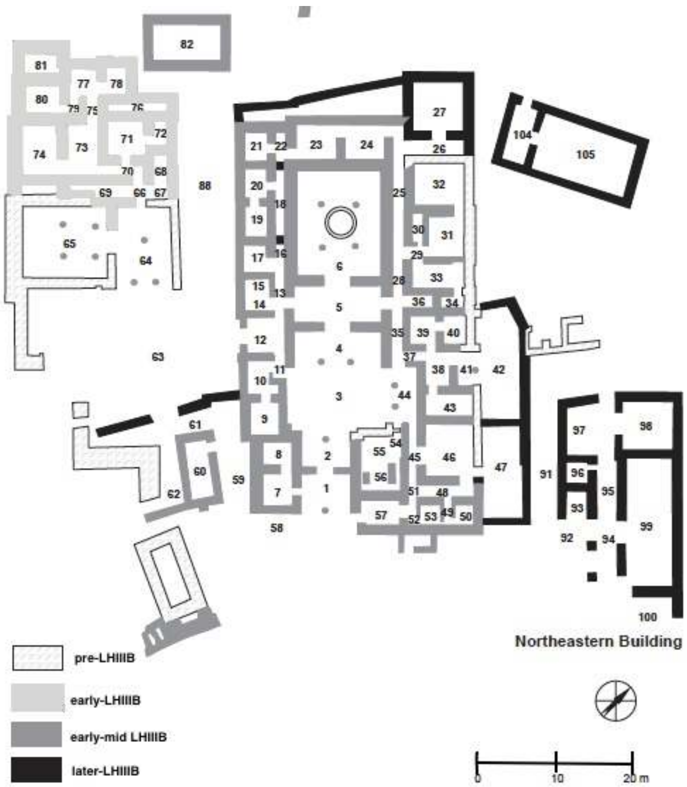



Figure 6: The Palace of Nestor from Lis 2016

and porches without enough detail for an accurate reconstruction, the player will not have access to these areas. However, placing a façade of second story acknowledges the fact the structure had more than one floor but does not attempt to fabricate how it could look without strong archaeological evidence. This provides increased authenticity without sacrificing accuracy. Again, the project aims for both authenticity and accuracy, but the former was deemed more pertinent in instances where a choice was forced.

After completing the initial construction, the material record from the site was placed into locations described in the archaeological records, mostly from Blegen and Rawson's publications of the artifacts and the reconstructions by Piet De Jong included in the book (Blegen and Rawson; 1966). To incorporate the art, an image was placed on a 2-dimensonal plane within the game engine, then sized and placed appropriately within the palace using the textual descriptions to verify location and size. When reconstructions of the art, or the actual piece, no longer exist outside a textual description, an image similar in content and period replaced the missing item. Using outside art from the same culture and period may reduce the accuracy of the reconstruction, but it does so to increase the authenticity (Fredrick, 2013). Because the art placed in the Pylian reconstruction maintains the same imagery and themes from the art indicated in the archaeological record, the reconstruction's authenticity is then closer to the original. Further, this authenticity provides a more genuine player experience than a blank wall could for phenomenological analyses.

Unfortunately, the material remains for the palace were harder and less accurate to incorporate. While the locations and approximate number of items could be placed with reasonable accuracy in the model, according to the recorded position in the archaeological record, the project did not have the time, nor ability, to create models for all individual Mycenaean artifacts. However, since the palace could not look empty, an asset from a previous Roman game developed by Tesseract Studios, in addition to other less problematic, architecturally-based assets from Tesseract, was slightly modified and employed throughout the reconstruction. Most of the pottery, then, is inaccurate with shapes more similar to Roman and Etruscan forms than Minoan and Mycenaean. However, since the focus of the project is on palatial navigation and not related to art history, the time and ability constraints necessitated this inaccuracy. The inaccurate pottery should in no way alter the way people perceive a room or navigates the palace. In the cases where pottery needed to be decorated, a Mycenaean styled model and texture was created and used but most of the pottery in storage areas was left blank in antiquity and the reconstruction. Again, though this introduces inaccuracies into the reconstruction, it does not affect the way a person navigates the palace in this project. Moreover, had the reconstruction neglected pottery it would have harmed the perceptions of rooms status by making the complex appear unused. Therefore, the model still yields accurate experiential results.

After completing the architecture of the palace to the extent possible with the archaeological record, a terrain was placed into the scene to increase realism of the environment.

This entailed two main steps: incorporating a digital elevation model into the Unity scene and decorating the terrain as accurately as possible. The DEM came from terrain.party, a site designed to allow easy incorporation of accurate digital elevation models directly into Unity. Once a 20 square kilometer centered on the approximate location of the Palace of Nestor DEM was downloaded from terrain.party, it was converted to a .raw file using Adobe Photoshop. The .raw file could then be placed and scaled into the Unity scene, which automatically creates a three-dimensional elevation model from the file. Using Google Maps and the north arrow in the Lis map as a guide, the palace was placed in its appropriate geographic location and orientation. Though this sounds like an approximate location only, and indeed there were probably more efficient ways to complete the task, the ground around the palace was flattened in antiquity to provide a stable foundation (Blegen and Rawson, 1966). When the approximate location was found on the DEM, the palace could be oriented and placed in the only area flat across the entirety of the palace. Since the complex is fairly large, 75 meters by 85 meters, and placed on the top of mountainous terrain, it is unlikely more than one location of this size and orientation existed in the area of the palace's location.

After placing the palace in the correct location, flora and coloration were incorporated onto the model. Luckily, the majority of evidence suggests the base environment has not drastically changed since antiquity barring periodic droughts, coastal erosion, and plant introduction as noted above (Robkin, 1979; Knapp and Manning, 2016). The similarity of the environment throughout the Bronze Age allowed a rough approximation of the modern landscape in the digital reconstruction. To do this, satellite images, a digital elevation model, and personal experience with the site were used to create a similar landscape around the complex through terrain tools in Unity. This entailed adding olive trees in the area surrounding the palace to replicate the farming of olives and other produce and coloring the ocean blue. To ensure play-through quality, only the immediately visible area had physical trees. In areas where the details of the tree could not be distinguished, without significant travel from the site, the environment was painted green to imitate farmland.

Since the reconstruction replicates the Palace of Nestor during its use, it occurs prior to the drastic climate change and raiding discussed above. Thus, the similarity of the ancient environment to the modern, as it reverted back after the dry period, means the modern foliage provides an adequate background for replicating the ancient environment. Further, adding the landscape to the game provides increased realism for the player and a more accurate setting to traverse the complex. This, in turn, provides greater context and accuracy for experiential studies by adding the broader landscape to experience. Thus, the climate was reconstructed similar to the modern era to increase the experience quality of the phenomenological study without impeding the accuracy of the model. Like adding art and artifacts inside the palace, including the environment enabled a more authentic representation of the palatial landscape, and, as such, enabled a more accurate experiential analysis.

For this study, experiential analysis, the recording of and interpretations from human site experiences, reveals how the built environment constructs movement in the palatial complex in a way that reinforces the socio-political system through visual stimuli and physical constraints. For example, after a participant played through a simulation, they filled out a survey about their experiences and interpretations about navigational effects and socio-political status (Appendix A). In the task-based play-through, users will not enter but circumambulate the primary megaron. Yet, this megaron and its two preceding vestibules are one of the first scenes a user has walking into the palace. Because these rooms have intensive decoration schemes, and are inaccessible based on their task, it should reiterate the lower status of the workers and emphasize the status of those inside the megaron. By using a subjective technique that examines how the palatial complex looks, experiential analysis provides an invaluable data source for the study. Where GIS and mapping techniques are seen as sterile logic, phenomenology incorporates the researcher's, and in this case participants', own perceptions and experiences to understand how the landscape shapes behavior.

To conduct the phenomenological portion of the study, two groups played through the palatial reconstruction. The participants were volunteers from Dr. Marvin Kay's undergraduate World Prehistory course, graduate students from the Anthropology department, and Dr. Kathryn Koziol's Introduction to Cultural Anthropology class at the University of Arkansas. Though not a completely random sampling, the participants provided a sample of individuals with varying knowledge about the topics used, i.e. architecture, Mycenaeans, archaeology, etc. The students were assigned one of two initial experiences based on the order of arrival. Every odd-numbered individual was assigned to a task oriented first experience acting as an archivist of low status needing to record the level of resources in the palaces storerooms. Those not assigned this task, were given up to ten minutes to freely explore the palace.

After they completed their first simulation, every participant filled out a survey assessing what paths they used, why they chose these, how they felt the environment affected the choices, and which rooms they would assign the highest and lowest socio-political status. Once completed, the participants were asked to replay the level with the other assignment and then fill out the same survey for the new task to understand if familiarity affects perceptions. Due to the variety of participant's backgrounds and familiarity with the palace during the play-through, the study assessed varying levels of experiences and knowledge in how the palace shaped its navigation and status. Of note, using the game provided a way to ensure each individual had identical settings to experience navigating the palatial complex. The use of a game engine meant all variables, like weather, light, and ambient sounds, were controlled and perfectly replicated for each play-through. Thus, the reactions and experiences of each player derived from the impact of the architecture and the individual background. These surveys, then, could be compiled to develop an understanding of the experiences shaping navigation and status within the architecture. This data could then be compared to the interpretations from the spatial analytic methods, discussed below, to evaluate whether idealized behavior and status in the syntactic methods hold true. Similar techniques to this, and inspiration from this work come from those in Gillings (2012), McEwan and Millican (2012), and, particularly, work by Tesseract Studios on Pompeii since 2011.

To conduct this measurement, the project used a spatial analytics tool within ArcMap, a software by ArcGIS; of note, this differs from space syntax's typical use of Depthmap though it accomplishes the same task. The tool was developed in Tesseract studios by another graduate student, Forrest Follet, for use on the lab's own projects. The results of each centrality used, and a description of the measurements can be found in the result section. The first step entailed cleaning the Lis palace plan so numbers and features would not interfere with room detection (Figure 7). After, the image was placed as a raster map within ArcMap and the room detection program run. The room detection identified rooms as multiple sections located between walls or features. Because this tool can conflate or separate rooms together depending, such as the rooms before and after a colonnade, the resulting room/basin map was scrutinized and modified to ensure all rooms occur where and how they should. From here, adjacent sides between basins can be designated to indicate which connections are edges, sections permitting travel from one node to another.

After establishing the rooms and edges within the palace map, two .csv files were created, one for nodes/rooms and one for edges, and placed in the Gephi software. This software can render a geometric map of the nodal network based on each connection independent from architecture. Though it does not affect much outside aesthetically altering the way the nodal map and connections are read, this display allows easier identification of where and how nodes connect and what the paths look like if they were straight lines. Aesthetically, this can help identify which points have the most or least connections prior to the statistical analysis. After reordering the geometric map, the centralities chosen for this project were selected and ran in the Gephi software. These data tables could then be used both as a comparison for the experiential data and to create a more comprehensive nodal map by connecting the tables with the basins designated in ArcMap, the latter of which is in the Results section (Figures 16 through 23 in Results). As seen, nodal map alters the size of an overlaid point relative to the value allowing interpretations of relative room values within the system.

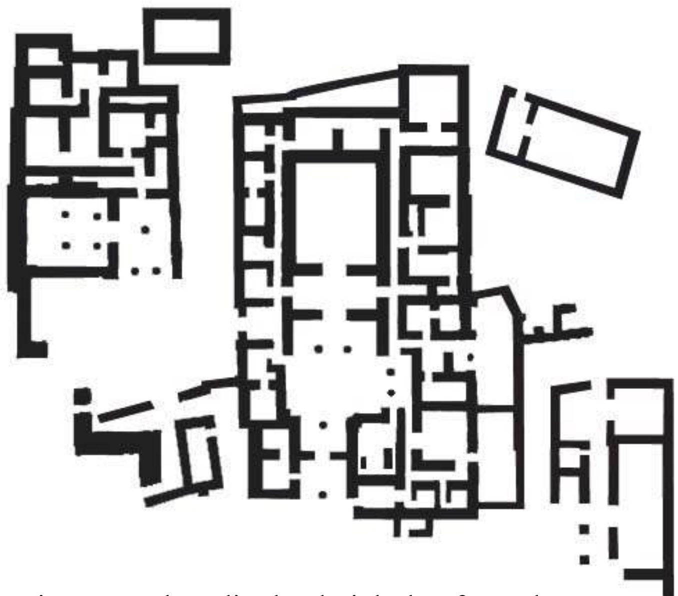


Figure 7: The edited palatial plan for Pylos so no feature on the map would appear as false rooms.

Since the study looks at both directed and undirected movement through the palace, the project performed the previous step twice. The former measures node value starting at a certain point, in this case node 1 (and different in Appendix B), and identifying access to other rooms from that point. Undirected, on the other hand, measures nodal associations from any and all directions. The first time calculated undirected flow and once again for directed. This allows the statistical measurements to convey the behaviors of those with low status or a specific task, like a craftsman or slave through directed, and to convey pathways for high status individuals with open access, such as the *wanax,* through undirected.

## Chapter 5: Results

To collect experiential data, participants played through either a free roam or task-based simulation, filled out a survey of their experience, then repeated the process with the other simulation. The free-roam simulation allowed participants to navigate the palace as someone without barred access akin to high status citizens and the undirected statistical analysis below. Similarly, the task-based simulation, where the participant navigates the palace collecting linear b tablets, acts as a correlate to individuals with lower status, by menial labor, and the directed statistical calculations. Of note, the linear b tablets were placed based on evidence in the archaeological record and, consequently, in rooms with typically lower status. For example, the majority are in storage rooms, while they are absent in the megaron. For instance, no tablets were placed inside either of the megarons or in the baths, but they were in most storage rooms. In the initial data collection period, 16 participants ran through both simulations and filled out the surveys. Though a small sample size, participant experiences already produced a recognizable, pattern of a lower status outer sections that are slightly higher on the right side with the highest status rooms occurring in the central part of the complex (Figures 8- 15). This pattern in the experiences allow general conclusions to be drawn and comparison to the statistical data to be made. Further, a secondary, more specific collection period expanded the sample size by 5 but maintained the same experience pattern. Of note, status was left to largely self-determined criteria, but it was explained that the project is examining socio-political status.

When asked which room had the lowest status after the free-roam simulation (Figure 8), 18 (90%) participants felt the outer, storage rooms while 1 (5%) answered the bathing complex and another (5%) had an irrelevant answer of “the landscape.” Further, while some of the participants cited a lack of art or difficulty in access, half, 10 of 20 (as one person failed to fill out a free roam survey), perceived the status based on the room’s use as storage. Moreover, in the secondary data collection period, all but one participant discerned the left side, outer rooms as having the lowest status within the complex. Conversely, 14 (74%) of participants said the megaron and associated central rooms had the highest status with 2 (10%) participants denoting the room with the most art, 2 (11%) the room with the most objects, and 1 (5%) the bath (Figure 9). Of note, the middle two categories do not actually exclude the megaron or central rooms; the answers could not be directly attributed and were, thus, given separate categories. Thus, even with a small sample size, a significant portion agrees on which rooms have the highest and lowest statuses, and these concur with the prior thoughts from the archaeological record. Further, almost half of the participants identified room use in the determination of status both high and low. Even when able to freely roam the palace, then, the uses of each room as well as their location affect the way people understand the associated status.

The questions about perceived navigational influences in free roam saw equal agreement. When asked what they felt most affected their navigation, the majority 14 (70%) said the architecture, 4 (20%) said the decorations, and 2 (10%) had miscellaneous reasons like “perceived flow” or “wanting to enter every room” (Figure 10). Similarly, 18 (90%) confirmed in a later question the architecture affected their navigation, 1 (5%) said it affected them somewhat, and 1 (5%) said it did not affect them (Figure 11). On the latter question, 5 (25%) of the participants described being either drawn toward the central megaron or the difficult access of the outer hallways/storerooms. Even when given open access in the palace, the architectural effects of navigation are felt. The purpose of having both questions, and only placing the term architecture in the latter, was to avoid influencing the post-simulation perception about navigational effects. Thus, since 70% (14) cited it as constricting their movement without psychological priming, it reveals a perceived awareness of the effects in the simulation. Combined with the identification of high and low status, then, it reveals an ability of the architecture and room use to iterate the status of certain sections of the complex in perceptible ways. Taken together, the free-roam data implicates the palace's use of status and architecture to construct certain types of navigation within the complex even among those with complete access as the only movement factors are the decoration and architecture.

Experiential Results

Next, the task-based simulations (Figures 12-15) saw similar conclusions to the free-roam relatively unaltered by the participant's lower, task driven status. The biggest difference came in the perceived influences on navigation (Figure 12). In this simulation, the participants were split with 7 (33%) identifying architecture, 4 (19%) attributing objects, 6 (29%) identifying both architecture and objects, and 4 (19%) identifying other miscellaneous factors like enjoyment. Interestingly, only 19% saw their task, collecting objects, as the sole constraint on movement, but 48% of the participants felt the objects and architecture affected how they travelled through the palace. Similarly, 62% of participants saw the architecture, some in combination with objects, affecting movement. Thus, at least some

Mycenaeans would feel their daily tasks affected how they could navigate the area and, as seen below, their status based on room use.

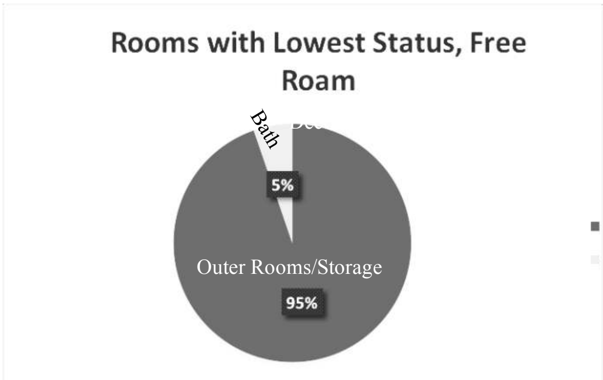



Figure 8: Graphical results from the experiential survey about perceived low status rooms in Free Roam.

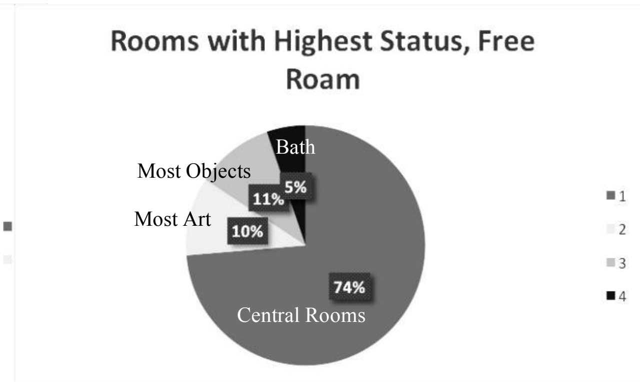



Figure 9: Graphical results from the experiential survey about perceived high status in Free Roam.

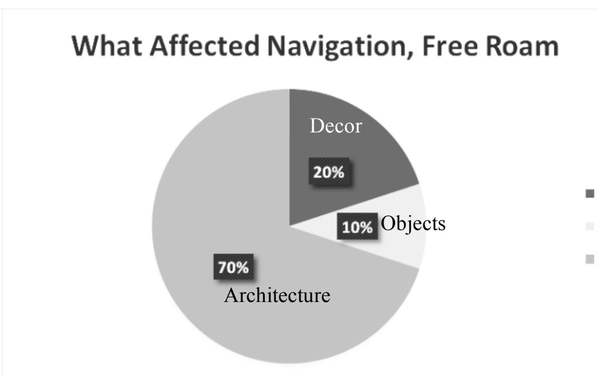



Figure 10: Graphical results from the experiential survey about navigational influences in Free-Roam.

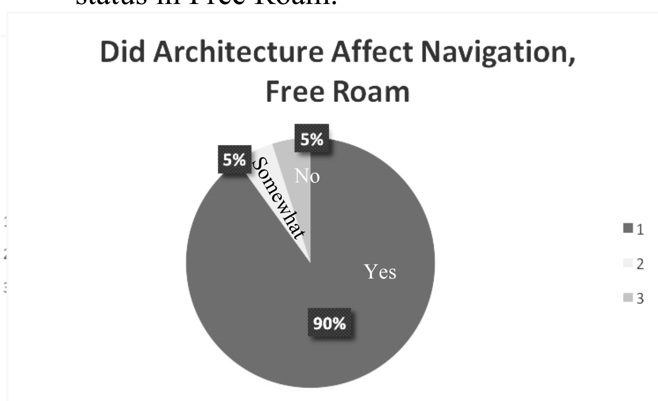



Figure 11: Graphical results from the experiential survey on if architecture affected navigation in Free Roam.

The other results from this half of the survey were more similar to the free roam. 15 (75%) felt the megaron and central rooms had the highest status while 1 (5%) identified the outer rooms, 3 (15%) felt the scribe room, and 1 (5%) only recognized an unspecified room with the most art (Figure 14). Similarly, 15 (75%) of the participants felt the outer rooms, 4 (20%) the small/blank rooms, and 1 (5%) the hall had the lowest status (Figure 13). Also, every participant in the secondary data collection period identified the left, outer rooms as having the lowest status within the complex. This implies that regardless of simulation, the high and low status rooms are not perceived too differently except for the appearance of the hallways. This could be because the task-based participants were more confined to the halls and, thus, more likely to notice them.

The main revelation of the task-based simulation, though, is how many did identify their status/task as affecting the way they navigated the palace and how 17 (85%) recognized the architecture as affecting their navigation (Figure 15). This indicates those with lower status or task-driven navigation may be more sensitive to a greater influence from architecture and their task has in their movement. Some participants noted they felt more constricted or confined to the outer sides and avoided the central, high status rooms during the task based play-through. These experiences reveal a relative inability to access these high status areas. Even more than the free-roam, the task-based, directed simulation revealed how task and architecture combined affected movement throughout the complex displaying the relative status of each area as a person moves through it. However, the perceptions of status are largely unchanged whether the person has complete or task directed access. Thus, the navigation of the palace was influenced by the art, which remained on for every participant, and architecture, seen in both free-roam and task-based, in a way that displayed status to the traveler.

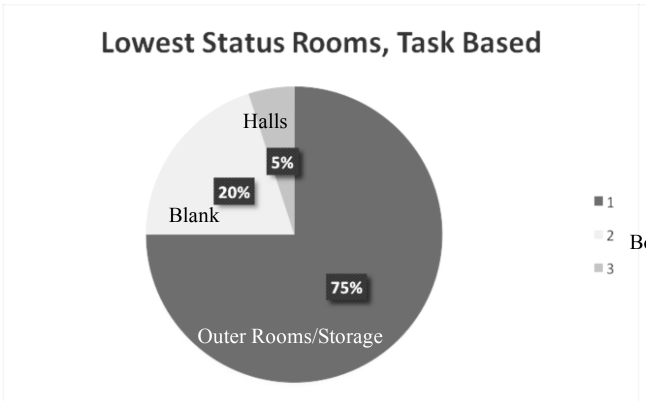



Figure 12: Graphical results from the experiential survey about perceived low status rooms in Task-Based.

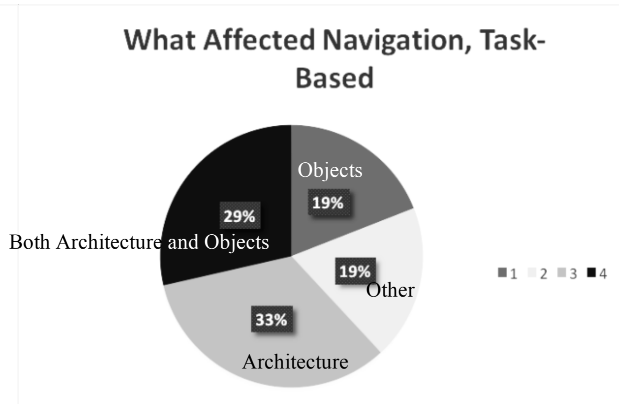



Figure 13: Graphical results from the experiential survey about navigational influences in Task-Based.

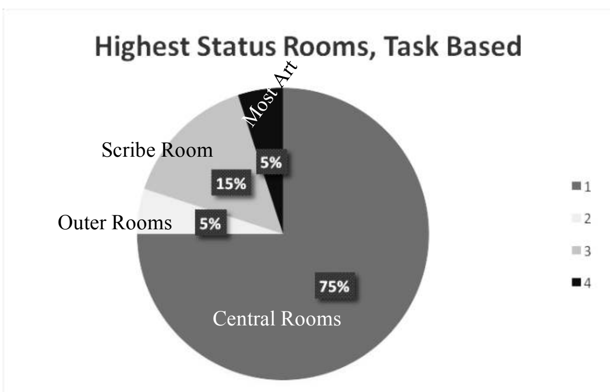



Figure 14: Graphical results from the experiential survey about perceived high status in Task-Based.

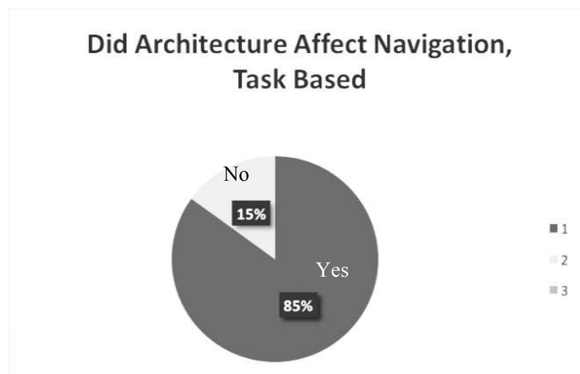



Figure 15: Graphical results from the experiential survey on if architecture affected navigation in Task-Based.

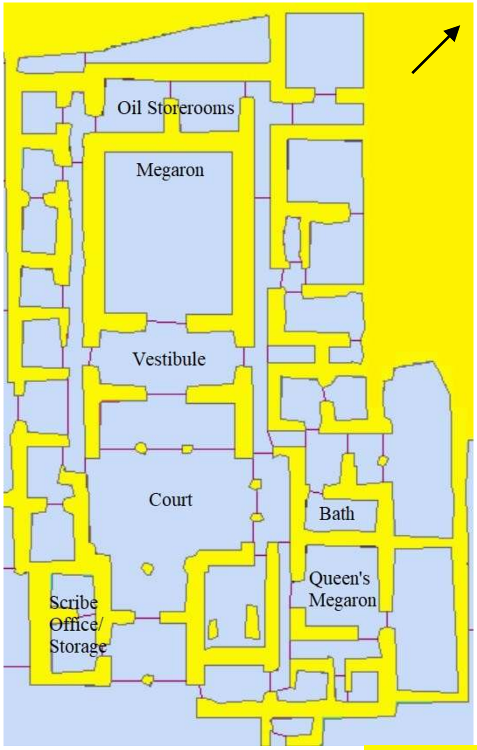
Spatial Syntactical Results

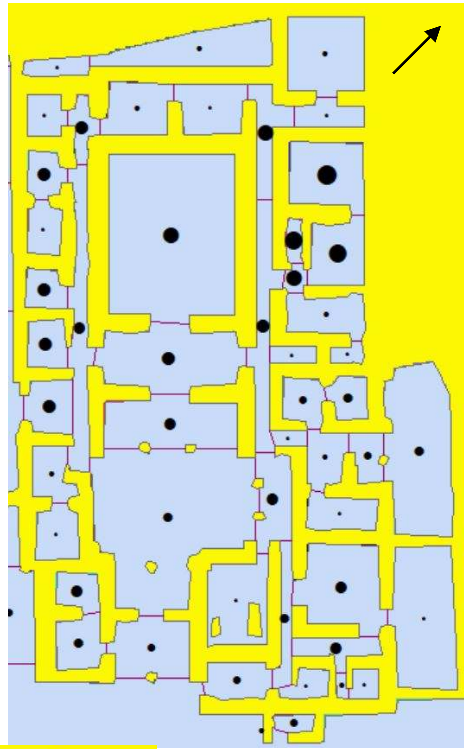
To complement these experiential surveys, the project employed spatial analysis using eccentricity, closeness, betweenness, and eigenvector centralities. As defined in the introduction section and table 1, each of these measurements assess a different way rooms interact within the complex. Further, each variable was measured in directed and undirected calculations. The direct, taking the low status role with a task, navigates the complex by means of access ease travelling in a specific direction through the complex. This highlights areas of restricted access by altering their values to depict access differentials within the system. Undirected measurements, on the other hand, measure the complex uninhibited by differential access, much like someone able to free-roam the complex, implying high status by possessing little or no access restrictions, viewing the area more cohesively. The exact values for both measurement types are shown in tables 2 and 3.

The first measurement was eccentricity. The directed and undirected values relative to the system can be seen in figures 17 and 18 below. This measurement displayed the biggest difference between directed and undirected measurements. In the directed calculation, the left side of the main complex had consistent, moderate values. While not showing complete easy access, it indicates generally equal, open access within this section of storage and workrooms. Conversely, the other half, with more decoration and less storage in the archaeological record, varies between high and low values displaying differential access throughout it. For instance, the storage rooms on this side, except for the amphora storage in the top right (Figure 16), have relatively open access. However, the more private, non-storage rooms, like the bath and its associations, cannot be easily accessed from the rest of the palace. Similarly, both megarons display high levels of differential access indicative of restricted access and high status. The main megaron, with an overall medium value, is only accessed through its vestibule, which has a lower value. This makes the megaron moderately difficult to enter, and implies an easier ability to access the rest of the complex.

These relationships shift, though, in the undirected measurements. When differential access is not considered in the measurements, the right side of the complex, the typically higher status side, appears to have easier access to the rest of the facility than the left. The high eccentricity on the right means the higher status individuals, also denoted in the rooms' art and use, would have an easier ability to access the entire complex unlike those in the lower status, left side. However, if incapable of freely roaming the complex, a person would have a measured, varying ability to travel throughout the right side. This, much like the access differential for the megaron, further suggests the higher status on this side. Conversely, the left side of the complex, which is mostly storage rooms, has relatively low undirected eccentricity values displaying a lack of access into the rest of the complex without possessing restricted access. Thus, it is likely the left side would see agents travelling only among that side of the complex (i.e. storage to storage), whereas, the actors inhabiting the other side of the complex could travel the complex virtually at will. Interestingly, the megarons do not vary significantly in their relative undirected and directed values. In both cases, the megarons tend to have a moderate ability to access the rest of the complex with a relatively low entrance capability. This continues to indicate a high status for the inhabitants of the rooms, as one would expect for the *wanax*. They are capable, though unlikely, to access any part of the complex with relatively few people accessing their megaron.

Similarly, the archive and scribe's rooms had larger eccentricity values than anticipated. This could be due to their proximity to the entrance and an equidistance length of paths. But, like the megaron, the directed measurement reveals an access differential into the archive room and, along with the scribe workshop, show an easy ability to access the rest of the palace indicating restricted access into the archive's storage. Relatively easy access into the scribe's workshop, in addition to a lack of decoration, shows both rooms to have lower status than inhabitants of the megaron but higher than those occupying the left side of the complex. As anticipated, then, the megarons and right side of the complex appear to have high status while the left side, which is



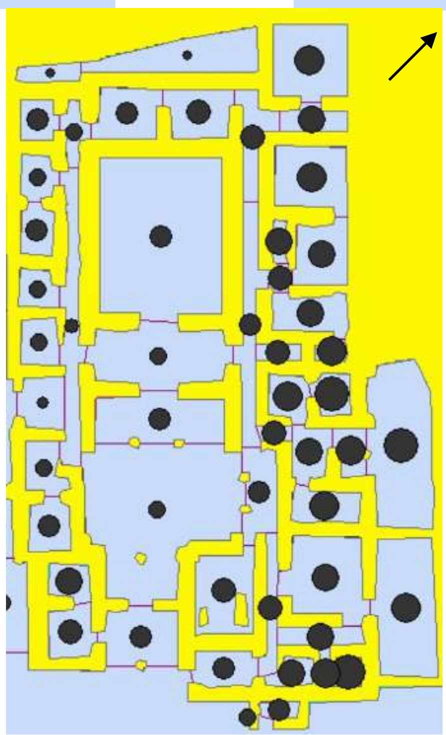
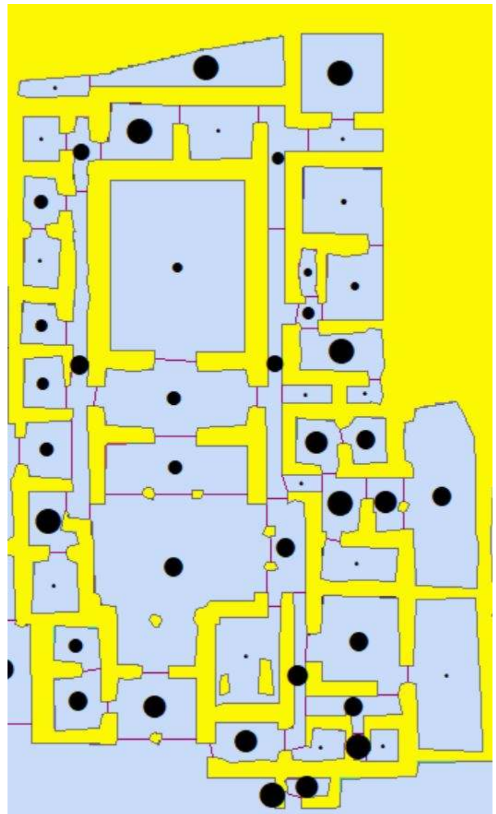


Figure 16, top left: An annotated map of the relevant section for the Palace of Nestor
Figure 17, top right: The directed eccentricity values with larger nodes corresponding to relative value.
Figure 18, bottom: The undirected eccentricity values with relative node size.

mostly storage, has lower status and a lesser ability to access the entire complex. Since the right side has less inhibited access to the entirety of the complex, it appears to have a higher status. This matches the experiential results which showed people to perceive similar status values within the complex.

The next centrality measurement, closeness, details the relative proximity of each node to the entire complex (Figures 19 and 20). One of the most notable features in the directed measurement is the relative isolation the megarons and secondary storage rooms (storage rooms accessed through other storage rooms) possess. Due to the difficulty of travelling from within, this indicates those rooms are either not frequently accessed nor were inhabitants able to access the rest of the complex. The isolation of these rooms from the rest of the complex, little access in and out, denotes limited, low status access. Conversely, in the case of the highly visible megaron, the differential access, low entrance and high exit access, exhibits higher status especially since the megaron emphasizes its limited entrance access through visibility. The inability to access the megaron, but easily see it and its inhabitants, only reiterates the inability to enter for the agent affirming his/her lower status. Further, the right side of the complex, again, oscillates between isolated and connected rooms. One of the notable areas of this variation appear with the bath and associated rooms. The bath is likely a terminal location with restricted access, indicated through the low value, but the antechambers are easily accessible to the group. However, the entrance hallway is isolated from the complex. Even though this group of rooms is easy to travel within, people in it are unlikely to continuously leave and reenter due to the difficulty in initial access. This can be contrasted to the megaron since it has a low value connected to a high indicating access difficulty and isolation of the megaron itself despite the strong connectedness of its entrance.

In the undirected analysis, though, the left side of the room consistently possesses the highest values in the main complex. Thus, displaying an ability to essentially room hop this side of the complex. Because each of the rooms are relatively close and easily accessed, the left side likely has a lower status than the inconsistent, isolated right half. Further, the rooms leading to the megaron reveal a relatively easy ability of travelling from the entrance to the primary vestibule. Once in the vestibule, though, it remains relatively difficult to access the megaron and much easier to enter one of the adjacent hallways. Like the eccentricity, this exposes the left side as lower status with an easier ability to travel within that half of the complex. Similarly, it gives the megaron easy access to, but not from, the complex. This continues to support the understood status-navigation relationship: the lower status, storage rooms allow easier access within that side as does the right, but the two sides remain relatively separate from one another with little travel betwixt. The biggest surprise of this measurement was the direct value for the oil stores at the back of the complex. Though they have relatively similar, and high, values in the undirected, the directed side shows a much greater ability to travel in and out of the left oil store. The right, conversely, appears much more difficult and unlikely to access despite being on a relatively interconnected hemisphere. It could deal with the number of agents likely to enter from the right side to cross through to the left since this should, theoretically, occur less frequently than the opposite.



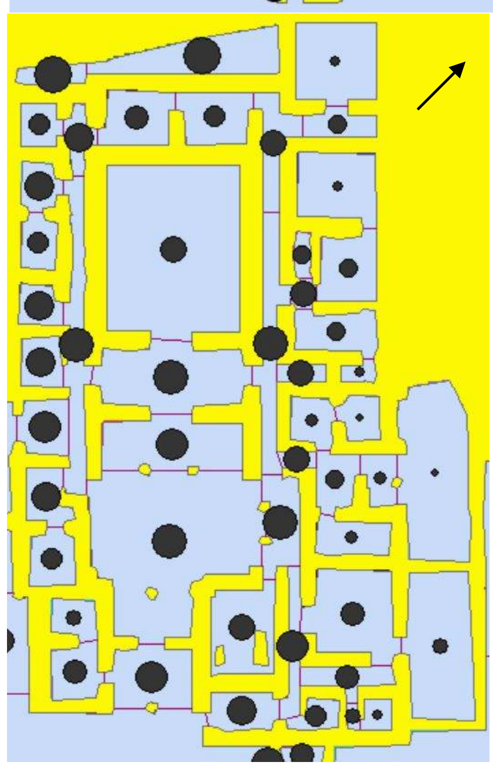
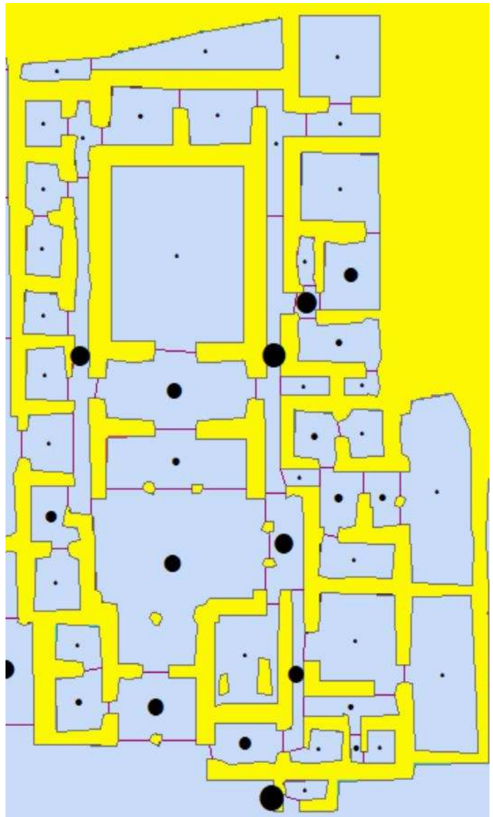


Figure 19, top: The directed closeness values with larger nodes corresponding to relative value.
Figure 20, bottom: The undirected closeness values with relative node size.

Next and like closeness, the betweenness measurement assesses palatial connectivity. As the name suggests though, it looks into the likelihood one node would be passed through to reach another (Figures 21 and 22). Though useful in reiterating observed behavior, this measurement was unsurprising in both directed and undirected measurements. As seen in the graphs below, the rooms with any, let alone high, values are the expected: vestibules, hallways, and entrances. The only real surprise is the lack of value in both oil storage rooms at the top of the complex.

Because they connect both sides, it was thought they would have an at least moderate value. This differs from the experiential survey since both were used to travel from the left to the right side revealing a typical utility and shortcoming of this method: where it does indicate the most likely rooms to be used to travel between, it does not always match with human behavior when needing to travel the entire complex. Here, instead of showing the oil stores to be a convenient method of traveling between palatial hemispheres, it suggests alternative routes would be used unless the agents had a purpose to use the room, as they do in the simulation. However, some of these are social constraints, like slave paths relatively unknown in the record.



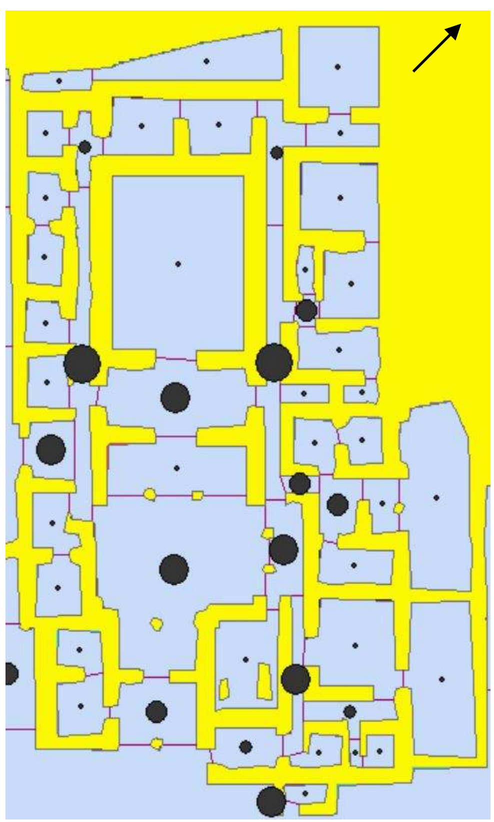
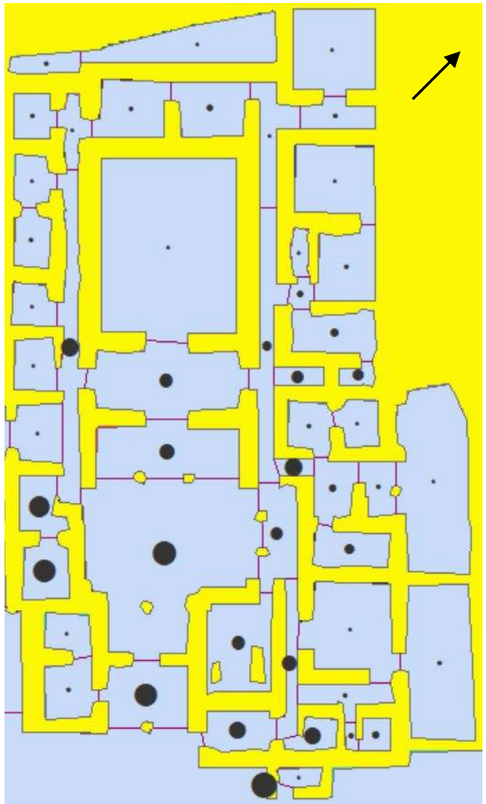


Figure 21, top: The directed betweenness values with larger nodes corresponding to relative value.
Figure 22, bottom: The undirected betweenness values with relative node size.

The final measurement used, eigenvector, determined the relative power dynamic in the architecture of the palace (figures 23 and 24). The directed eigenvector provided the most surprising results[1]. For instance, the main megaron had a virtually non-existent value despite only having a single connection which, in turn, connected to both hallways, and thus, the whole palace. Potentially, the megaron's indirect access isolates it, as depicted in the closeness value, lessening easier, direct access to the rest of the complex and the eigenvector value as a result. However, the megaron's vestibule has one of the higher values, indicating an ability to access the rest of the complex while minimizing connections outside the megaron. This, however, is understandable: it is linked to every sector of the palace with only three connections.

Also surprising were the high values for the entrance and main court. Though it makes sense the entrance has a high value, connecting to a court which leads to the rest of the complex, the main court was not theorized to have a high value due to its number of connections. Usually the more connections a node has, the lower the eigenvector value. Like the vestibule, though, its high value is understandable both architecturally and archaeologically. As the first room upon

[1] During the defense, it was pointed out this value's oddity comes from the direction of measurement. Revisions of this data are upcoming, but they should not drastically alter the conclusions of this research.



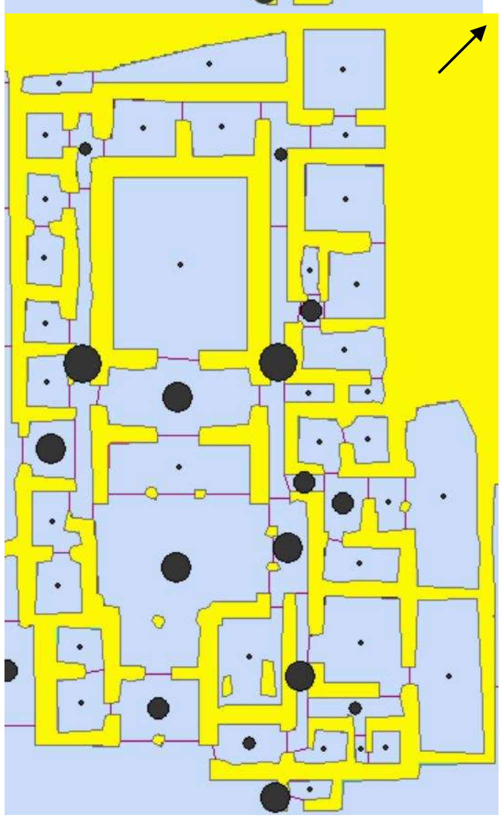


Figure 23, top: The directed eigenvector values with larger nodes corresponding to relative value.
Figure 24, bottom: The undirected eigenvector values with relative node size.

entrance, the palace designed the court to display a level of status indicative for the entire complex, seen in the intensive decoration patterns from the archaeological record. Further, the court served as an antechamber to access any part of the complex. So, while it was frequently travelled through, it could still be used to display status and power and maintains deceptively few direct connections, only to each of the halls. Though the values increased and changed slightly in the undirected eigenvector measurement, the revelations are virtually identical. The megaron is seen as more isolated while the halls, entrance, and court have higher values than initially


Figure 25: The Palace of Nestor with room ID numbers as a key for the space syntax Tables below

Table 2: The values for the directed space syntax centralities corresponding to prior figure

| Id | Eccentricity | closnesscent | betweenessc | eigencentrali |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 2 | 10 | 0.173333 | 0 | 0 |
| 3 | 9 | 0.193548 | 12 | 0.008264 |
| 4 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0.029598 |
| 6 | 0 | 0 | 0 | 0 |
| 7 | 7 | 0.225 | 0 | 0 |
| 8 | 1 | 1 | 0 | 0 |
| 9 | 8 | 0.2 | 20 | 0.029598 |
| 10 | 0 | 0 | 0 | 0.008264 |
| 11 | 1 | 1 | 0 | 0 |
| 12 | 6 | 0.3125 | 0 | 0 |
| 13 | 9 | 0.180328 | 0 | 0 |
| 14 | 5 | 0.37931 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0.016528 |
| 16 | 1 | 1 | 1 | 0.008264 |
| 17 | 0 | 0 | 0 | 0.037862 |
| 18 | 0 | 0 | 0 | 0.008264 |
| 19 | 8 | 0.2 | 10 | 0.008264 |
| 20 | 0 | 0 | 0 | 0 |
| 21 | 7 | 0.225 | 0 | 0 |
| 22 | 8 | 0.2 | 0 | 0 |
| 23 | 7 | 0.225 | 54 | 0.094402 |
| 24 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 |
| 27 | 6 | 0.258065 | 8 | 0.008264 |
| 28 | 1 | 1 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0.008264 |

| Id | Eccentricity | closnesscent | betweenessc | eigencentral |
|---|---|---|---|---|
| 30 | 6 | 0.258065 | 64 | 0.15661 |
| 31 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 |
| 33 | 5 | 0.346154 | 0 | 0 |
| 34 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 |
| 37 | 8 | 0.203704 | 0 | 0 |
| 38 | 0 | 0 | 0 | 0 |
| 39 | 6 | 0.258065 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 |
| 41 | 0 | 0 | 0 | 0.008264 |
| 42 | 5 | 0.304348 | 70 | 0.197837 |
| 43 | 0 | 0 | 0 | 0 |
| 44 | 7 | 0.244186 | 0 | 0 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0 | 0 |
| 48 | 7 | 0.244186 | 21 | 0.008264 |
| 49 | 0 | 0 | 0 | 0 |
| 50 | 6 | 0.307692 | 60 | 0.037862 |
| 51 | 5 | 0.32 | 0 | 0 |
| 52 | 5 | 0.304348 | 14 | 0.029598 |
| 53 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0 | 0 |
| 55 | 5 | 0.386364 | 85 | 0.086138 |
| 56 | 0 | 0 | 0 | 0 |
| 57 | 6 | 0.277778 | 0 | 0 |
| 58 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0 | 0 |

| Id | Eccentricity | closnesscent | betweenessc | eigencentrali |
|---|---|---|---|---|
| 60 | 1 | 1 | 4 | 0.077874 |
| 61 | 0 | 0 | 0 | 0.105678 |
| 62 | 0 | 0 | 0 | 0 |
| 63 | 5 | 0.32 | 0 | 0 |
| 64 | 0 | 0 | 0 | 0 |
| 65 | 5 | 0.346154 | 33 | 0.135276 |
| 66 | 0 | 0 | 0 | 0.127012 |
| 67 | 3 | 0.444444 | 0 | 0 |
| 68 | 3 | 0.444444 | 0 | 0 |
| 69 | 2 | 0.6 | 3 | 0.008264 |
| 70 | 5 | 0.352941 | 0 | 0 |
| 71 | 4 | 0.357143 | 5 | 0.162631 |
| 72 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0.231828 |
| 75 | 4 | 0.375 | 88.5 | 0.269412 |
| 76 | 2 | 0.6 | 3 | 0.008264 |
| 77 | 0 | 0 | 0 | 0 |
| 78 | 0 | 0 | 0 | 0 |
| 79 | 0 | 0 | 0 | 0 |
| 80 | 4 | 0.411765 | 54.5 | 0.203951 |
| 81 | 4 | 0.45 | 54 | 0.127012 |
| 85 | 1 | 1 | 8 | 0.059197 |
| 111 | 3 | 0.444444 | 52 | 0.570123 |
| 106 | 3 | 0.5 | 78.5 | 0.275122 |
| 89 | 1 | 1 | 14 | 0.267749 |
| 120 | 0 | 0 | 0 | 0.141297 |
| 133 | 3 | 0.5 | 34.5 | 0.179159 |
| 93 | 0 | 0 | 0 | 0.104816 |
| 87 | 2 | 0.625 | 0 | 0 |

| Id | Eccentricity | closnesscent | betweenessc | eigencentrality |
|---|---|---|---|---|
| 110 | 2 | 0.571429 | 5 | 0.016528 |
| 142 | 1 | 1 | 88 | 1 |
| 101 | 0 | 0 | 0 | 0.277659 |
| 126 | 2 | 0.6 | 52.5 | 0.250329 |
| 129 | 0 | 0 | 0 | 0.242065 |
| 108 | 3 | 0.416667 | 0 | 0 |
| 109 | 3 | 0.444444 | 0 | 0 |
| 122 | 1 | 1 | 9 | 0.059197 |
| 130 | 2 | 0.6 | 45 | 0.567816 |
| 114 | 4 | 0.357143 | 0 | 0 |
| 127 | 3 | 0.444444 | 4 | 0.008264 |
| 118 | 4 | 0.434783 | 0 | 0 |
| 123 | 4 | 0.421053 | 2 | 0.008264 |
| 134 | 0 | 0 | 0 | 0.008264 |
| 119 | 2 | 0.571429 | 0 | 0 |
| 154 | 0 | 0 | 0 | 0.931214 |
| 169 | 0 | 0 | 0 | 0.931214 |
| 138 | 1 | 1 | 2 | 0.029598 |
| 135 | 2 | 0.6 | 19.5 | 0.203746 |
| 136 | 0 | 0 | 0 | 0.203746 |
| 139 | 0 | 0 | 0 | 0.05654 |
| 140 | 2 | 0.6 | 0 | 0 |

Table 3: The values for the undirected space syntax centralities

| Id | Eccentricity | closnesscent | betweenessc | eigencentrali |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 2 | 14 | 0.104749 | 0 | 0.035933 |
| 3 | 13 | 0.116822 | 147 | 0.077605 |
| 4 | 0 | 0 | 0 | 0 |
| 5 | 14 | 0.104749 | 0 | 0.035933 |
| 6 | 0 | 0 | 0 | 0 |
| 7 | 11 | 0.13587 | 0 | 0.026387 |
| 8 | 1 | 1 | 0 | 0.008803 |
| 9 | 12 | 0.131119 | 216 | 0.100254 |
| 10 | 1 | 1 | 0 | 0.008803 |
| 11 | 13 | 0.143954 | 0 | 0.038085 |
| 12 | 11 | 0.2 | 202.833333 | 0.280046 |
| 13 | 13 | 0.115385 | 0 | 0.034441 |
| 14 | 9 | 0.213675 | 155.166667 | 0.325404 |
| 15 | 12 | 0.167785 | 74 | 0.105252 |
| 16 | 10 | 0.186567 | 40 | 0.145051 |
| 17 | 11 | 0.179856 | 28.833333 | 0.136684 |
| 18 | 10 | 0.176471 | 0 | 0.098428 |
| 19 | 12 | 0.130208 | 74 | 0.080962 |
| 20 | 0 | 0 | 0 | 0 |
| 21 | 11 | 0.144788 | 0 | 0.058298 |
| 22 | 12 | 0.129758 | 0 | 0.06432 |
| 23 | 11 | 0.14881 | 490 | 0.160781 |
| 24 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 |
| 27 | 10 | 0.156904 | 74 | 0.058726 |
| 28 | 1 | 1 | 0 | 0.008803 |
| 29 | 1 | 1 | 0 | 0.008803 |

| Id | Eccentricity | closnesscent | betweenessc | eigencentral |
|---|---|---|---|---|
| 30 | 10 | 0.168919 | 602 | 0.151924 |
| 31 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 |
| 33 | 9 | 0.209497 | 74 | 0.271502 |
| 34 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 |
| 37 | 13 | 0.143954 | 0 | 0.042509 |
| 38 | 0 | 0 | 0 | 0 |
| 39 | 10 | 0.162338 | 0 | 0.063839 |
| 40 | 0 | 0 | 0 | 0 |
| 41 | 10 | 0.173611 | 0 | 0.080435 |
| 42 | 9 | 0.193299 | 714 | 0.177279 |
| 43 | 0 | 0 | 0 | 0 |
| 44 | 12 | 0.167038 | 0 | 0.100845 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| 47 | 0 | 0 | 0 | 0 |
| 48 | 12 | 0.167785 | 74 | 0.118996 |
| 49 | 0 | 0 | 0 | 0 |
| 50 | 11 | 0.2 | 358 | 0.314589 |
| 51 | 9 | 0.208333 | 0 | 0.244861 |
| 52 | 9 | 0.184729 | 146 | 0.120546 |
| 53 | 0 | 0 | 0 | 0 |
| 54 | 0 | 0 | 0 | 0 |
| 55 | 10 | 0.241158 | 1117.83333 | 0.660846 |
| 56 | 0 | 0 | 0 | 0 |
| 57 | 10 | 0.195822 | 0 | 0.167857 |
| 58 | 0 | 0 | 0 | 0 |
| 59 | 0 | 0 | 0 | 0 |

| Id | Eccentricity | closnesscent | betweenessc | eigencentrali |
|---|---|---|---|---|
| | | | | |
| 61 | 13 | 0.143954 | 0 | 0.042509 |
| 62 | 0 | 0 | 0 | 0 |
| 63 | 9 | 0.208333 | 0 | 0.244861 |
| 64 | 0 | 0 | 0 | 0 |
| 65 | 9 | 0.242718 | 605.166667 | 0.587183 |
| 66 | 11 | 0.194805 | 0 | 0.195338 |
| 67 | 14 | 0.128645 | 0 | 0.034172 |
| 68 | 14 | 0.128645 | 0 | 0.034172 |
| 69 | 13 | 0.147348 | 74 | 0.082034 |
| 70 | 7 | 0.234375 | 717.5 | 0.33902 |
| 71 | 10 | 0.218659 | 14.333333 | 0.349739 |
| 72 | 0 | 0 | 0 | 0 |
| 73 | 0 | 0 | 0 | 0 |
| 74 | 11 | 0.201072 | 414 | 0.260862 |
| 75 | 8 | 0.223214 | 1022.33333 | 0.284431 |
| 76 | 13 | 0.147348 | 74 | 0.082034 |
| 77 | 0 | 0 | 0 | 0 |
| 78 | 0 | 0 | 0 | 0 |
| 79 | 0 | 0 | 0 | 0 |
| 80 | 8 | 0.262238 | 1180.66667 | 0.850595 |
| 81 | 10 | 0.243506 | 685 | 0.573753 |
| 85 | 12 | 0.171625 | 358 | 0.175846 |
| 111 | 9 | 0.256849 | 613 | 0.649524 |
| 106 | 9 | 0.206044 | 364.666667 | 0.234039 |
| 89 | 9 | 0.209497 | 74 | 0.271502 |
| 120 | 11 | 0.196335 | 0 | 0.164588 |
| 133 | 11 | 0.219298 | 563.333333 | 0.498462 |
| 93 | 13 | 0.146771 | 0 | 0.065524 |
| 87 | 10 | 0.184729 | 69 | 0.370716 |

| Id | Eccentricity | closnesscent | betweenessc | eigencentrality |
|---|---|---|---|---|
| 110 | 11 | 0.158898 | 75 | 0.323384 |
| 142 | 9 | 0.223214 | 769 | 1 |
| 101 | 10 | 0.173611 | 0 | 0.080435 |
| 126 | 9 | 0.202703 | 363.166667 | 0.387747 |
| 129 | 10 | 0.171233 | 0 | 0.075632 |
| 108 | 12 | 0.137363 | 0 | 0.09381 |
| 109 | 10 | 0.168919 | 0 | 0.112887 |
| 122 | 10 | 0.186567 | 147.5 | 0.680277 |
| 130 | 10 | 0.224551 | 419.333333 | 0.508655 |
| 114 | 12 | 0.15625 | 0 | 0.049866 |
| 127 | 11 | 0.184729 | 74 | 0.161213 |
| 118 | 12 | 0.182482 | 74 | 0.262696 |
| 123 | 12 | 0.182927 | 146 | 0.268944 |
| 134 | 13 | 0.154639 | 0 | 0.083085 |
| 119 | 11 | 0.157563 | 0 | 0.18891 |
| 154 | 10 | 0.184729 | 0 | 0.465816 |
| 169 | 10 | 0.184729 | 0 | 0.465816 |
| 138 | 13 | 0.155602 | 74 | 0.102495 |
| 135 | 10 | 0.213068 | 272.333333 | 0.425231 |
| 136 | 12 | 0.180288 | 0 | 0.148325 |
| 139 | 14 | 0.134892 | 0 | 0.037534 |
| 140 | 10 | 0.182927 | 0 | 0.276906 |

thought. Thus, the eigenvector value reveals the court and vestibule were designed to hold higher status than originally anticipated. Agents walking through these areas, then, should feel a sense of status associated with these central rooms, especially since they lead directly to the megaron. In fact, some of the participants noted in their free-roam survey how the entrance seemed to guide them into the megaron, but equally remark on the constriction and isolation from it they felt in the task-based simulation.

While each of these measurements reveals a way agents interact with different aspects of the architecture for navigation, combining them provides a deeper understanding of the quantitative relationships. For instance, combining eccentricity, eigenvector, and closeness show the megaron to be relatively isolated and difficult to access, but quickly able to access any other part of the complex with relative ease. Though the eigenvector did not reveal an innate power in the placement of the megaron as thought, the isolation from closeness combined with an easy ability to go to the farthest part of the complex through eccentricity value reveals the paradoxical access relationship. Though isolated and hard to enter, once inside the megaron has relatively easy access to any other point in the palace. Additionally, the main court, in all measurements, appears to be one of the more significant rooms for the complex. Though understandable due to its immediacy and evident in the experiential study, this was a surprising revelation for this research.

However, not all of the revelations from the measurements were unanticipated. Primarily, the values continue depicting a lower status, locally-interconnected left hemisphere. This corresponds to the predominately storage and workrooms on this side indicating servile, non-administrative access and roles. Similarly, the right side shows an easier ability to access the entire complex than the left when undirected, but a more separated state in the directed measurements. This indicates a higher status, through differential complex access, on the right. If an agent was able to access the right side of the palace, they could travel easily in that hemisphere and relatively easily to the other side. Those on the left had more difficulty accessing the right, revealing a status-power differential between the hemispheres as anticipated. This complements the status presumed with non-storage related rooms, like the bath and office, indicative higher status within the archaeological record and the experiential study. Of note, however, one participant did feel the bath to be the lowest status room during free-roam, but this appears to be an anomaly. The statistical and experiential data, then, concur showing both qualitative and quantitative evidence that the left-side of the palace, and the outer room as a whole, are of lower status than the right which, in turn is lower than the central rooms and megaron. Further, they cross-verify the architectural influences on both the navigation and perception of status throughout the complex.

## Chapter 5: Discussion

The Palace of Nestor utilized its architecture to construct navigation in a way that reaffirms specific statuses through the complex. Combining the experiential and spatial analytic methods revealed the outer, left side to posses the lowest status but with an easy ability to travel from room to room. Conversely, the right side had slightly higher status and an ability to travel easily into the left and central rooms but was difficult to travel room to room. Despite having little access restrictions to the central court and highly restricted access of the megaron, these rooms and the vestibule possess the highest status in the complex. These rooms, though, all provided relatively easy access to any part of the complex to anyone inside, boosting inhabitant status. In the task-based simulations, these constructions of space appeared as participants felt their movement within the palace was confined to the lower status areas. Because of their low status, simulated through menial labor, the palace seemed to inhibit access to higher status locations while the agents performed their duty. This observation becomes quantified as the spatial analytics show the outer, lower status rooms to be more interconnected and lacking access to the central, high status part of the complex. By showing the higher status, right outer side to be more difficult to navigate than the left but still moderately easily accessed, aligning with participant observations, the two techniques further corroborate one another.

Comparably, participants felt funneled into the higher status rooms when able to freely roam the palace like a high status official. This effect also appears in the undirected closeness value where each room on the central axis possesses relatively high values indicating easier access with their connections. Thus, the Mycenaean palatial architecture at Pylos was designed so individual status influenced how agents travelled the complex entering and avoiding rooms based on status and task. Further, the effects of status on navigation recursively enforced their status back on the agents as they travelled the palace. As seen in the experiential survey, most participants were aware of how their task affected movement and how the architecture restricted access to certain areas during their task.

While this type of movement and status had already been hypothesized from the archaeological remains of the site, it had never been tested (Blegen and Rawson 1966); nor was there a means to adequately assess it. Some spatial analytics had been performed to understand the connectivity and potential movement or status throughout the palace, but the results only appeared as idealized, rational interpretations without knowing whether humans would follow the same logic or connecting the way navigation could affect the perceived status of an area.

Until recently, any experiential study performed on the palace would take place in a ruinous environment diminishing the palace's ability to construct status through navigational patterns.

This study, however, tests and strengthens the previously understood theory of movement, status, and architecture by combining phenomenological surveys, quantitative techniques, and digital environments. The digital reconstruction, through recreating both the art and architecture, gave participants experiences akin to navigating a completed, non-ruinous Palace of Nestor. Of note, art's exact influence on movement was not explored though it would be a good future direction for the research. These experiences were then catalogued in survey format to compare with the idealized status and navigational insights from the spatial analytics measurements. Because the reconstruction rebuilt the Palace of Nestor before the Mycenaean decline, the participants gained experiences unlikely to occur through traditional phenomenological techniques. By simulating the palace during use, it also provides a better understanding how the complex shaped both movement and status through utilizing a full, non-destroyed environment. Further, these experiences largely aligned with the statistical analyses yielding a more quantifiable value to the phenomenological interpretations. Even though the experiential analysis shows how humans interact with and perceive the environment, the interpretations remained entirely subjective. Since the experiences matched so closely to the spatial analytical results, though, the latter provided a quantified, similar explanation.

Similarly, instead of having statistical measurements of perceptions which people may not notice, the results from the experiential surveys provide verification and explanation of the measurements. The spatial analytics present how architecture could construct space and status, but cannot determine if human logic would perceive the environment in a similar manner. The phenomenological analysis, then, demonstrates what aspects humans perceive and their effects.

Thus, the phenomenological results qualify the spatial analytics as much as the analytics quantify the experiential analysis.

Had the project employed only one or two of the techniques used, the results would not elaborate as fully the construction of navigation and status in the Palace of Nestor. For instance, if only the phenomenological survey and spatial analytics were used, the dubious results from the ruined architecture would weaken claims made in the results and skew comparisons to the analytical measurements. Should the project negate the statistical measurements but retain the digital reconstruction and phenomenological tests, the experiences and results, though largely the same, would not be quantified and remain fully subjective, also weakening the conclusion. Because this project combined digital reconstructive techniques, phenomenological surveys, and spatial analytics, though, there are fewer deficiencies in the data accumulation and, thus, conclusions.

This is not to say there could be no improvements in the project, however. While combining the techniques provided an accurate method to study and answer the question of the spatial construction of status and navigation in the Bronze Age Palace of Nestor, improvement could be made for future research and applications. For example, due to time and record constraints only the main, later section of the palace was fully reconstructed and simulated. If the project were repeated, completing the earlier south western complex could improve the results in one of two ways. It could either give insights into how the entire complex, not just the main section, constructed status and navigation, or it could alter how the entirety of the complex was navigated. Fortunately, the latter is unlikely. Additionally, having all participants start with the task-based simulation could potentially alter some interpretations and improve the data. In this experiment, the participants alternated experiences to gain insights about varying levels of familiarity with the architecture during the simulations. However, these preconceived interpretations about status in specific areas from the free-roam simulation could have introduced a potential skew in the task-based dataset. Another change to improve the reconstruction, as noted in the methods section, the pottery in the digital reconstruction is neither from the palace nor the right time period. Because this project focused on architecture and space, it did not interfere with the results. However, should the project be used for a more public or art historical model, this error would need rectification. Even though these shortcoming did not affect the results of the project, they could by corrected in future research making the model more precise or provide a more accurate model for the public to understand how a Mycenaean Palace may have looked during the Late Bronze Age. Additional future work on this, or similar, projects could includes performing a visual integration analysis to understand how the visual axes within the complex could affect movement and status perception; comparing the data from this site to other Mycenaean palatial complexes to understand how, or if, Mycenaeans construct space in similar ways, and expanding the sample size continuing a randomized distribution of free-roam and task-based starts. Each of these directions would add more information to understanding how space interacts with agents to construct both status and navigation within Mycenaean palaces. Further, they also maintain the ability to compare spatial constructions not only to other Mycenaean sites but to other cultures' constructions that have undergone phenomenological, analytical, or both assessments.

## Chapter 6: Conclusions

The experiential surveys and the statistical calculations reveal the influence of the architecture on constructing status by constricting movement within the Palace of Nestor.

Interestingly, the experiences and statistics both show a construction of space coinciding with prior archaeological theories about the palaces. In the experiential simulations, the majority of the participants in both versions consciously felt their movement constricted by the architecture. Both versions also yielded the same perceptions on which parts of the complex were high and low status. Regardless of the simulated character status and purpose, the participants felt the left, outer side to have lower status and the outer right to have higher. Participants regularly felt constricted in their access ability on the left side, but made no comments about palatial access from the right side. According to the statistical results, this could be due to the easier access to the rest of the complex within the right side and the isolation from the rest of the complex in the left. Further, in the task-based simulation, which feigned lower status through purpose-driven navigation, some participants consciously found themselves avoiding the highest status rooms, like the megaron. The awareness of avoiding high status areas reinforces how architecture and purpose affected perceptions of status and navigational ability in the palace.

Similarly, the spatial analytic approaches further explained each room's relationship within the complex and the potential effects on perceptions of status and navigation. The values identified the megaron, and a few other high status rooms, as relatively isolated with indirect access but possessing easy entry into any other portion of the complex. It also revealed how the right, higher status side had a higher capability to travel throughout the entire complex while having relatively difficult access and hard to move within. Conversely, the left, lower status side possessed a lesser capability to access the entire complex but was relatively well connected to itself. This facilitated travel within the left side and indicates individuals inhabiting it would seldom travel to the central or right rooms without a purpose. The majority of this behavior and perceptions were, in fact, observed and reported in the experiential analysis. While searching for tablets in the task-based simulation, participants avoided higher status rooms seeking out the storage areas. Alternately, they found themselves drawn to the right outer wing and central areas in the free-roam simulations due to the art and open paths there. Thus, both experiments agreed on the architectural influences of navigation of the Palace of Nestor in a way that iterated the status of the areas.

While this may not be a novel interpretation of the palace and localized status relationships, since it coincides with prior archaeological evidence and theory, the study provides additional confirmation from previously untapped data sources. Using the digital reconstruction provided a method to test the plausibility of the theories through human interaction and perception in a fully realized, virtual environment. Previously in archaeology, probable theories of navigation were based solely on archaeological remains or phenomenological experiences with the remains of the site (Blegen and Rawson, 1966; Tilley, 1994). Here, participants experienced the environmental influences of a fully constructed, albeit theorized, environment and reported their effects on navigation and status perceptions. The research also corroborated these subjective interpretations through employing spatial analytics. Though a few studies employed spatial analytics prior, none had used the exact centralities to understand the status and navigational effects of the architecture nor had they employed experiential analysis. Further, because the quantitative approach of the statistics matched the experiential, it strengthened the revelations of each method. Granted, the data coincided with the prior interpretations, but the research deepened the understanding of why the architecture and artifacts created the statuses and navigational patterns. Due to its isolation from the higher status areas and easy inter-room access, the left side storage generates feelings of lower status among those using it and makes the user circle but not enter the megaron enforcing their lower status role. Likewise, the more varied access, increased decoration, and lack of storage on the right side created a feeling of higher status and increased cross-palatial access when free-roaming. The isolation and visibility of the megaron from the complex, then, along with its location on the central axis and intensive decoration marked it as seldom inhabited but very high status. While these techniques did not alter our understanding of the construction of status and movement within the Palace of Nestor, they did provide a quantified form of experiential data explaining how the architecture constricted navigation constructing status in the process.

Appendix A: The survey used during the experiential data collection created using SurveyMonkey.com

1. Which game did you complete?

- Task-Based
- Free-Roam

2. How easy was the palace to navigate?

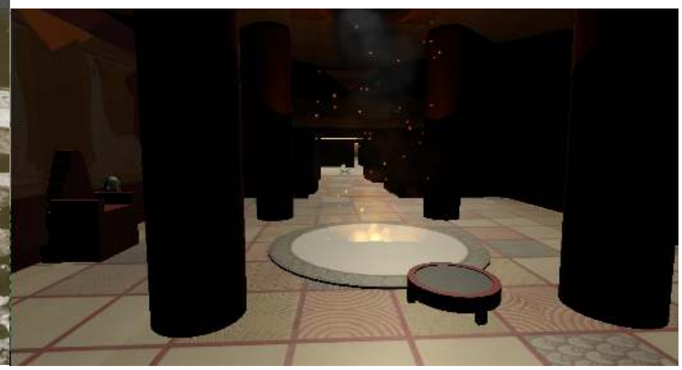
3. What do you think affected the way you navigated the palace?

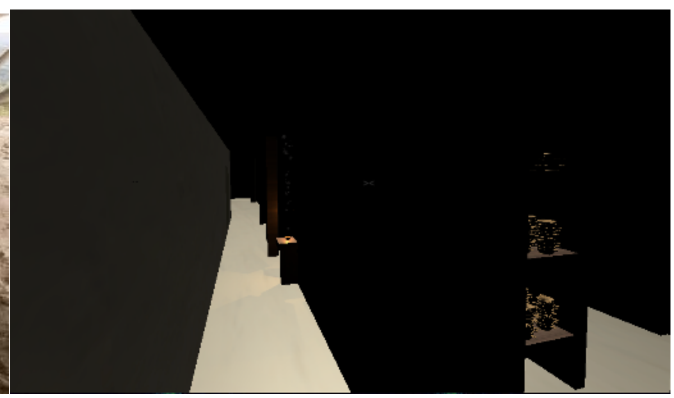
4. Which room(s) did you feel had the highest social/political status associated with it? Why?

5. Which room(s) did you feel had the lowest social/political status associated with it? Why?

6. Do you think the architecture affected the way you navigated the complex?

Appendix B: Images from the contemporary Palace of Nestor megaron looking southwest, top left, and left side hallway, bottom left, next to their digital counterparts to emphasize the differences and more accurate perception of spatial constriction provided by the digital model (Blegen and Rawson, 1966; Fulton, 2017).

Bibliography:

Baikie, James, 1866-1931. 1910. *The Sea Kings Of Crete*. London: A. & C. Black.

Bafna, Sonit. (2003). “Space syntax: A brief introduction to its logic and analytical techniques.” *Environment and Behavior*, 35, 17–29.

Bender, B., 1998. *Stonehenge: Making Space*. Oxford: Berg. In Fleming 2006.

Bengtson, Hermann, 1909, and Edmund F. Bloedow 1930. 1988. *History Of Greece: From The Beginnings To The Byzantine Era*. Vol. no. 3. Ottawa: University of Ottawa Press.

Blegen, Carl William and Marion Rawson. 1966. *The Palace Of Nestor At Pylos In Western Messenia*. Princeton, N.J.: Published for the University of Cincinnati by Princeton University Press.

Bonacich, Phillip.1987. "Power and Centrality: A Family of Measures." *American Journal of Sociology* 92(5): 1170-182.

Branigan, Keith. 1981 "Minoan Colonialism." *The Annual of the British School at Athens* 76: 23-33.

Brughmans, Tom. 2013. "Thinking Through Networks: A Review of Formal Network Methods in Archaeology." *Journal of Archaeological Method and Theory* 20(4): 623-62.

Cargill, Robert R. "An Argument for Archaeological Reconstruction in Virtual Reality." *Near Eastern Archaeology* 72, No. 1 (2009): 28-41.

Castleden, Rodney. 1990. *Minoans: Life in Bronze Age Crete*. New York;London;: Routledge.

Castleden, Rodney, and ProQuest (Firm). 1990. *The Knossos Labyrinth: A New View Of The "Palace Of Minos" At Knosos*. New York;London;: Routledge.

Dickinson, O. T. P. K. (Oliver Thomas Pilkington Kirwan). 1994. *The Aegean Bronze Age*. Cambridge;New York, NY;: Cambridge University Press.

Dellonte, Carolina. 2018. “The Palace of Nestor and Sandy Pilos: a myth that is history.” Verba Volant Monumenta Manent. Wordpress.com. https://verbavolantmonumentamanent.com/2018/01/18/il-palazzo-di-nestore-e-pilo-sabbiosa-un-mito-che-e-storia/

Driessen, Jan 2003.“The Court Compounds of Minoan Crete: Royal Palaces or Ceremonial Centers?" Athena Review. Université Catholique de Louvain. 3 (3): 57–61.

Estrada, Ernesto, and Knight, Philip A. 2015. *A First Course in Network Theory*. Oxford: OUP Oxford.

Eve, Stuart, 2012. “Augmenting Phenomenology: Using Augmented Reality to Aid Archaeological Phenomenology in the Landscape.” *Journal of Archaeological Method and Theory* 19(4): 582-600.

Graham, Walter. 1960. “Mycenaean Architecture.” *Archaeology.* 13:46-54.

Feur, Bryan. 1996. *Mycenaean Civilization*: *A Research Guide*. New York;London: Garlan Publishing

Feinman, Gary M., Kent G. Lightfoot, and Steadman Upham. 2000. "Political Hierarchies and Organizational Strategies in the Puebloan Southwest." *American Antiquity* 65(3): 449-70.

Fitton, J. Lesley. 2002. *Minoans*. London: British Museum Press.

Fleming, Andrew. 2006. “Post-Processual Landscape Archaeology: A Critique.” *Cambridge Archaeological Journal* 16(03):267 - 280

Fredrick, David. 2013. "Time.Deltatime: The Vicissitudes Of Presence In Visualizing Roman Houses With Game Engine Technology." *AI & Society: Knowledge, Culture And Communication* (Springer-Verlag).

Fulton, Ed. 2017. “The ‘Palace of Nestor’ Looking SE toward the Archives.” Hiveminer. Flickr Hivemind. https://www.flickr.com/photos/60030427@N07/34809480594. Image.

Gillings, Mark. 2012. "Landscape Phenomenology, GIS and the Role of Affordance." *Journal of Archaeological Method and Theory* 19(4): 601-11.

Graham, Walter. 1960. “Mycenaean Architecture.” *Archaeology.* 13:46-54.

Hruby, Julie. “Crafts, Specialists, And Markets in Mycenaean Greece. The Palace of Nestor, Craft Production, And Mechanisms for The Transfer of Goods.” *American Journal Of Archaeology* 117, No. 3 (2013): 423-427

Johnson, Matthew. 2012. “Phenomenal Approaches in Landscape Archaeology.” *The Annual Review of Anthropology* 41:269-284

Lis, Bartłomiej. 2016. “A Foreign Potter In The Pylian Kingdom? A Reanalysis Of The Ceramic Assemblage Of Room 60 In The Palace Of Nestor At Pylos.” *Hesperia* 85 (3): 491.

Knapp, Bernard and Stuart W. Manning. 2016. "Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean." *American Journal of Archaeology* 120, no. 1: 99-149.

Moody, Jennifer. 2009. "Environmental Change and Minoan Sacred Landscapes." *Hesperia*

*Supplements* 42: 241-49.

McEwan, Dorothy G. and Kirsty Millican. 2012. "In Search of the Middle Ground: Quantitative Spatial Techniques and Experiential Theory in Archaeology." *Journal of Archaeological Method and Theory* 19(4):491-494

Neer, Richard T. 2012. *Greek Art And Archaeology: A New History, c.2500 - c.150 BCE*. New York: Thames & Hudson

Palmer, Leonard Robert, 1965. *Mycenaeans and Minoans: Aegean Prehistory In The Light Of The Linear B Tablets*. London: Faber and Faber.

Parkinson, William and Michael Galaty. 2007. "Secondary States in Perspective: An Integrated Approach to State Formation in the Prehistoric Aegean." *American Anthropologist.* 109(1): 113-129

Preziosi, Donald. 1983. *Minoan Architectural Design: Formation and Signification*. Berlin: De Gruyter Mouton

Opitz, Rachel. 2017. "An Experiment in Using Visual Attention Metrics to Think About Experience And Design Choices in Past Places." *Journal of Archaeological Method and Theory* 24 (4): 1203-26.

Ram, Kalpana and Christopher Houston. 2015. "Phenomenology's Methodological Invitation." *Phenomenology in Anthropology: A Sense of Perspective.* Indiana University Press: 1-25

Rapoport, Amos. 1987. "On the Cultural Responsiveness of Architecture." *Journal of Architectural Education (1984-)* 41, no. 1: 10-15.

Robkin, A. L. H. 1979. "The Agricultural Year, the Commodity SA and the Linen Industry of Mycenaean Pylos." *American Journal of Archaeology* 83, no. 4:469-74

Scheop, Ilse. 2006. *"*Looking Beyond the First Palaces: Elites and Agency of Power in EM II-MMII Crete*." American Journal of Anthropology.* 110(1): 37-64

Shear, Ione Mylonas, 1936. 2004. *Kingship in The Mycenaean World And Its Reflections In The Oral Tradition*. Vol. 13. Philadelphia, PA: INSTAP Academic Press.

Smith, Michael E. 2011. "Empirical Urban Theory for Archaeologists." *Journal of Archaeological Methods and Theory* 18:167-192.

Taylour, William, Lord, 1904. 1983. *The Mycenaeans*. Rev. ed. Vol. 39. New York, N.Y: Thames and Hudson.

Tilley, Christopher Y. 1994. *A Phenomenology of Landscape: Places, Paths, and Monuments*. Oxford, UK;Providence, R.I;: Berg.

Tilley, Christopher. 2010. *Interpreting Landscapes*. Walnut Creek: Taylor and Francis.

Vermeule, Emily. 1963. "The Fall of Knossos and the Palace Style." *American Journal of Archaeology* 67(2): 195-99.

Weiguni, Marina. 2011. “Method” *Streets, Spaces and Places: Three Pompeiian Movement Axes Analysed* Uppsala Institute for Archaeology and Ancient History: 15-58

Wu Xuguan, Zhang Minqing, and Han Yiliang. July 2012. “Research on Centrality of Node Importance in Scale-free Complex Networks” *Control Conference (CCC).* IEEE:Hefei, China. http://0-ieeexplore.ieee.org.library.uark.edu/document/6390084/