UNIVERSITY OF CINCINNATI

Date: August 17, 2006

I, Banu BEDEL

hereby submit this work as part of the requirements for the degree of:

Master of Science

in:

Architecture

It is entitled:

Revealing Gordian: A Case of Virtual Heritage Interpretation

This work and its defense approved by:

Chair: John E. Hancock

Udo Greinacher

Elizabeth Riorden
Revealing Gordion: A Case of Virtual Heritage Interpretation

A dissertation submitted to the Graduate School
of the University of Cincinnati
In partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE
In the Department of Architecture
of the College of Design, Art, Architecture, and Planning

By

BANU BEDEL
B. Arch, Middle East Technical University, Turkey, June 1999
M. CP, Middle East Technical University, Turkey, December 2002

Committee Chair: John E. Hancock
Despite its significance in history and popular imagination, the city of Gordion today offers very little to be seen. The level of preservation and restricted access to the site obscure the city. Digital reconstruction of the site can compensate for these shortcomings and help non-experts see the architecture of the site as studied and imagined by the experts.

This study deals with how the possibilities of digital modeling can be exploited in order to present a richer and more accurate picture of Gordion. Besides detailed and realistic images of a site, digital visualization can display how these images were generated from factual evidence and its interpretation. Cinema offers the model for this work in telling complex yet comprehensible stories by audio-visual means.
to my family
ACKNOWLEDGEMENTS

I would like to thank my committee members: John Hancock whose experience with academic writing has helped make the task of writing this thesis not only manageable, but also enjoyable for me; Liz Riorden, because the match between our fields of interest and her combination of academic pursuit and entrepreneurship set her as an inspiring model for me; and Udo Greinacher, for he has contributed his expertise in visual media with his high level of intellectual and emotional engagement.

I am also grateful to my colleagues at CERHAS, led by Jose Kozan and Ferenc Traser for the assurance that I could always receive help, technical or otherwise. I would also like to thank my classmates and colleagues in the MS program who made this educational experience richer and worthwhile. Senior MS student and graduate coordinator Ellen Guerrettaz has made coping with bureaucratic affairs a relief with her unyielding cheerfulness.

I also owe gratitude to Gordion staff, especially our director G. Kenneth Sams for generously sharing his firsthand knowledge of the site work in Gordion. I am indebted to my colleague, Richard Liebhart who has always been a precious partner, mentor, and finally an editor.

Last, but not least I would like to thank my friend Serhan Öztemiz for his last minute help.
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................................................................................ iv

Preface: THE MEMORY OF GORDION ........................................................................... 1

Introduction: REVEALING GORDION ........................................................................... 2

Chapter 1: GORDION: A SITE OF POTENTIAL AND PROBLEMS ............................. 8

A. Excavations at Gordion ........................................................................................... 8
B. Main Elements of Gordion .................................................................................. 11

Chapter 2: DIGITAL RECONSTRUCTIONS: A NEW MEDIUM AND A NEW PARADIGM ........................................................................................................... 32

Chapter 3: THE LANGUAGE OF MOVING IMAGES ....................................................... 46

A. Objective and Subjective Reality through Cinematography ................................ 50
B. Non-linear Narrative of Multi-Media .................................................................... 79

Chapter 4: SOURCES AND METHODS OF RECONSTRUCTION IN GORDION ..... 85

A. Archaeological Documentation ............................................................................ 91
B. Analogical Evidence ......................................................................................... 94
C. The Reconstruction Process .............................................................................. 97

Conclusion: RESTORING GORDION IN PUBLIC MEMORY AND EXPERIENCE 105

BIBLIOGRAPHY ........................................................................................................... 108
Preface

MEMORY, LANGUAGE AND THE CITY OF GORDION

I have been involved with Gordion since my graduation from the school of architecture in the summer of 1999. Before then, my knowledge of Gordion was limited to what I had learned in high school: it was the capital city of Phrygians, who were well known for their textiles. Although I had been living quite close to Gordion for thirteen years, I was not even sure about its exact location until I started working there. My image of Phrygians was a history book picture of a pottery fragment showing people with long-haired goats.

Even if I had been to Gordion as a tourist, I doubt that my knowledge of the city would have improved much further. It was only after I had worked there for a season that I started to see buildings among the rubble on the site. It was then that I started worrying about the tourists who did not have months to spend at Gordion, seeing the site, reading publications, and talking with experts.

I focused on the presentation aspect of site conservation at Gordion, and searched for visual means of communicating about the site. I began with sketches and line drawings, and I started feeling that I was closer to my goal when I began using computer models. The following is an account of the process and outcomes of this attempt.
Introduction

REVEALING GORDION

History survives in the concrete events and in the language, memories and aspirations of people. Better understanding of the past as a guide to today and the future requires reinterpretation at every new moment. The passage of time challenges this endeavor by deteriorating the physical remains of the past and changing human frames of thought. Archaeology seeks to bring past events to current reflection by studying the physical remains of the past, and reconstructing the processes. However, this knowledge remains inaccessible to the public at large, since it appears mainly in scholarly media, with the exclusive language and representational imagery to be earned by professional education.

The ancient city of Gordion is a good example of this situation. Although the memories of Midas and the Gordian knot survive in the language, there is little knowledge of the city that used to be the seat of Midas and the Iron Age capital of Phrygia. Although the site offers an enormous amount of historic evidence in its settlement mound and several tumuli, even the visitors to Gordion can see only the vague remains of this once-glorious civilization from a distance. The level of preservation at the site, and conservation concerns preclude any further access. The lack of a strong visual image of Gordian architecture, and the dislocation of the site’s artifacts from their architectural contexts to various museums, adds to the confusion of visitors. They are unable to gain a coherent, vivid, or memorable idea about the architecture of the site.
The emerging discipline of “virtual heritage” offers solutions to such problems by applying digital technology in exploring, presenting and preserving heritage sites. Digital visualization technology, enabling a more thorough and better-integrated study of ancient architecture, has the capacity to present continuously-updated interpretations of ancient sites in ways that public audiences can find meaningful.

Among practitioners of this work, “Learningsites” led by Donald Sanders has had a leading role in reconstructing and publicizing ancient architecture digitally, working on data from several sites since the early 90s. Other major labs are based in Rome, London, and UCLA. UC/DAAP’s “CERHAS” laboratory has also emerged as a major voice, particularly concerning issues of interpretive theory and public education using these media. Websites such as the Virtual Heritage Network establish an online community of research in this field, and the onward rush of technology means there is no lack of novel formats and techniques.

One of the major criticisms toward digital archaeological reconstruction is that the apparent precision of digital images could be overly persuasive to their audiences. A viewer may lack familiarity with an archaeological site and thus be led to think that the image before his/her eyes is the true representation of this historic environment. And, since the available knowledge on most sites and civilizations is limited, there arises a need for employing historical imagination. Reconstruction work is by its nature conjectural, and computer media force their users to a level of detailed decision making that the old water-color renderings never required.

Reconstruction is a design endeavor that not only presents but also explores knowledge. Rather than attempting to make display artifacts of reproduced ancient
buildings, it tries to regenerate and re-imagine ancient architecture as the setting, the context or horizon of a multifaceted life which once belonged to the people of a civilization, and that modern audiences can relate to some extent with their own, recognizing it as a vivid “world”: a context of human existence.

The presentation of digital reconstructions is therefore met with the challenge of offering the viewer some understanding of the complexity of the material at hand in a comprehensible and engaging manner. Cinema comes to the fore as the field of art that can create meanings through the treatment of audio-visual material that are legible to the vast majority of people and appeal to them emotionally. Cinematic conventions can be used to synthesize and deliver such information as: the difference between conjecture and evidence, processes of construction and destruction, substitution of an environment with another through time, and possible alternative treatments that are essential to reconstruction. The virtual world generated by digital modeling can be the setting for the virtual cinematography with lighting, camera angles and movements, motion, textures and colors, realistic or abstract details, in addition to editing, transitions, narration and music.

This thesis explores the relationship of the designed environment of Gordion to the evidence used to recreate it virtually. The dimensions and components of reconstructed structures have been derived from excavation drawings and photographs. The façades, on the other hand, have been designed by reference to façade monuments in the nearby Phrygian cult center of Midas City, modeled after the patterns of a monument of comparable size. A number of similar patterns have been explored for each façade. Parameters for this effort are based on the already-existing digital models of two phases
of Phrygian settlement and Tumulus MM, which I have been preparing from 2002-2005 as the Gordion site architect, in my on-going collaborations with the excavation and study team based at the University of Pennsylvania Museum.

The purpose of this research effort is to make manifest the design process of the digital Gordion model based on archaeological findings. The effect of overlays and transitions between rendered and actual images will be explored in terms of communicating the processes of interpolation and exploration that are necessary to the reconstruction process. The actual images consist of archaeological documentation: excavation photos and drawings, and façade monument photos and drawings. The rendered images comprise mesh views, solid models and realistic renderings displaying the analysis of evidence, basic decisions and the outcome respectively. As such, the viewer is presented with the actual evidence that has been the foundation of the reconstruction, and with its interpretation.

Besides exploring the transition from fragmentary facts to a richer, more meaningful description, a multiplicity of options is explored in each step. In order to communicate the interpretive processes to the expected audience, that is general public interested in archaeology, a variety of rendered images such as mesh views, solid models, photorealistic illustrations, and their interactions with archeological documentation such as photographs or survey drawings are discussed. It is aimed that the reconstructed image will challenge its own authority as the true representation of the historic environment as it was. It is displayed instead as it might have been in the light of available information.
Finally, to portray a more vivid image of the Gordian designed “world”, and also to experiment with principles of object-placement, models of artifacts uncovered by the excavations will be situated within the virtual spaces. Especially the elaborate wooden furniture and bronze objects from the tomb chamber of the royal Tumulus MM can help a better appreciation of this space once they are virtually reconstructed in their original context. It is also a worthwhile to experiment with placing these and other in situ objects in the digital models of the megarons in the palace area of the Citadel Mound. This will allow the portrayal of “honorific” spaces with signs of inhabitation, particularly for engaging public audiences.

The inquiry of this thesis dwells greatly on the current virtual reconstruction work in Gordion, and moves it forward through several of the key questions in the field today. The key questions of virtual heritage work tackled in this Master’s thesis are: accuracy and conjecture, inferring from fragments, visualizing temporal change, and public audience engagement. The techniques and methods of the extant models will be continued in the exploration of new experimental treatments. A description of the computer reconstruction work, and processes in both design and presentation phases, offers the background for further work, and for the discussion of these principles.

The research involves a study of archaeological records from Gordion, both published and unpublished; literature on Phrygian art and architecture; and published knowledge of building techniques in Anatolia during the Iron Age. The outcomes of this research will be included in the ongoing virtual model of Gordion which I have been preparing for four years. This thesis aims at eventually presenting these models and their sources in digital media for different venues such as museum exhibits, site tours, or a
Website for visitors of varying backgrounds. Longer-term outcomes may include the actual production of these public education media products about the site, and a dynamic interface for scholars that can relate the myriad archaeological data to key visual locations within the virtual models.
Chapter 1

GORDION: A SITE of POTENTIALS and PROBLEMS

The settlement remains which are generally recognized as the ancient Phrygian capital of Gordion are located on a flat mound near Yassihöyük, a village about 80 km. to the west of Ankara, the current capital city of Turkey. The Phrygians migrated from southeastern Europe in the early Iron Age, settling in central Anatolia in the wake of the collapse of the Hittite Empire. While having contact with the Greeks to the west and Near Eastern peoples to the east, Phrygian culture developed its own unique character. The best-known figures related with Gordion are the Phrygian kings Gordias and Midas, and, much later, the conqueror Alexander the Great, who famously cut the Gordion knot while spending in this city the first winter of his Asian campaign.

A. Excavations at Gordion

The historical reality of Gordion and its people is mingled with myths. The archaeological expeditions at this site have been motivated by these legends on the one hand, while on the other they have been trying to reach the truth behind them. After a half-century of delay following the first explorations in the beginning of the last century, Gordion excavations have continued for about sixty years. Excavations on the site have revealed several layers of settlement from the Bronze Age through medieval times.

In 1900, two German scholars, Alfred and Gustav Koerte, conducted an archaeological survey around the ancient remains near the contemporary village of Yassihöyük on the Sakarya River (the ancient Sangarius River). They excavated a number of tumuli and dug a test trench on the south face of the low mound by the river.
Judging by ancient sources and their findings, they concluded that this site must be Gordion, the capital city of ancient Phrygia and the seat of King Midas. They published their book *Gordion; Ergebnisse der Ausgrabung im Jahre 1900*, comprising the results of their excavations, a map of the region and a collection of ancient sources related with Gordion. The objects revealed by their excavations have been distributed between museums in Berlin and in Istanbul.\(^1\)

In the winter of 1948, John F. Daniel, the curator of the Mediterranean Section of the University of Pennsylvania Museum, and Rodney Young, a professor of Classics at the University of Pennsylvania, were in Turkey in order to find a suitable site for excavation. The site of Gordion was among those they visited. One of the motives for the selection of Gordion was that there were few studies and little knowledge on Phrygia, while the other was the impressive potential of the site as revealed by a test excavation. Despite the sudden death of Daniel, Gordion excavations were started under Young’s direction in 1950 and continued ever since. From 1950 to 1973, Young dedicated odd years to field work while even years were reserved for the study of findings. There were some additional excavations in some of the even years.\(^2\)

It may be said with sufficient justification that the most important archaeological discoveries at Gordion were made while Young was director. The major findings of this period include the structures of the Old and the New Citadels on the settlement mound and three great early tumuli (to borrow the title from one of Young’s publications).


\(^2\) Ibid., p.xxxv
Another major contribution of the Young years was the establishment of the Gordion Museum in Yassıhöyük in 1963 in order to display some of the finds from the excavation.

The impressive, albeit ambitious, scale of work was the product of conditions that are difficult to replicate now: a major personal financial contribution, in addition to his professional commitment, enabled Young to be the foremost actor in excavations during his tenure. He also had fruitful collaborations with Turkish and American institutions that were promoted, among other things, by the multitude and wealth of his findings. Today, excavations normally proceed not only under more stringent budgets involving a greater number of decision makers, but also with a greater concern for preservation of excavated materials. This combination keeps the work from proceeding as fast and at such a vast scale as at Gordion during the 1950’s and 1960’s. This fruitful period ended with the unexpected death of Professor Young in a car accident in 1974.

In the aftermath of Rodney Young’s death, the directorate of the excavation was undertaken by Keith DeVries, also from the University of Pennsylvania Museum. Field work stopped during this period, and the efforts were concentrated upon tying up the loose ends from the preceding era. The findings of the 1950-1973 period that were still awaiting interpretation were evaluated, while some conclusions were re-assessed in the light of more recent knowledge and in retrospect.³

In 1988, G. Kenneth Sams became Director of the Gordion Archaeological Mission, and he currently holds this position. In this same year, field work was resumed under Mary M. Voigt of William and Mary University, although the new campaigns were

---

of more limited and focused scale than those of the Young years. As a comprehensive evaluation of all periods of work on the settlement mound, a new stratigraphic sequence has been developed. More recent work at Gordion includes excavations on the previously uninvestigated parts of the mound to the north of the 1950’s trench.

One of the major changes in this period has been the emphasis on conservation, following the trend of most archaeologists today acknowledging that the preservation of archaeological findings is an integral part of the archaeological process. Recent work at Gordion includes conservation and restoration work on the settlement mound, and a new support system for the wooden tomb chamber of Tumulus MM. In addition, the Gordion Museum was renovated in 1999 along contemporary museum design understanding.

This study has developed as part of the site presentation component of the recent architectural conservation project in Gordion. Digital graphics have proven to be a promising medium for the visual presentation of the site. Aiding this endeavor, the current and former Directors Kenneth Sams and Keith DeVries, as well as Richard Liebhart working on the tomb project, have provided support and sources of information.

**B. Main Elements of Gordion**

The first feature of Gordion as an archaeological site is the settlement mound that was formed by the accumulation of habitation remains from the Bronze Age to medieval times. In addition to this mound, the area contains nearly 100 artificial hills created as burial monuments, or tumuli, which are a component of the topographical configuration of the site’s surrounding landscape. Tumulus MM is the largest of these, and it has been associated with King Midas (MM = Midas Mound). It is also the richest in finds, one of which is a standing tomb structure that can be visited today. The Gordion Museum
stands across the road from Tumulus MM and presents some of the findings from the site to visitors while sheltering others in its depots.

Figure 1: Aerial view of the settlement mound at the lower left beside the river, the modern village and Tumulus MM above and to the right.

From what is known about Gordion, the two most significant levels of settlement are the two consecutive Phrygian layers. They belong to the period when Gordion was the seat of the Phrygian kings who ruled central and western Anatolia in the Iron Age. The aura of myths surrounding the actual history, as well as the desire to explore this history, has attracted archaeologists to this particular site. The Phrygian levels have been called various names as the excavations, and the knowledge they have generated have proceeded. Today, they are generally referred to as the Early Phrygian and Middle Phrygian levels, with Old Citadel and New Citadel used to designate the architectural remains of these periods on the Citadel Mound itself.

Although its remains indicate a more monumental scale of building, the New Citadel is less visible today. Lying closer to the modern surface of the mound, this later
phase of the citadel had suffered more damage before the excavations either by natural or human agents. During the excavations, most of the remains of this period were taken away because of the desire to reach the presumed “City of Midas” lying underneath. Most of what can be seen of the New Citadel today is the visual documents of excavations.

The better known level of Phrygian settlement on the site is the Old Citadel, and most of the buildings on the site today belong to this phase. The fire that destroyed the Old Citadel around 800 BC also preserved it better than any other period on the site. The inhabitants had no time to remove the everyday objects that had been used in the various buildings, and these were left in the burned debris. The city was then covered over by a thick layer of clay during the building of the New Citadel, and this further contributed to the preservation of the city as it was immediately after the fire. The plans of the two Phrygian layers are strikingly similar, which suggests a short span of time and substantial cultural continuity between the two periods. Within the excavated area, it appears that each structure in the Old Citadel generally has a counterpart in the New Citadel. Most recent studies date the Old Citadel to roughly between 900 and 800 BC, and the New Citadel to between 800 and 700 BC.  

---


5 Ibid., p. 10-21
Figures 2 and 3: Plans of the Old and the New Citadels

The architecture on the Citadel Mound mentioned in this study is from this earlier period, except when noted otherwise. The settlement mound is accompanied by two lesser mounds, one to the south and one to the north. Both were part of the larger city fortification system before the river changed course and washed away most of the remains of the walls. The city plans presented here are limited to the Citadel Mound itself.6

Rising over 10 meters, the Gate Building complex is the most impressive remaining architectural feature on the Citadel Mound. The Gate consists of two large bastions flanking a cobbled ramp leading up to the actual gated building. This gated structure was called the Polychrome House by the early excavators because of the alternating colors of the stones in its walls.

---

The walls of the Gate building are of ashlar facing with a rubble core. The ashlar blocks are of light grey limestone, chinked with smaller pieces of stone in the joints and bonded by a mud-mortar. The walls taper as they go up, which must have served defense purposes. The mud plaster covering the walls apparently protected the structure from weathering. It is also possible that this plaster was whitewashed for greater endurance.\(^7\)

The consolidation of facing stones outside the south chamber during conservation work in 2003 has led to the unexpected discovery that the two faces of the wall were tied together by juniper logs. Although it is reasonable to expect reinforcement timbers in walls of this size, these logs are comparable to the well-known and well-preserved juniper logs at Tumulus MM (discussed later) in their having been remarkably resistant to weathering.

The structures on the Citadel Mound at Gordion are almost exclusively of the megaron type: simple, prismatic masonry structures. Figures 2 and 3 show these megarons consisting of a main chamber opening up to an antechamber with a central

---

\(^7\) Goodman, Mark., “Interpretive Stabilization at Gordion, an Iron-Age Anatolian City”, manuscript for CMAS publication, 2001, p.6
doorway. The main chamber has a circular hearth located on the central axis of the building, as does the antechamber in some cases.

The megarons in Gordion were given numbers according to the order that they were excavated, reaching up to 12. Of these, Megarons 1 to 4 have offered the most information as they seem to have been still in use at the time of the fire. The others were either taken down to their foundations prior to the destruction (Megarons 9 to 12) or were already under the terrace (Megarons 5 to 8). All these megarons are in the palace court of the citadel, a paved area surrounded by outer and inner city walls. All of these buildings suffered fire damage.

The reconstructed megarons in this study are Megarons 1 through 4 of the Old Citadel, whose settlement began in the 10th century BC and ended with the fire around 800 BC. Following the order of their excavation (which probably coincides with the order of their construction), Megaron 1 is a mudbrick structure with intricate timbering. The timbers and mudbrick are interlaced together, far beyond mere practicality, to the point that structural reinforcement and decoration are one. The remaining wall sections of Megaron 1 seem to have a pattern of square mudbrick surfaces alternating with the grid of vertical and horizontal timber supports. Megaron 1 had a plain white pebbled floor with one hearth in the main room and one in the antechamber.
Right next to Megaron 1 was Megaron 2, whose remaining walls were of stone. These walls hint at a similar treatment of reinforcement used as decoration, with a pattern of stone piers alternating with the gaps left by burnt wood. Megaron 2 has thick masonry walls which were covered on the outside with doodles, carved most likely by people who were sitting on the stone bench along its walls. The pebbled mosaic floor of this building is a very early and impressive example of its kind. Also set into the walls between the antechamber and the main chamber is a pair of cabinets. The exquisite Phrygian furniture from tumulus excavations suggests that they might have been similar works of cabinetry.
Next is Megaron 3, interpreted upon its excavation as the palace of the Phrygian kings. Supporting this assumption is the monumental size of the building, exceeding any of its contemporaries in the region. The outer dimensions of Megaron 3 are almost 30 x 18m, and the main chamber measures about 18.85 x 15.05m., with 1.5 m thick walls. There is a double row of massive squared wooden posts, which may have supported an upper storey as well as the roof timbers, in addition to heightening the monumental impact of the space.8

Figures 9 and 10: Excavation drawing and photograph of Megaron 3

The last megaron in the palace area of the Old Citadel is Megaron 4. The inconspicuous construction of this building with plain mudbrick walls, and the fact that it was separated from the rest of the palace area in elevation, suggest that this was a service space. It is on the same level as the terrace and the terrace buildings behind, and connected to the palace court with a cobbled ramp.9

9 Young, Rodney S. “The 1963 Campaign at Gordion”, AJA 68, 1964, 279-292
The Terrace Building consists of a series of chambers aligned side by side, separated by the side walls that they share. The Terrace Building is named after the 1.5 m. high terrace separating this area from the level of the palace court, and supported by retaining walls as well as the back walls of Megarons 2 and 3. The finds from this complex reveal a large scale of production and processing of such items as food and textiles. Remains of a similar structure, designated CC for Cut Clay Building, have been uncovered to the west across a street or courtyard from the Terrace Building. However, the building has never been completely excavated and its limits remain unknown.

Figures 11 and 12: Excavation plan and photo of one of the chambers in the Terrace Building complex

The chambers of the Terrace Building are also built on the megaron plan and have two rows of posts in their main chambers. These posts may have supported an upper storey for habitation, or storage shelves, or a different configuration for the roof. The preserved height of the walls is built of various types of limestone reinforced with timber. Traces of plaster remain on the inside, although it is not certain whether or not these colorful limestone blocks were exposed on the outside. One of the major changes from the Old Citadel to the New Citadel is the isolation of chambers above the terrace.
buildings (see figures 2 and 3). It is tempting to think of this change as a precaution against fire, after the catastrophe that brought an end to the previous settlement phase.

Tumulus MM covers the oldest standing wooden building in the world, and is also the second highest burial monument in Anatolia. Although it was initially thought that this structure was contemporaneous with the Old Citadel, a review of the findings from this tumulus revealed a greater similarity with the New Citadel objects. The height of the mound reaches about 53 m. after being subject to erosion for 27 centuries. Inside the mound is a tomb structure slightly off center and consisting of an inner chamber with walls, a floor and a gabled ceiling of squared pine timbers. The inner dimensions of the chamber measure approximately 5.1 x 6.2 m. This chamber is surrounded by a casing of round juniper logs, approximately 10 x 8 m. There is an infill of cobbles between the two layers of walls. Juniper logs rise like a second wall on four sides of the tomb chamber, and originally covered the roof at the top. A common phrase used to describe the outward appearance of the tomb is that it is like a log cabin underground.

Under the floor level, there is a foundation of limestone boulders. However, this foundation does not correspond to the footprint of the walls, and may indicate a change in plans. The gaps in and around this foundation are filled with rubble. On this rubble and under the tomb structure is a bedding of juniper logs. A few meters to each side of the juniper outer casing, there is a limestone wall rising above the tomb structure. When the tomb was excavated, the space between the limestone wall and the tomb was also found to be filled with gravel. Augmented with details like the gutter and clay packing on the tomb, this immense heap of gravel must have successfully drained water away from the tomb chamber, and helped its survival to this day. Another contribution to the tomb
structure comes from the clay mound that covers the layer of gravel like a dome, distributing both water and the weight of the mound away from the tomb.

![Figure 13 and 14: Axonometric drawing of the tomb and an image of the entrance to the tumulus](image)

The sheer size of the tumulus and the tomb structure makes one consider the scale of the whole project. The timbers used in the construction of the tomb range between 6 to 11.5 meters in length. Curiously, the lengths of the pine timbers in the tomb chamber correspond to the spans of megarons in the early citadel. Dendrochronological analyses of some of the tomb’s juniper logs have that they were over 900 years old when they were cut. Research suggests that they might have come from nearby mountain ridges which host the remnants of a forest of such trees, though the possibility remains that they might have been available closer to Gordion in antiquity.

The construction of the tomb seems to have progressed simultaneously with the piling of the tumulus that covers it. The interior and exterior walls of the tomb chamber, as well as the perimeter stone wall must have risen course by course while rubble was

---

being filled between the walls. It appears that the earth was being piled up in consecutive layers reaching from the ground to each new height of the walls, forming a working ramp as well as growing the heap of clay. This gradual rising of the tumulus can be observed in the layering of clay on both sides of the excavation trench that now form the walls of the path leading to the tunnel into the tomb.

The finds from the tomb chamber are as interesting as its architecture. These include a large number of bronze vessels and bronze accessories, along with pieces of very precisely and intricately worked wooden furniture. These pieces bear Phrygian landmark geometric decorations of varying types of wood set into their surfaces.

The Gordion Museum was established in 1963 as a dependent branch of the Anatolian Civilizations Museum in Ankara to display, conserve and study some of the finds from Gordion near the site of their recovery. An interesting feature from an excavation report from the early 1960’s is a proposal to build a megaron type museum in Gordion. This idea has not found its way to practice, and a more conventional structure was built. Today, the Gordion Museum consists of an administrative building and an exhibition hall set around a courtyard, with a row of facilities for storage and study of archaeological finds at the back, and an open-air exhibit featuring a Galatian tomb salvaged from its original site and a Roman mosaic floor. Following the vision of Ilhan Temizsoy, the former director of the Museum of Anatolian Civilizations in Ankara, the museum grounds have been landscaped with samples of juniper, pine, boxwood, maple, and yew representing the species of wood that were used in the tomb structure and furniture. This high maintenance green of the museum stands out in the Central Anatolian steppe.
Figures 15 and 16: One of the exhibition halls of the Gordion Museum and the restored interior of a Terrace Building chamber

Despite the shortcomings of its provincial setting and remoteness from its administration, it is a rich museum featuring Gordion finds in an informative and appealing way. This level of success has been attained after a joint renovation project completed in 1999 by the Gordion Excavations, the Turkish Ministry of Culture and the Gordion Foundation, with financial support from several institutions.

The exhibits in the Gordion Museum consist of a general outline of stratification on the settlement mound; objects grouped by type, like coins, iron, and glass; fragments of architecture; cases featuring different finds from each designated period on the settlement mound; a timber model of the tomb structure and some of the bronze objects discovered in the tomb; and a replica of a portion of a chamber from the Terrace Building, filled with material from the actual building.

The major finds from Gordion are displayed in the Museum of Anatolian Civilizations in Ankara. This museum presents a rich array of finds from various sites in Turkey from Paleolithic to Roman times. Along with Urartian finds, Phrygian material mostly from Gordion represent the Anatolian Iron Age. The central pieces of this exhibit
at the museum are the furniture and bronzes from Tumulus MM, which are accompanied by finds from the two other tumuli (W and P) and examples of Phrygian pottery.

![Figures 17 and 18: Serving stand from Tumulus MM and a half scale model of the tomb in the Anatolian Civilizations Museum at Ankara](image)

As the supporter of the Gordion Excavations, The University of Pennsylvania’s Museum of Archaeology and Anthropology in Philadelphia is another likely candidate for the display of Gordion finds, but Turkish antiquites laws preclude anything more than temporary loan exhibition of artifacts from the site. However, this museum does hold invaluable information on Gordion in its archives, housing all original materials documenting the excavations at the site. While copies of much of this material are currently kept for use at the excavation compound in Turkey, it is hoped that digitizing these resources might solve problems of access and preservation simultaneously, both in Philadelphia and Yassıhöyük.

There are also Gordian and Phrygian artifacts in museums in other cities, particularly Istanbul and Berlin. On the one hand, these findings are divorced from their original setting, exhibited like mere objects that are the same regardless of where they are. On the other hand, this dispersion helps people have at least a glimpse of the
Phrygian civilization even though their normal course of life does not necessarily take them to Gordion.

Although the site of Gordion is rich in remains, this richness is hardly visible to visitors. The traces of the past are obliterated by the natural and historic degradation that has taken place over the ages. Not only are these remains so fragile that visitors to the site need to view them from a distance, but most of them are also too subtle to be seen by the untrained eye. In the words of a tourist guide, “Gordion is a site that only archaeologists like”.

The site of Gordion is in a poor level of preservation in general due to a series of natural and historic processes. Neither the limestone nor the masonry that were used in the building of the city were of the highest quality. There was significant fire damage in the destruction of the Old Citadel, and there has been prolonged exposure to extreme weather conditions since the excavations. Although the effects of weathering are more severe in the excavated area, there is damage in unexcavated parts as well. Even without immediate exposure to the elements, the stones buried under the mound are subject to disintegration. This process of destruction is visible at the collapsing spots on the mound.\(^{11}\)

The fire of ca. 800 BC left nothing but some charred fragments and voids of the timber supports within the walls. When the site was excavated, what remained of the walls had splayed without its timber reinforcement. Although some tentative measures were taken to protect the walls from imminent collapse, they have been subject to the extreme weather conditions of Central Anatolia, marked by high seasonal and daily

\(^{11}\) Personal communication with geologist Ben Marsh.
fluctuations of heat and humidity. Without a roof or covering of some sort, precipitation has been soaking the walls, washing down what remains of the mortar, then filling into the gaps and occasionally freezing and causing frost damage. The stones, having been subjected to extensive heat of fire in antiquity, are now cracked and calcinated, making them vulnerable to water penetration. The chemical composition of the stones is prone to dissolution, resulting in material loss and physical damage during re-crystallization.¹²

With concerns of Gordion team members over the extent and speed of deterioration of the excavated monuments, Megarons 2, 3 and 1 were reburied in 1961, '62 and '89 respectively. With the recognition of conservation as an indispensable part of work at archaeological sites, a more comprehensive conservation program has been taken up at Gordion. From 1998 to 2004, Mark Goodman supervised architectural conservation at Gordion, with “interpretive stabilization” as a goal. After Goodman’s untimely death in 2004, conservation efforts on the Citadel Mound have continued under the supervision of Frank Matero of the University of Pennsylvania, but these most recent efforts are not included in this study.

Unlike “obtrusive measures” like reburying, Goodman’s program aimed at making the site more visible and comprehensible for visitors. The part of the work that concentrated on the Terrace Building complex involved restoration of the disintegrated walls to their excavated height. The procedure was consolidating walls by putting the wall blocks of adequate strength back into their places in the wall, replacing disintegrated ones, and buttressing the walls with a secondary wall of sandbags. There was a buffer zone of sand between the wall and the buttress, which is itself covered with a protective

¹² Goodman, Mark., “Interpretive Stabilization at Gordion, an Iron-Age Anatolian City”, manual for CMAS publication, 2001, p.6-9
coating and sand. The final touch was capping the walls with layers of sand, nylon and clay in such a way that moisture would be drained away and not retained.\textsuperscript{13}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{images}
\caption{Figures 19 and 20: The state of preservation at the Terrace Complex in 1989 and after consolidation in 2001}
\end{figure}

Of the site features, the Gate Building presents a special case. The gate was not damaged by the fire, and has been preserved to a considerable height of almost 10 meters. However, the problem of water penetration for the lack of any topping applies to this structure as well. By its sheer bulk, any risk of collapse is more severe, since minor damage would easily be aggravated and turn into a major problem, and would be impossibly difficult, if not altogether impossible, to stop or repair. Especially threatening is the bulge on the north face of the northern wall of the south chamber, which has been monitored for a while indicating an urgent need for consolidation.

The consolidation in question was started in 2001. The walls of the gate have been supported with steel scaffolding which also served as the workstation for conservation efforts. Starting from the ground up, one-meter sections of the wall were cleared of any objects that may be blocking the connections between voids, stones were covered with mud for protection, their joints were stuffed with fabric to prevent outbursts, and the voids were filled with grout. This grout is a cement-free, lime-based

\textsuperscript{13} Ibid. p.10-13
mortar that is physically and chemically compatible with the vulnerable walls. The grout was injected by gravity in order to prevent potential damage from the vibration of a mechanical device.

Unlike the structures on the settlement mound, the tomb chamber in Tumulus MM has been preserved under a huge heap of clay for millennia and this stable environment has been relatively well maintained since the excavation. There was a sudden deterioration in the wood following the introduction of modern wood and moisture into the environment during excavations and the building of the concrete shell. After some successful and unsuccessful attempts at reversing this damage, the tomb has reached equilibrium and remains as such. The successful replacement of the old, precarious support system with sophisticated steel supports in 2002 offers better reason to be optimistic about the future of the tomb. Similarly, there have been some problems with the preservation of the mound of clay at the tumulus. Since antiquity, precipitation has caused erosion, which was most easily observable at the erosion channel on the south face of the tumulus. Since 1990, there have been attempts at slowing down this erosion

Figures 21 and 22: Photo of the Gate Structure with steel scaffolding and the installation of the new support system at the tomb with an old support post in the foreground

Unlike the structures on the settlement mound, the tomb chamber in Tumulus MM has been preserved under a huge heap of clay for millennia and this stable environment has been relatively well maintained since the excavation. There was a sudden deterioration in the wood following the introduction of modern wood and moisture into the environment during excavations and the building of the concrete shell. After some successful and unsuccessful attempts at reversing this damage, the tomb has reached equilibrium and remains as such. The successful replacement of the old, precarious support system with sophisticated steel supports in 2002 offers better reason to be optimistic about the future of the tomb. Similarly, there have been some problems with the preservation of the mound of clay at the tumulus. Since antiquity, precipitation has caused erosion, which was most easily observable at the erosion channel on the south face of the tumulus. Since 1990, there have been attempts at slowing down this erosion
by measures such as building mudbrick dams across the channel, and banning grazing on
the tumulus to foster the growth of perennial plants.

The excavated areas of the Citadel Mound in Gordion is inaccessible to visitors
for the sake of conservation, though they can walk all the entire perimeter of the main
area at the top of the excavation scarp. Despite the insistence of some visitors to walk
through the gate and within the city, the architectural remains on the site have
deteriorated beyond the point of favoring any foot traffic on the excavated areas. Given
the low preserved height of the walls that can easily be surmounted, and the high
likelihood of tourists interfering with conservation interventions, the risk is even greater.
In addition to the risks to the site by visitors, the site itself may also be dangerous to
visitors, because collapses of scarp edges are not totally unexpected.

Figure 23: Plan of the excavated area with the viewing stations marked
Visitors to Gordion are required to tour around the site on the path around the excavated areas. There are two viewing stations on this path: the first near the palace court, and the second near the Terrace Building complex. There are metal information plates at these stations which present information about the old citadel, albeit outdated information. The tour around the site could provide an elevated, general overview of the site from 8 m. above the level of the excavated city. However, reburying and deterioration have made the structures barely visible, and obstructed the relationships among level differences that were part of the physical structure of the city. Even the continuity of the walls is hindered by intermittent collapses. This situation has been somewhat improved by the buttressing around and capping on the walls of the Terrace complex, although there is still a long way to go in the clarification of the site.

Visitors to Gordion can also see the tomb, but not walk any farther than the end of the entrance tunnel. This tunnel was dug during the initial excavation and was not designed to offer the best views of the tomb. However, the inevitability of such a restriction is caused by the potential hazards of having people in such a delicate structure of organic, fire prone material, as well as the graffiti on the walls of the tomb chamber left from the times when there were no restrictions on access.

The past cultures which survive vividly in the public memory are represented by their architectural images. Emblematic buildings such as the Parthenon, Coliseum, Hagia Sophia or the Sphinx, or generic building types or elements as pyramids, columns, onion domes or pointed arches are easily associated with a period or civilization even by the lay person. These architectural entities correspond to the visual identity of these periods or
civilizations, and make it easier for contemporary people to relate with the physical remains of these cultures.

Phrygian architecture lacks such a strong image even though there is a dominant building type, the megaron, and the city of Gordion was laid out with a plan rather than being a mere agglomeration, and was therefore the result of deliberate architectural process. One reason for the absence of a widely-shared, iconic image is that the Phrygian culture was endemic to a part of Anatolia, unlike for instance, Roman culture that has built works in three continents. Moreover, as can be observed in mound formation that is a common feature of archaeology in this part of the world, several other civilizations such as the Hitites have occupied the same lands as the Phrygians, making Phrygian architecture far from being the only one up for recognition. In these circumstances, Gordion is possibly the best studied Phrygian site, especially in terms of earlier findings. Given how incomplete the findings from even this best studied site are mean that creating an architectural image for the Phrygians remains a challenge.
Chapter 2

Digital Reconstructions: A New Medium and a New Paradigm

At this point in time, the increased versatility and availability of computer graphics appears to offer a solution to the problems of an obscured site like Gordion. With computer models, it is possible to restore the site three dimensionally without physical interference with the actual remains. Moreover, these models can be changed infinitely to present varying interpretations. Using digital models in archaeology offers a spatial expression of archaeological documentation, a tool that helps to visualize various stages of a site and the outcomes of proposed interventions, and a medium for communicating the experts’ knowledge to the general public.

Digital models of historic buildings and sites address some of the basic concerns of historic preservation. A three dimensional model is a great tool for documenting various aspects of historic structures. Thanks to the mediation of various softwares, it is possible to relate available information with specific coordinates derived from the survey of structures. The digital model would offer the spatial basis where various data, such as temperature and humidity charts, can be referenced to specific locations. The documentation takes on a greater importance due to the rapid decay of most heritage sites under human impact and natural conditions. One of the basic objectives of any form of documentation is the monitoring of structures, and this can be done comprehensively using digital models. The digital model can be a dynamic tool that saves a detailed survey of a historic structure at a certain point in time, as well as tracking changes.

Besides serving as a tool for studying and better understanding structures, digital models help to visualize the original states of structures and help illustrate any possible
interventions. The virtual reconstruction of a building is an ideal alternative to such radical interventions as anastylosis that rebuilds a structure in actuality, as it has no physical impact, and is totally reversible. In case of interventions, better decisions can be made because the virtual trial-and-error cycles can save from going through the same cycles in actuality.

It should be no coincidence that the emerging digital technologies find more applications in archaeology as the discipline of archaeology reconsiders itself. There are attempts at bringing the discipline in line with a more comprehensive world view than the scientific view. This interpretive approach considers absolute truths far from available. In this approach, the generation of knowledge is not through a linear process that tests theorems for a given question and picks up the correct answer, but rather a helical process that considers and reconsiders probable answers in the light of ever new data, trying to make a coherent description of phenomena.

What is sought is a “thick description”, a term coined by the anthropologist Clifford Geertz in his 1973 article "Thick Description: Toward an Interpretative Theory of Culture." in The Interpretation of Cultures. Geertz was referring to a more complex and comprehensive rather than a causal explanation, pertaining to the world of a people that denies the simplicity imposed upon it by causality.¹⁴ In this process, the archaeologist does not offer answers that will be valid once and for all, but instead keeps his findings open to debate. Unlike a model of study where each profession works in isolation and is self-contented, the multiplicity of aspects of the world in question requires concerted contributions from various disciplines. The digital medium offers a

convenient setting for such a dynamic and multi-disciplinary debate of ideas. Textual or visual information is made easily accessible, and digital models particularly enhance dialogue among different professions free from exclusive professional vocabularies. Models can be changed infinitely with relative ease according to inputs from the experts involved. A further step can be taken to expand the sphere of dialogue to non-experts and to get them engaged as participants.\textsuperscript{15}

The digital medium also offers an opportunity to open up the findings of archaeologists to the general public. Presently, archaeological remains that are by themselves incomprehensible to non-experts attain meaning through the studies of experts. There is a growing body of knowledge accumulated by the works of archaeologists around the world, which keeps changing in the light of ever new information and study techniques.

Traditionally, this knowledge is published in professional periodicals and books, illustrated with technical drawings. The verbal language of these publications is inaccessible to non-professionals because of their specialized professional language and reliance on former knowledge in the field as they are addressing the professionals. This is also true of drawings that need to be abstracted due to the limits of two dimensional representations, along conventions that change from profession to profession, and are legible only to a few who are trained to understand them. The use of digital models for the presentation of historic structures offsets this drawback by the availability of more literal means for visual communication. Digital images from models have the advantage

that they can communicate information about the spatial configuration of a historic environment to anyone who is familiar with visual media, regardless of professional background. A reconstruction can also bring together the objects that are dispersed to several different museums and re-contextualize them so that they will support the understanding of an architectural setting. The chance for a better understanding of historic sites through such unobtrusive means can also decrease the demand for unrestricted physical proximity to archaeological entities, thereby reducing the impact of human traffic.

Not only visual, but also textual information on archaeology can be made more accessible when it is made available digitally as on a website or an information CD. As opposed to an exclusive professional understanding that may aim at archaeology for the sake of archaeology, sharing the knowledge generated by the discipline is a requirement. The first reason for this is that the social role of archaeology is to improve the understanding of the past by the study of material remains, which they do through public funding. Besides, a heightened awareness on the part of the public contributes to the preservation of monuments. Such improved communication between archaeologists and the public would also inspire interest in the next generation of archaeologists.

The promise of the digital medium for archaeology was recognized almost as soon as the technical means were available. There have been collaborations between the experts of the historic environments and digital design that present the knowledge of these environments. The examples of such collaborations are both interesting in terms of their outcomes and in terms of their relationship to the body of theoretical work that is being produced in the expanding field of “virtual heritage.”
Learningsites is one of the pioneers, if not the pioneer in virtual heritage. The project was founded through the collaboration between the late Bill Riseman and Donald Sanders. Bill Riseman was an expert in CAD technology who came to realize by the end of the 1980’s that there might be more uses to it than merely streamlining the design aspect of buildings. In order to explore the uses for the emerging digital technology in studying ancient buildings, he started collaborations with Timothy Kendall and Dr. Peter der Manuelian, who were then assistant curators in the Department of Egyptian, Nubian, and Near Eastern Art, at the Museum of Fine Arts, Boston. The visually impressive outcomes of these early endeavors encouraged the use of digital technologies for the research and presentation of ancient sites by others. The requirements of this work also had an impact on how the softwares evolved.

Simultaneously, however the archaeologist Donald Sanders was independently working toward a similar goal. While teaching archaeology, he came up against the difficulty of comprehending ancient buildings through representations. What he wanted was to present graphically ancient environments in a way that would intellectually and emotionally engage students.

The Learningsites project has been aiming at public education and scholarly research on heritage sites in the Near East and the Mediterranean. The digital medium has been seen as a remedy for preserving information on sites whose physical remains as well as documentation are subject to irreversible degradation. It was during such studies
that the emerging concepts of virtual reality, hypertext and multi media attained their current meaning.\textsuperscript{16}

The Learningsites website features about 15 years’ work in several archeological sites around the Mediterranean. The site lists examples of reconstructions of monumental and domestic architecture from Anatolia, Assyria, Egypt, Greece, Nubia, Syria and Sicily. The images that can be viewed on the website hint at the richness of the sites as well as the care given to their interpretations. It is also possible to see the emphasis on academic integrity by the bibliographical lists following the images. However, despite the non-commercial and educational focus of Learningsites, their website offers only a glimpse of their work. The website seems to be intended mainly for those interested in hiring their services, to give an idea about the quality of these services. Although this message comes across clearly from what is visible on the website, we are not able to learn much more about the sites in question. This content seems to be reserved for the educational CD’s and is left unavailable through web navigation. Although the preservation of intellectual property and managing the file size are legitimate concerns that may have led to this situation, the website does not fully exploit its potential for public education.

The Earthworks project by CERHAS, Center for Electronic Reconstruction of Historic and Archaeological Sites at the University of Cincinnati, is a recent and comprehensive example of virtual heritage applications. Several earthen structures built by the ancient residents of the Ohio Valley are almost invisible to the current visitors of these sites. This is often due to the physical condition of these monuments: their vast

\textsuperscript{16} \url{http://www.learningsites.com/Frame_layout01.htm}
scale makes them difficult to be seen at once on the one hand, and on the other, their physical degradation makes the individual preserved remains difficult to interpret. That degradation is due to natural processes as well as to the neglect for these monuments: they are not seen as part of the cultural history of the area.

Under a unilateral understanding of the past, the area has been construed as a tabula rasa that had no cultural significance until the coming of the European settlers. However, there is increasing recognition of the earlier, native past and a desire to include this past in the appreciation of the country by its current residents. By restoring the architecture of the ancient dwellers of the Ohio Valley, CERHAS seeks to deepen and enrich the association of people with their environment, in the hopes of promoting the preservation of the ancient monuments.17

Part of the Earthworks project seeks to make the ancient architecture of the Ohio visible to contemporary people, and CERHAS has prepared interactive CD’s of the Little Miami Valley and Ancient Newark Ohio. These presentations target the general audience, who may be finding out about these sites for the first time. As an extension of museum exhibits, the CD’s let the viewers take the presentations home with them, where they can explore further. The Newark CD has been released more recently, and is particularly revealing to this study. The CD brings together real footage from the area, digital reconstructions, objects uncovered in the excavations, representatives of the American Indian culture and experts dealing with the various aspects of the sites and the culture in question. The diversity of the people involved with the Earthworks, either as their heritage or field of study, presents the multiple layers of information without giving

the illusion that these are exhausted. Multiple voices narrate the script and accompany
the visual materials, introducing an ancient world to the viewer.

The contemporary images of the environment are merged with digitally
reconstructed aerial views of the earthworks, and these also serve as the signature pieces
appearing before various parts of the presentation. The interface is designed carefully:
there is a coherent graphic style overall and the simple background stresses the
foreground movie while also giving navigation options. The general structure of the
navigation is like a tree branching off from the introductory clip to locations on the site,
features and objects in these locations, and interviews about these features or objects.
Each movie clip is like a node in the network, connected vertically as well as horizontally
to other nodes. As one navigates deeper down the layers, the sense of direction is
weakened due to a lack of a clear index showing the viewer where he/she is, and what
may come next. On the other hand, this approach enhances immersion by leaving the
viewer to wonder what might be on the way and whether he/she has missed something.
This is better suited for a CD that can be owned and explored at will than it would be for
a quick exhibition that tries to economize on its content delivery.

Çatalhöyük is one of the earliest manmade settlements in the world, dating to ca
7500 BC. Although it is not in a remote part of the world from the Western point of view
and the location has been inhabited continually until the present, the site is still obscured
by its age that precedes written text by a wide margin of 5000 years. Therefore the
presence of a coherent narrative about the significances of objects and spaces, and about
the lives of the inhabitants, relies greatly on the interpretations of archaeologists.
Ian Hodder, the director of the excavations at Çatalhöyük, elaborates on the role of interpretation in archaeology in his book *The Archaeological Process: An Introduction*. While outlining the evolving episteme of archaeology, it is no coincidence that he mentions digital technology. The increased awareness that the findings of an archaeologist are far from absolute, but his/her interpretation based on available facts, is manifested in a desire to open up findings to view. The digital medium offers a convenient setting where different teams of experts, as well as non-experts, can access and discuss different options.

Çatalhöyük has an official web site where such theories are put to the test and shared with the general public. A well designed interface presents visual and textual information to those interested in the site. The website also has a forum where anyone can post comments or requests, and sign up as a member if they desire. However, although Hodder foresees a two-way communication between the expert and the public in his writings, in reality the exchange is one-way. The expert selects and conveys the information to the public, and responds to their inquiries. The digital medium is a good means for informing and involving the public, however its non-hierarchical organization does not survive actual life.

The growing body of work on the digital reconstruction of historic structures is accompanied by a similar body of writings. The basic concern of most writings seems to be accuracy. Despite the univocal emphasis of writings on “truthfulness”, the visual outcomes suggest two different approaches to digital reconstructions. This duality is by

---

19 http://www.catalhoyuk.com/
no means new or limited to the digital medium, but follows the different approaches to reconstruction exemplified by the graphics of Piranesi on the one side and Viollet le Duc on the other. While the former has a more subjective/romantic/expressive or affectional tone, the latter is objective/factual/scientific or cerebral.

There are few, if any, reconstructions that are either one way or the other. On the contrary, reconstructions of historic environments are the results of factual and expressive considerations together, depending on such factors as the character of the site and available information. The symposium “Architecture that isn’t There” held at the University of Cincinnati in April 2005 offered a number of examples of varying degrees of factuality and expression, ranging from exact replication of an existing building to the reconstruction of a building based completely on verbal accounts. These different strands of reconstruction are more obvious in the face of similar statements of priorities, purpose and method.
The factual approach is more easily adapted to the sites for which there is a greater and more reliable body of knowledge. Either the building or a significant part of it survives, or there is abundant evidence about missing pieces. The digital reconstruction of the Chapel of the Convent of Our Lady of the Sacred Heart presented by Michael Jemtrud in the above mentioned symposium is one such example. When this historic building was pulled down in 1972, its interiors were reassembled inside a museum. The laser scanning of the still-standing interiors and the restored building shell were brought together, and the building was digitally reconstructed and photographically superimposed on its original context.\(^{20}\) This work appears to have involved little to no interpretation. As the author also suggests, it has been an experiment in emerging technologies and how they can be correlated in virtual heritage applications.

Although individual cases may vary, it is possible to assume that less conjecture is possible with more recent buildings or with better studied periods and styles of architecture. Availability of relatively more accurate documents such as photographs or blueprints, or clearly delineated architectural design principles leaves less room and need for conjecture. Whatever the case might be, achieving the highest level of accuracy is a goal for every reconstruction, although it may be attained to varying degrees in each case.

Despite the overriding emphasis on accuracy in the literature of digital reconstruction, many approaches are highly expressive. At the very least, a closer view of graphic products reveals that not all of their content can be verified. The most striking example of this kind of reconstruction in the abovementioned symposium has been the reconstruction of the Aztec Templo Mayor presented by Antonio Serrato-Combe. The

still images rendered from the reconstruction models of this site were presented in a slide show accompanied by music that heightened the dramatic impact. In his article, Serrato-Combe states one of his research group’s objectives as reflecting the reconstructed architectural space as part of the Aztec cosmos and the setting for the drama that bore their beliefs and life, or more briefly, the Aztec world.  

In this respect, the presentation has been successful by conveying the atmosphere of the Aztec world as an intense, fearsome and powerful place, expressed through color, atmospheric elements, and features like the skulls on poles.

Such reconstructions are controversial as they compromise scientific validity in order to create a more vivid picture of the past. For the lack of material evidence and under the light of what is known about the quality of the environment or the civilization in question, the reconstruction work may entail daring conjectures. Such an approach may be more proper for sites and civilizations for which available evidence does not suffice to simulate a life that must have been. This increases the number of decisions to be made by the designer. The challenge in reconstruction is to make these decisions explicit because of the notorious liability of images, especially realistic ones, to impose one interpretation of the environment as the objective truth.

Although a differentiation between factual and expressive reconstructions have been attempted here, it is obvious that the reconstruction of archaeological sites involves a presentation of verifiable and more interpretive knowledge. It is a design decision as to which aspect will be stressed more, that depends on the character of the site and the expected outcome of the presentation.

---

21 Serrato-Combe, Antonio, “The Aztec Templo Mayor – A Visualization”, Publication for Symposium Architecture that isn’t There, 2005
Gordion may be said to occupy the middle ground between well-preserved and well-known sites, and the more mysterious ones. These mysterious sites are often from earlier periods, in isolated locations, often preceding written documents whereby even the name and the fate of their inhabitants are sometimes unknown to us. The lack of reliable knowledge on such a site can render it a blank slate on which to paint a wild image of curious cults, fancy decorations and eccentric people.

Gordion might be contrasted with Pompeii, which is an example of the other extreme, being a more recent site with reliable documentation, from a civilization whose study is an established scholarly tradition. The level of preservation at sites like Pompeii or the familiarity with classical architecture allow a different approach, where the remaining pieces of architecture strongly suggest the missing ones, whose names, positions or styles are consistent from site to site.

Despite the abundance of material finds in Gordion, there is uncertainty as to how they will be brought together to reconstruct the architecture of the city. Phrygians were related with other civilizations of their time, but their civilization is unique and specific to their location. Even with a general building type like the megaron, variations in such features like roof configuration or cladding are possible and can change the overall appearance. So far, Gordion is the best-studied Phrygian city, and there is still new material to be found and studied at Gordion. The excavated areas of the Citadel Mound comprise but a minor part of it, and further excavation can change the existing knowledge greatly.

The middle ground covered by Gordion means that abundant material evidence needs to be interpreted in order to derive design principles for reconstruction. The
evidence from the site needs to be compared with information from other sites and civilizations. The application of the principles derived from this inclusive body of sources yields conjectural configurations for the architecture of Gordion. Reducing the degree of conjecture may be desirable in terms of accuracy, but not to the extent of doing injustice in representing the physical environment of a culture that is definitely rich and complex.
Chapter 3

THE LANGUAGE OF MOVING IMAGES

This thesis aims to establish the theoretical basis for a presentation of the knowledge on Gordion and the interpretation of the architecture of this ancient city by computer modeling. Because most of this information is spatial, visual means have precedence in the communication of the digital explorations of Gordian architecture. Although architectural graphics can convey complex meanings about the built environment, these graphics constitute a professional language that is legible almost exclusively to architects. This chapter explores the basics of cinematic expression as the model for visual as well as audial communication that would appeal to most audiences, both intellectually and emotionally. The expected outcome of this study is removing the obstacles mentioned in Chapter I, under the title Inaccessibility and Invisibility in Gordion, so that the visitors to the site will have a better understanding and enjoyment of what they see there.

The medium chosen for this purpose is a digital presentation of Gordion that involves photographs from the site, images and clips from reconstructed models, archaeological documents such as plans and photographs, and the references used for reconstruction work. The interaction of these visual media is meant to display the structure of buildings and the processes of their building, as well as the archaeological evidence that led the understanding of these historic edifices. Although digital media can be disseminated easily all around the world, the outcomes of this project are basically
meant for the visitors to the site of Gordion. Most of the site visitors are Turkish and Western tourists who are willing to find out about the past, and/or wish to add a cultural dimension to their leisure time. The diversity of this audience, and their levels of information and interest necessitate that the presentation be designed for the delivery of multiple layers of information. If visual media need to be complemented by text, Turkish and English are the two languages that will address the majority of site visitors.

The best setting for such a multi-media presentation is the Gordion Museum. Gordion tours usually have three steps: the mound, the museum, and the tumulus. It is better to present this information while the site visitors still have fresh impressions and need some further explanation. Unlike the site itself that is exposed to weathering and vandalism, and the tumulus whose stable conditions rely greatly on limiting the number of visitors and the time they spend around the tomb; the museum offers a safe and controlled environment for electronic installments. Individually operated, interactive computers could be running the multi media program in the main museum space, while a large screen in the conference room would show clips to larger groups. It should also be possible for the viewers to purchase a CD, or have online access to the program that they have just navigated. The site, on the other hand, would benefit from having transparent plates that show 3-D reconstructed views from where the visitor is standing.

In cinema, the sequences of spatial images create the illusion of movement in space: virtual and actual models, as well as digitally, manually and photographically created images can be employed to simulate the experience of long gone places. Moving images can also display spatial processes that shaped the places through time. Cinema has been around for over a century now, borrowing from other modes of representation
like literature, painting, and theater, and developing its own language. This language can communicate a complex set of meanings through subtle means, thanks to its expressive potential and popularity. By manipulating the lighting, the frame composition, the angle of view, the sequence of images, and the sound, even slightly, the scene can communicate to the audience feelings like suspense or relief as well as such knowledge as the sequential order of events or from whose perspective the story is told. Because the majority of the world’s population has been visually and aurally trained by movies and television, the cinematic language can be used to communicate with almost everyone.

The documentary film is the first movie genre that can offer guidance about the cinematic treatment of reconstructions. Besides offering information about the subject matter through audio-visual material, this genre has formal qualities that are associated with reality. Unlike fiction that creates an imaginary world and whose events go along the rules of this world, documentaries deal with actual events and the scientific inquiry about them. Whether in the past, the present, or projections on the future; the documentary seeks to expand our knowledge of the world that we live in. Although it is impossible for any knowledge to be completely unbiased or “real”, the documentary still acts in a more limited field than fantasy. Dziga Vertov’s “Man with a Movie Camera” exemplifies how a documentary apparently about a day in the life of Moscow and Odessa seeks to propagate the revolution. The movie involves no acting, but merely captures

---

everyday people in their everyday activities. For Vertov, this is Kino-Pravda, or cinema of the truth.\textsuperscript{23}

City films are the second type of movies that can inform digital representations. These movies differ from the analytical air of documentaries because they are not a thorough examination of the city in question, but reflect its life in a more synthetic fashion. In a city movie, the city is not in the background as the backdrop of events, but is in the foreground as a main character.\textsuperscript{24} A city with a distinctive and multidimensional character can be the subject matter of a whole movie. The fact that the onset of movie making coincides with the rise of modern cities makes this relationship even more interesting. An earlier city movie like “Berlin: The Symphony of a Great City” makes the perception of the city apparent by celebrating its diversity, while also hinting at the fears of urbanization.\textsuperscript{25} Jacques Tati’s “Playtime”, on the other hand, is a critique of modernity showing the obstruction of the city of Paris by the anonymous modern city. The historical monuments of the city show up only for a fleeting moment on the reflective glass surfaces of modern buildings.

The third group of movies that can inform digital representations of historic places is historic movies. Although the physical environment is hardly more than a stage setting for the drama of actual or imaginary heroes, the depiction of the historic environments in movies reflect and influence the popular perception of historic places. Often, a whole world is constructed for a movie out of actual environments, sets and

digital models. These environments are richly furnished with the furniture, textiles, sculpture, etc., representing the period or the people in question. They help to picture a lived world with multiple dimensions, even when evidence for some details is inadequate or contradictory. The “Indiana Jones” series offer a two-tiered example of simulated environments: set in the early 20th century, the adventurous archaeologist moves through the spaces of his time as well as ancient relics and architectural environments from yet earlier earlier times. Although these movies would hardly make a good history lesson, they successfully establish a world of archaeology within a retro world, and enhance their entertainment value for the historic movie lover.

A. Objective and Subjective Reality through Cinematography

The first works of cinema recorded actual reality, and while this was more than fascinating by itself, it was soon discovered that even real footage could communicate imagination. This element of imagination did not replace actual reality, but co-existed with it and lay the foundation for expressive movies as opposed to documentary ones. However, this differentiation is not mutually exclusive and these different approaches can be used in the same work of cinema to achieve different effects. The tools that can be used for these differentiated perceptions of reality are: frame composition, movement, sound, content, and editing. The following paragraphs on each of these tools offer a brief summary of their effects to the perceived objectivity or subjectivity of the movies. Although it would be possible to contest them by contrary examples, these summaries are still useful as a general reference. Because the digital reconstruction of Gordion employs architectural imagination that is based on actual findings, these tools would be useful in exhibiting the relationship of imagined environments with archaeological evidence.
Frame Composition. Cinematic sequences comprise still images changing at the standard rate of 24 frames per second, thus creating an illusion of continuous flow. The graphic composition of each of these images determines the overall appearance of the resulting movie. Panoramas shot with wide lenses appear more informative and objective to the viewer than close-up views shot with tele lenses. A close-up gives a sense of immediacy and further detail about an object, like looking closer at it, but also divorces it from the context and lends it prominence and singularity. Another function of the close-up is the treatment of an object as more of a graphic entity than a real object in a real setting.

Figures 26 and 27: Interviews with experts, set in neo classical spaces (Stills from “Rome: Engineering an Empire”).

The interviews with the experts in the documentary “Rome: Engineering an Empire” offer an example of well composed frames by the placement of objects and people. In these scenes, the speaker is often seated on one side of the frame in the middle ground. The placement of the speakers off center helps them blend with the rest of the scene as part of the spaces that they are in. This seems to be in line with the photographic compositional rule of thirds that places the figures at the intersection of imaginary axes passing at each third of height and width rather than centering the person before a passive background. In the background is a majestic classical or neo classical space, receding
behind the person in the scene. In some cases, the speaker’s presence in the scene is counterweighed by the partial view of an iconic marble Roman bust in the foreground taking up the other side of the frame. As well as achieving a sense of depth by creating a foreground, middle ground and background that play against and balance one another, a tension between consecutive scenes is generated by reversing the placement of foreground and middle ground figures.

The camera angle also affects the feeling imparted by the view. In general, a human vantage point and human modes of movement suggest subjectivity. However, a higher camera angle gives a sense of looking down on the subject, related with domination or clarity of view and omniscience. The extreme case of a high angle is an aerial view, which is now part of human experience thanks to aviation, and helps reverse the diminution of the human scale by the environment. Being at a lower angle, on the other hand, gives a sense of looking up, being dominated or awed by the subject’s scale. An angle close to the ground level takes this diminutive effect further, especially when combined with the unusual perspectives of a small lens.

Figures 28 and 29: Looking down on the model of Rome and up at columns of the Roman Forum (Stills from “Rome: Engineering an Empire”).

---

26 Sobchack, T. and Sobchack V.C., *An Introduction to Film*, Boston : Little, Brown, c1980, p.54-111
The documentary “Rome: Engineering an Empire” offers examples of various camera angles with different or complementary effects. An aerial view of the model of Rome shows the city as both a conglomeration of monuments and a relic in itself. There are also several low angle shots, as those of the ruined buildings in the Roman forum, stressing the overbearing scale of architecture in the representation. The sense of drama and monumentality generated by this architectural scenery is sustained in the interviews with experts who are seated in classical or neo-classical buildings, with a fixed camera looking up to them.

The proportions of the scene also have an impact on the appearance of the frame. Anamorphic and spherical screen formats with 2.39:1 and 1.85:1 aspect ratios respectively are associated with the cinematic experience in contrast to the 1.33:1 aspect ratio of the television or early computer monitors. Steven Poster, one of the contributors to a book on cinematography published by the American Society of Cinematographers, expresses his preference for the anamorphic screen as it has a more particularly cinematic feel, at once soothing and exciting. To him, a wider composition corresponds better to the wide oval of human vision. Besides, the cinematographer uses the extra space of the horizontal screen for visual design that he/she can manipulate by such features as gradations of light or the movements of the actors, and have the viewers’ eyes move across the frame. He also points at a trend toward wider formats in television broadcasting whereby 16:9 becomes a standard although most of the TV sets remain with the customary 4:3.  

---

of home movie theater systems with wide screens, and the availability of wide screen computers, in parallel with the increased quality of image offered by the DVD format.

Such a large screen format can be adapted in Gordion in order to show the relationship of the manmade structures to the surrounding landscape. The terrain around Gordion consists of a floodplain surrounded by ridges and rolling hills, with mountain ranges in the distance. The bright sky adds drama to the place as a contrasting backdrop for the golden hues of the land; and with fast changing weather and clouds in motion. A wider format would both stress the horizontality of the terrain and show more of the tumuli that are an indispensable part of the cultural landscape of the area, along with the mound and Tumulus MM. Views of the Citadel Mound from the viewing stations should be used as they allow the viewer to relate the reconstructions with the current state of the place as well as to have a general grasp of the image from a higher point of view. Such a view is useful for showing relationships between building parts and buildings, engaging the viewer intellectually rather than emotionally. On the other hand, the human vantage point is suitable when trying to simulate the experience of the place, especially in realistically rendered models.

**Lighting.** Light is one of the most important tools in communicating the informative and expressive message of a scene. Cinematographer Stephen Burum of the American Society of Cinematographers explains the three functions of light in cinematography as casting shadows, creating a sense of depth and fill lighting.\(^{28}\) The amount of fill is inversely proportional to the level of contrast in the frame, which has an

---

effect on its dramatic quality. Hard lighting with high contrasts, that is with highlights and dark shades, makes more of a definitive statement while soft light creates a softer world.\textsuperscript{29} The shades and shadows can serve several purposes: shadows designate time by their length and position while their absence portrays a less-dramatic, non-defined universe.\textsuperscript{30} On the other hand, darkness in a scene leaves room for imagination and thus involves and engages the audience. In Cinematographer Frederick Elmes’ words, it is \textit{leaving stones unturned}.\textsuperscript{31} Whatever the general choice of lighting may be, a variety of light within the scene or from one scene to the other is recommended. In the same scene, a sense of depth is created by having the actors move between pools of light and shade, rather than within the flatness of uniform lighting. On the same note, extended low key lighting has a numbing effect on audiences, which can be defied by flooding the next scene with light. A light source that comes on in a scene can also be used for dramatic effect.\textsuperscript{32}

Light also impacts the sense of realism in a scene: top lighting bright enough to see every object in the scene with shades and shadows enough to suggest articulation, textures or distances is more likely to grant the sense of objective reality. Glaringly bright light without shadows that fades colors and contrasts, similar to a lower light source casting elongated shadows that cover part of the scene, can make it look surreal or

\textsuperscript{29} Hora, John “Two Hard Sources”, in \textit{Reflections: Twenty-one Cinematographers at Work} by Benjamin Bergery ; introduction by John Bailey ; with photographs by Jasper Johal, Bergery, Benjamin, Hollywood, Calif. : ASC Press, c2002, p.37
dramatic. Light is an effective tool for a richer representation of an environment. While diffuse light without shadows can be useful in presenting such information as structural detailing; directional light with a visible source such as a hearth can hint at the life within a space. A dynamic source can also display daily or seasonal cycles, such as the sunrise and the sunset or the phases of the moon, which may be significant for a civilization. Along with light, shadows can be used to articulate surfaces and volumes, to evoke curiosity, to cover ambiguities, or to make a scene more interesting to look at.

Figures 30, 31, 32, and 33: Various cases of lighting resulting in different moods (Still images from “Rome: Engineering an Empire”).

“Rome: Engineering an Empire” uses different lights and light sources in different situations. In real footage from the exteriors, natural light illuminates the ruins in the daytime while they are lit with bright electric lights at night, stressing their present life as

Sobchack, T. and Sobchack V.C., *An Introduction to Film*, Boston: Little, Brown, c1980, p.54-111
monuments embellishing the cityscape. The daytime interiors are well lit with soft light that articulates the surfaces, but does not cast any dark shadows. The lighting of the ruins at night involves several candles or torches, which represent the lighting technology of the Roman times on the one hand, and spatial ambience on the other. A similar flickering light source casts shadows, such as that of Nero on the defaced walls of his palace like a fleeting ghost immediately before his tragic end.

Figure 34: Light on the deity reliefs inside the Temple of Abu Simbel (Still image from “Ancient Egypt’’)

There is a unique lighting event mentioned in the documentary “Ancient Egypt”. The Temple of Abu Simbel has been built in such a way that the rising sun lights three of the four sculptures 17 meters down the entrance into the temple, on the 22nd of February and again on the 22nd of October. While this information is given by the narration, shots from the exterior and the interior of the temple follow one another. The final frame shows the sculptures in question with pale light shining on them, which may or not be the sunlight as intended by the builders. It appears that the documentary has not fully exploited the visual means, and relies mainly on verbal description of this design with light.
In Gordion, the low angled afternoon sun brings out the relief of the landscape and the texture of vegetation. Unlike the midday glare that flattens the scenery, this light imbues the environment with a rich golden glow and adds a tactile quality to it. In realistic renderings, simulating such low angled light with elongated shadows would help stress the surface qualities of the environment. As for the scenes such as the one showing the assembly of the tomb, diffused light without shadows is a better choice in terms of clarity. The interior views of the reconstructed megarons would be lit by simulated fires on hearths that will both show the function of the hearth and create the relevant atmosphere. The light from a fire is warm, dramatic, and with dark shadows, appealing to the imagination rather than showing clear details. In the light of simulated fire, the elements of the long gone life of the megarons would flicker like a dream.

Movement. One type of movement in a scene is the movement of objects. Unless they are moving in unusual ways, this movement of the objects suggests relationships, exhibits working mechanisms, and gives better information about a space. The other type of movement is that of the camera, and this type suggests motion in space. Because the camera lens corresponds to the human eye, movement of the camera furthers the illusion of space.34

Three basic moves of the camera are pan, tilt and dolly. Pan is the lateral movement of the camera, and corresponds to the view of the human eye across the scene to see more of the surroundings. The camera that goes around an object in a full circle gives information about the whole of the object, leaving nothing unseen. Tilt is the vertical movement of the camera target, corresponding to the act of turning one’s head up

34 Ibid. p.56
or down in order to present information about an object across its height. Both of these movements suggest that the scene offers more to be seen than can be confined in a single wide shot.

Of the three camera movements, the dolly is the most versatile. The audience can associate with the dolly camera as it mimics bodily movement across space. A dolly camera can go through a scene like a human being walking through or flying over a space. As well as imparting such information as size and sequencing of a space, this movement can be paced to expressive ends. A dolly scene that is close to the natural rate of human stride and whose duration regards cinema time is like an exploration. A faster or backward dolly is contrary to the expected course of movement, and can be used to accentuate a specific feature or the general view at the culmination point. In general, faster movement in a scene suggests panic while slow motion refers to either swiftness or agony, and a freeze frame disrupts the flow of events and calls for the attention of the viewer.\textsuperscript{35} Although there is an apparent similarity between dolly and zoom in bringing the distant object closer, the audience can still tell whether it is the spectator that moves toward the object or the object that closes in and occupies his or her field of vision.

While the dolly is a smooth movement of the camera provided by such equipment as rails or cranes in cinematic production, the jolting movement of a handheld camera bears even closer resemblance to the human experience. Such shaky images are familiar, for instance from news reports of an emergency situation or from amateur recordings with digital cameras, and suggest less fabrication and more immediacy than the flawless movement.

\textsuperscript{35} Ibid. p.59
One of the ends to which the documentary “Rome: Engineering an Empire” uses camera movements is exploring an actual or digital environment thoroughly: the camera flies over or around buildings; dollies and pans through corridors, across rooms and up the stairs. The same movement is accelerated or decelerated between natural and lightning-fast, offering views at a human vantage point and avoiding unnecessarily long screen time. Such a continuous shot, rather than cuts that could achieve similar purposes, also lends a dreamlike character to the viewer’s tour across the Roman spaces. The camera has the subjective view of a person in these spaces, however the smoothness of the camera movement seems to defy physicality; perhaps hinting at the contribution of digital tools to cinematic expression.

Figures 35 and 36: Consecutive scenes showing the interiors of Domus Aurea in its current ruined state and the reconstruction superimposed on the actual spaces (Stills from “Rome: Engineering an Empire”).

The second use of camera movements in this documentary is offering a smooth transition between real footage and reconstructions. We are presented with real footage of the ruined interiors of Nero’s Domus Aurea, which is gradually replaced by the reconstructed image of the same interiors while the camera pans left at a steady pace. This treatment enables a swift transition, communicating accurately the relationship between actuality and imagination.
In the same documentary, the camera also moves across paintings depicting scenes from Roman history to animate these still images. These paintings are great tools in illustrating the dramatic events involving several people without actors as well as reminding us that people before us were also interested in the Romans as actors of history and fantasy. The movement of the camera before these paintings is like the gaze of a spectator that moves across the surface and pauses on more interesting aspects of the scene. Zooms into the painting help the viewer explore further by bringing the details to his or her attention.

Scenes 37, 38, 39, and 40: Stages of water accumulating in the source, traveling into the city through the aqueduct, and flowing through the basins in the city into a public fountain (Stills from “Rome: Engineering an Empire”).

Another striking example of camera movement from the same documentary is synchronized with animation of the building process of Julius Caesar’s bridge across the Rhine. As the camera pans from the south bank to the north across the river, the
animation shows the wooden beams falling into place, followed by the superstructure of the bridge. This movement engages the camera in the construction process more than a still camera, because it shows not only technical information about this engineering feat, but also its contribution to crossing the colossal channel of water step by step. This scene is culminated by the reconstruction of the Roman army marching the bridge, to take the Roman power across its former limit defined by the river. Another use of camera movement in this documentary that hints at a new opportunity for expression offered by digital models illustrates the flow of water. The camera dips into the aqueduct, and flows the water’s path through the open and closed sections of the aqueduct, into the storage tanks, and finally into a fountain in the city.

Although the basic camera movements can be observed at the basis of all camera work, there are some changes due to the use of digital technology. While images are rendered from a camera moving along or toward an object, or simply looking onto it, as with the conventional cameras, the camera in the digital medium is free from physicality. It is no longer the costly optical tool that is bound by its size, amount of light, or objects around it, but a virtual point in a virtual environment that can go through any object. Thanks to the lack of physicality, the virtual camera can be more extravagant with shots like flyovers, too. A flyover lets vast expanses to be viewed by the camera, from the space into the object if desired, clearly showing the relationships between architectural works and their built or natural settings. The camera can swiftly fly through or around objects to explore them, or dive in for a closer view without bothering about any obstacles. A parallel change can be observed in real footage with the use of digital equipment and technologies, and perhaps also due to a digital imagination.
The general approach to camera movement in Gordion reconstructions is using pans for cityscapes and landscapes, and dolly for individual buildings or paths in the city. The movement of building components and site features, captured by a still camera, would show the building processes and changes over time. Zooms into reconstructed objects in their contexts are to be used to isolate the object from its setting, and as a transition to the object’s actual location, such as a museum. Real time navigation in a virtual reality interface that combines views from one point in all directions with simulated movement between such points would also be useful as the type of movement that simulates, and hopefully stimulates, exploration.

**Sound.** Although visuality may have precedence, sound is also important in cinematic communication. Sound used in cinema involves dialogue, narration, sound effects and music. Each of these, or the lack thereof, can be used informatively and expressively in cinema. Whereas there is a limit to the multiplicity of the visual material that can be viewed without overloading the senses of the viewer, a great number of sound tracks can be combined with varying emphases to different ends.\(^{36}\)

When a movie aims to inform its viewers, narration often plays an important role. Due to our familiarity with movies, it is easy to associate narration with the formal style of a documentary. The voiceover serves as the literal delivery of the movie’s content through a script and may occupy a significant part of the screening time, with the visuals serving as illustrations. The narrator guides the audience through the images of people, objects or environments; and elaborates their stories. The voice of the narrator also

\(^{36}\) Ibid. p.135
impacts the reception of the script by the audiences by lending such qualities as authority, compassion, or credibility.

Depending on the choice of style or the content of the movie, the script may be more informative or dramatic. Although the concern of the documentaries with factuality may favor a more objective style, the script needs to have an element of drama or intrigue in order to appeal to the audiences. Every good story needs tension and a climax, and the nature of interest with archaeology is essentially romantic. The stories of heroes whose successes or tragedies still move us after centuries or even millennia call for the discovery of their worlds. Moreover, even though methods of science may be disciplined and serious, the driving force behind the scientific enterprise is curiosity.

**Expert views.** It is not uncommon for a documentary to feature narration in the voice of an expert. An expert’s explanations delivered by himself or herself are likely to grant greater credibility to the content of the movie. If there are different opinions voiced by different experts, their simultaneous presentation gives a better understanding of the varying interpretations of an archaeological site by some of the people who have contributed to the body of knowledge in the field.

“Rome: Engineering an Empire” follows the convention of documentaries in resorting to experts’ help and handling of the material. The experts are introduced to the viewers with footage showing them in ancient or modern places reflecting Roman architecture, and sometimes in the Roman buildings that they are talking about. Then their voices are laid over other footage, such as reconstructions, explaining the images further. The interview with the Italian archaeologist researching the underground channels differs from the other interviews in general appearance. He is diving in these
channels looking for evidence that they led to the Coliseum and filled the arena with water, so that naval scenes could be enacted. He is interviewed inside one of the channels where his pursuit is taking place. He is speech in his native Italian is in low key, while its translation is in the foreground. The grainy look of the images due to the technical conditions in the underground and the dual soundtrack seem to swerve from the overall visual and aural quality of the movie, but add the special documentary appeal of footage with real people in real conditions.

Witnesses. The more recent developments around an archaeological or historic site may be part of the information to be imparted to the audience. The excavation or restoration is often a significant stage in the history of an ancient site. Not only experts, but also people like local inhabitants who may have worked on the site, or continue similar architectural traditions to those on the historical site have information to offer. Interviews with these people add the dimension of personal experience from another perspective as well as a variation in the way that information is presented.

Figure 41: Interview with a witness of excavations (Still from “Ancient Egypt”).

For example, the documentary “Ancient Egypt” features an interview with the son of the guide who in 1922 witnessed Howard Carter’s discovery of the steps that led to the
undisturbed tomb in the Valley of the Kings, which turned out to be Tut Ankh Amon’s grave. He is a local man in traditional garments, seated before a stone wall and telling the story of the discovery of this ancient treasure. His account authenticates the story as an enterprise driven by curiosity, fortunate accidents and caution. Thus, not only the archaeological findings, but also the process of their excavation is far from sterile, but endowed with human feelings.

**Music.** Music in a movie can serve several functions. For example, it can either reinforce the imagery or establish the mood and the rhythm of the film. In “Rome: Engineering an Empire”, the sequence of the construction of the colossal bridge over the Rhine by the army of Caesar is accompanied by the loud beating of the drums. The beat corresponds to the animation of the structural elements falling into place one by one, and has the military sound of the drums in an army march.

The music can also serve as an element that ties separate sections of a movie together. Such, music may offer uniformity that reconciles an eclectic set of images. At times, it is a neutral background that does not refer to a specific time or place, or suggest timelessness like classical music. At other times, the music strongly suggests a certain time and place.

The theme music of “Ancient Egypt” exemplifies how music associated with a specific locale or culture can evoke a place and its people. This music is heard almost all through the documentary, receding to the background when mixed with narration or the interviews, and becoming more dominant when it is the only sound track. It is basically Western, but has Oriental accents that increase or decrease depending on the context. With images like the colorful Egyptian paintings, the local accents are strong with a high
tempo, in line with the vibrant life these images depict. On the other hand, when the images are more solemn like those from the tomb of Tut Ankh-Amon, these accents are but the muted and slow reverberations of an exotic instrument.

Another treatment of music that both has documentary value and enriches the visual presentation is reconstructing the music of the period or place in question. The White Water Presentation by CERHAS offers one such example. In 19th century, White Water was settled by the Shakers, a religious community whose lifestyle was based on simplicity and abstinence. By using the Shaker chorus music with the digital reconstructions of their settlement, the presentation both offers one more layer of information about the group of people whose environment is studied, and reconstructs this environment as a richer world with an audible dimension.

**Sound effects.** Sound effects enhance the realism of an image by suggesting physicality.\(^{37}\) The sound of an entity hints at its materiality; whether it is heavy or light, hollow or solid, hard or soft, and the material from which it was made. The reverberation of the sound also suggests the size and surface qualities of the environment in which it is generated. The use of sound effects in the documentary “Rome: Engineering an Empire” animates the water scene mentioned above where the camera moves as if flowing into the city through the aqueduct. As the water moves along the channels, it is hissing; then it hurries pouring in from one basin to the other, and finally roars down the fountain. Because the object in the scene is a reconstruction, the sound effect greatly increases its credibility.

\(^{37}\) Ibid. p.146
One way of classifying sound in a film is as synchronous and asynchronous sound. While synchronous sound comes from a source than can be seen in the scene, asynchronous sound is not directly associated with such a source. Synchronous sound enhances what can be seen on the screen whereas asynchronous sound places the scene in a larger world that may be beyond the limits of the screen, but is still there. The ambient sound in a place imparts its character and its life: while singing birds evoke a peaceful natural setting, noisy streets suggest a city or a foreign language reminds one of the foreign lands. In “Gladiator”, the soundscapes of Rome and the North African province are unmistakably different. While they are both populated by bustling crowds, the African city’s air is filled with Arabesque music and bits of Arabic conversations. The alien sounds of the place are in accord with its role as a threshold place, at once marginal and transitory. Similarly, the description of the fire of 64 that destroyed Rome in “Rome: Engineering and Empire” is accompanied by the screams and the crunching of flames with the reconstructed animated image of Rome on fire. These sounds help to show that fire is more than a play of light and color, but also a destructive and terrorizing event.

Visual Style. Not only the content of a movie, but also its general appearance effects the meaning that it has for an audience. Our familiarity with photography and real footage as tools for the documentation of reality through an “objective” lens usually makes us feel that these images show actual events. Even though the digital technology has rendered these media even more malleable than they originally were, scenes from a camera are more easily considered as authentic. This effect is probably stronger with

---

38 Ibid. p.149
black and white shots that resemble archival footage. Even the clumsiness of these images may make them seem more “real”, due to the newsreel effect of such images.\(^{39}\)

Visual style is an important consideration for the renderings from a digital model. Photorealistic renderings that faithfully imitate reality with the careful use of naturalistic lighting, textures, and a high level of detail stand next to real footage and photography in terms of their persuasiveness. Although this has been a dominant trend in digital reconstructions, possibly due to the fascination with the hardware and the software that can render lifelike scenes, it is now criticized as creating a false sense of verity. One of the challenges currently being addressed in the presentation of digital reconstructions to the public is finding a balance between appealing to the viewers and not misleading them through the level of detail and naturalism in rendering.

In addition to the finished look of photorealistic images, renderings from digital models can be modified in such ways that the resultant images will reflect some of the conjectures or interpretations made during the process. An alternative is the mesh view that shows the outlines of objects in the model like a 3-D line drawing. Without such features as light and textures, the basic form of the structures in focus. Such images have a “technical” feel, and make it very obvious that the reconstructed model has been prepared digitally, not shot on location. A solid model without texture mapping, on the other hand, can convey decisions of massing, which are important considerations in reconstruction, but are less visible once the scene is complete with details. The variety of visual treatments can shed light on the various sources and processes of digital reconstruction, and the fact that not even the final product is static one.

\(^{39}\) Ibid. p.149
Figures 42, 43, 44 and 45: Real footage from the remains of an aqueduct and of the superimposition of the reconstructed model on the actual environment showing the stages of construction and the working principle of arches (Stills from “Rome: Engineering an Empire”).

Figures 46 and 47: Semi-realistic model of an aqueduct showing its relationship to the terrain and the wire mesh view of the same model showing the geometry of an aqueduct (Stills from “Rome: Engineering an Empire”).

“Rome: Engineering an Empire” uses several layers of images to present different aspects of Roman architecture. The first type of images used is real footage, showing Roman buildings in the landscape or in Rome. These images are the points of departure for exploration and reference for contemporary audiences. In places like the aqueduct and the defense structures commissioned by Hadrian in Northern Britain, realistic reconstructions are overlaid on real footage to achieve a lifelike representation of these
edifices in their contexts. Such reconstructions are supplemented with models of buildings and their immediate site in solid colors, often showing the working principles of the building in a sectional cut such through the site and the building. The next level of abstraction of models, which is a white mesh model on a blue background, displays the geometric relations and structural system of buildings animated with arrows and guidelines.

Figures 48 and 49: The glamour of Rome in a ceremonial procession and the filth of the streets in the same city (Stills from “Gladiator”).

Figures 50 and 51: A general view of the provincial arena with its surroundings and a closer view from the inside (Stills from “Gladiator”).

The treatment of the similar architecture is quite different in the movie “Gladiator”. The movie employs some actual and digital reconstructions of Roman architecture as the setting of the hero’s adventures. While scholarly reconstructions show ancient buildings in a state of perfection that may have never been, but was probably intended by their builders; the environments in the movie are less than perfect as they
simulate actual living environments, not intellectual constructs. Although the architecture of Rome preserves its grandeur in panoramic shots, the street scenes show the dusty streets crowded by the mob. Outside the city of Rome, such as the fortified Roman province in North Africa, the built environment is already in ruins. Whether or not the actual environment was so degraded while the empire was still powerful, these images help to accent the corruption and social degradation contrasting the power and the glamour of Rome. An account of such swerving from accuracy for the sake of creating the desired impression exists with respect to the Coliseum. The director of the movie, Ridley Scott, found the actual building too small and had a larger reconstruction built, the inspiration for which came from French and English romantic painters and Albert Speer.\textsuperscript{40} Internet Movie Database (IMDB) webpage offers a long list of “goofs” in the movie, some of which are inaccurate representations of the environment such as lanterns on the domes, a view into the River Tiber from the Coliseum, an open air encampment of the Roman army, the lack of pavement in the streets, and the large open space where the imperial procession takes place.\textsuperscript{41} These are not very different from inaccuracies related with historical events or characters, because the movie borrows from the Roman world, but still creates its own imaginary world. Here, the past is a parallel universe engaging the audience with its familiarity, while enticing the imagination and allowing fantasy: the environment merely contributes to the persuasiveness of this fantasy.

\textsuperscript{40} http://www.imdb.com/title/tt0172495/trivia
\textsuperscript{41} http://www.imdb.com/title/tt0172495/goofs
A Visual Style for Gordion Reconstructions. There are considerations of the quality of environment and information to be communicated in designing the Gordion presentation. A layering of images can be useful to these ends. In terms of the quality of environment, the wealth of finds from the site and the famous affluence of Phrygians suggest a richly decorated environment. The character that can be assigned to Phrygians by looking at their art is rather peaceful and appreciative of nature, one that does not challenge the knowledge of this civilization as an urban society based on agrarian economy. There is nothing particularly violent or dark about this culture, which can justify the use of bright, warm light on decorated and richly textured surfaces in photorealistic renderings that are meant to reflect the life of this ancient city. On the other hand, mesh views and solid models of the same structures superimposed on arcaheological documentation can inform the viewer of the decision making process during reconstruction that was guided by these documents.

Text as a Graphic Tool. Another interesting material to be presented is text, which can be used to enhance the message of visual materials. However, text needs to be used sparingly, in order to avoid conflict with the initial choice of visually displaying the knowledge of an ancient architecture so that it will be legible to a wider audience. The
straightforward use for text is to give such information as the names of the people or places that appear on the screen, section titles, or subtitles for conversations in a foreign language. In addition to this literal use of text for information, it can also be used graphically. Especially the original script of the civilization whose architecture is being explored can be part of their visual image.

Figures 54 and 55: A hieroglyphic carving and the Rosetta Stone (Stills from “Ancient Egypt”).

Such a piece of text is one of the important features in “Ancient Egypt”. Pans across walls inscribed with hieroglyphs accompany the narration about the mystery of hieroglyphs. The Rosetta stone, whose discovery enabled the researchers to decipher the Egyptian hieroglyphs, is then shown in the center screen, with the bands of different scripts inscribed on it. This image is followed by a colored drawing of hieroglyphs, possibly the outcome of an analysis by the researchers, with the camera moving down, in the likely direction of the text. These scripts are both documents and part of the graphic palette of the Egyptian culture.
Similarly, “Rome: Engineering an Empire” employs a font that has a handwritten look to it on the maps showing the expanse of the Roman Empire. The map surface also has a yellowish tint that makes it look like the aged paper of a handwritten map. While all the narration and the titles of the movie are in English, these writings show the Latin names of the Roman cities in English letters.

Examples of Phrygian text have been found inscribed on Phrygian monuments and some objects. This text has been only partly read, and is not exclusively Phrygian, but a version of Greek script. In the presentation of Gordion, visual materials are to prevail because of the universality of their language. However, there would still be use for Phrygian lettering, especially with the names of key figures in Phrygian culture like Midas or Matar, the mother goddess whose cult was a major aspect of Phrygian religion. These words would be best shown on the surface where they are inscribed, followed by a zoom into the text that isolates it and brings it to the fore.

**Editing.** Editing is the process through which the overall narrative of the visual materials is composed. The first of the three main styles of editing is *invisible editing* which is most commonly used by commercial cinema. The segments of the movie are brought together as flawlessly as possible, to divert the attention of the audience from the
fictional character of the work and engage them in the reality created by the movie. The second approach is proposed by the Russian cinematographer Pudovkin, and views movie clips as *building blocks*, which have meaning by themselves, but create an overall grand narrative by their compilation. The last editing style, the *montage* of Eisenstein, is based on the belief that the meaning in a movie is created by the clash of different clips that are actually inert.\(^{42}\)

Besides creating an illusion of space, cinema can manipulate the sense of time. Screen time can be either longer or shorter than, or equivalent to actual time. This effect is achieved by different editing techniques. Because reconstructions involve the architectural configuration and processes at a certain time as well as the changes in a building or a whole settlement over time, editing can be exploited to convey the sense of simultaneity or the passage of time.

The editing techniques that are used to display events taking place simultaneously are: insert; parallel editing or crosscutting; split screen; and superimposition and dissolve. In insert, a more general scene is followed by detail views that display aspects of one event that happen simultaneously or sequentially. Parallel editing is the alternation of multiple scenes that are developing simultaneously. Split screen serves a similar purpose, with effects ranging from intensity to overload. Superimposition and dissolve use graphic or content relationships between scenes, and offers a more gradual transition from one scene to the other that is happening at the same time.

On the other hand, the majority of transitions and the direct cut that is showing one scene after the other without a transition, display the elapse of time. While direct cut

\(^{42}\) Sobchack, T. and Sobchack V.C., *An Introduction to Film*, Boston: Little, Brown, c1980, p.65-67
implies a shorter time gap, transitions suggest a longer one. Fade-in and fade-out create a sense of time passed by, by separating scenes with a gap of dissolving blackness on the screen. ⁴³

Figures 57 and 58: Reconstructed views of the pyramid superimposed on actual footage (Stills from “Ancient Egypt”).

Figures 59 and 60: Reconstructed views of the pyramid superimposed on actual footage (Stills from “Ancient Egypt”).

The documentary “Ancient Egypt”, broadcast on the Internet by Films for the Humanities and Sciences, offers examples of how reconstructed images can be edited with real footage to describe the processes on an ancient site. In one such scene, the construction process of a pyramid is described. One of the existing pyramids is visually removed from its setting, and the surrounding landscape is restored to what it would be without the pyramid. Then, in parallel with the narration, the pyramid starts rising from

⁴³ Ibid. p.76
the ground as the mask on the image is being removed from the bottom up. At the same
time, the hypothetical ramp that was used for the construction of the pyramid rises
diagonally as a red line. As soon as the peak is reached, the overlay is replaced by the
reconstruction of the golden crown and limestone cladding on the pyramid from the top
down. When this process is complete, real footage from the present, eroded state of the
pyramid cuts in to show the effects of time and weathering on the structure. Then the
superimposition cuts back in, to be followed by a sectional view of the interior of the
edifice from the same viewpoint. The flat, paint-like appearances of reconstruction
images sharply contrast the textured images of real footage. The other two examples of
superimposition from the same documentary are the reconstructions of the Great Sphinx
at Giza and the façade of a temple carved into a stone cliff. Similar to the reconstruction
with the pyramid, the real footage from these monuments reveals the impact of time.
This treatment aids the viewers’ imagination to visualize the surfaces as they were built.
Even though these monuments still retain their majesty of scale and articulation, such a
reconstruction enables their appreciation as they were designed by their makers.

Such transitions would help to display the processes of change at Gordion. While
an animated sequence without editing can adequately demonstrate the construction of the
tomb chamber or any of the megarons on the Citadel Mound, not all changes can be
communicated in this way. For example, the reconstructed image of Tumulus MM can
be superimposed on its current state to show how far it has eroded. Similarly, the distant
view of the reconstructed Old Citadel would fade out to black, and the view of the New
Citadel from the same point would fade in, to show the succession of these two phases of
inhabitation on the same space, with a complex and unclear period of transition in
between. The same two phases would fade into one another without the blackness in plan view, to show the similarities between these two phases that can be seen in Figures 2 and 3.

**B. Non-linear Narrative of Multimedia**

Although cinema offers a model for digital movies in creating meanings through audio-visual material, there is a major difference in that the narratives in the digital medium are not necessarily as linear as the cinematic narratives. It would be simplistic to assume that cinema does not manipulate time, but there are major differences in the relative technologies of these media and the ways that they are experienced. Cinema is lengthier and meant for a collective audience who are within a certain space.

A movie is watched from the beginning through the end, even if they might not correspond to the linear procession of events in real time. Digital movies, on the other hand, are often for individual or smaller audiences, and lack the ambience of a movie theater that contributes to the immersion of the audience in the screen reality. With digital technology, the spectator has the chance to interfere with the flow of images through commands like skip, pause, rewind, and fast-forward.44 Each movie clip in a digital presentation has its own inner linear procession, but it connects with other clips in several different arrangements.

There is also another difference between cinema and digital movies in the role of technology. The digital movie is more apparently a technological artifact and its

appreciation in part derives from this awareness. Especially in commercial cinema, the technology of the making is invisible. The sight of equipment or any hint of production technology in a movie is considered a “goof”, and listed among the attributes of a movie on the IMDB website. For example, the goofs of the “Gladiator” are not limited only to discrepancies with historical facts or inconsistencies within the film’s narrative, but include contemporary crewmen and equipment that are visible in certain scenes.\(^{45}\) There are exceptions to this when the director deliberately displays the fact that the reality of the cinema is illusory by such means as making equipment visible or the actors addressing the audience.

\[\text{Figures 61, 62, 63, and 64: Digital and live components of Gollum scenes (Stills from the information disc of “Lord of the Rings: The two Towers”).}\]

\(^{45}\) http://imdb.com/title/tt0172495/goofs
A recent development that blurs the distinction between cinema and the digital medium is the pervasive use of digital imaging technologies in cinema. An impressive cinematic work, the “Lord of the Rings” triology resorts to computer graphics in creating the fantasy world abundant with supernatural characters, places and events. The approach taken by the makers of this movie is to create a fantastic yet credible world by integrating live acting, scale models, landscape photographs, stage sets, with hand painted and digitally created images. In the postproduction phase, all these visual materials are modified and seamlessly blended by digital technology. For instance, real acting has been the source of the movements and facial expressions of the animated character Gollum through motion capturing and artistic rendering. Scenes were shot with an actor could interact with the other actors. His suit, like the blue screen, made it easier for him to be replaced by his electronic counterpart. The actor lent his “mind, body, and soul” to the cgi (computer generated image) character, while the movie took advantage of the possibility of the impossible with computer graphics. In the director’s words, the choice of a cgi character for Gollum enabled them to replicate his emaciated physique described in the books, which was not possible with an actual actor. Although the digital technology used in this movie is very skilled, it remains a means rather than being an end in itself. The choice of producing parts of Edoras, the Rohanian capital, as an actual built environment rather than generating it digitally is consistent with this approach. Computer graphics could have been an alternative to building a city in eight months for no more than eight days of shooting. In their interviews in the special features section of “The Two Towers”, both the director Peter Jackson and the actors state that the feel of

---

the particular place was so special as to engage them emotionally, something that could not have been achieved in a set.  However, in general shots these actual buildings were complemented by digitally generated buildings and city walls during post-production to achieve the desired appearance.

The opportunities offered by the digital technology are welcomed by this study of Gordion. Besides enabling the creation of virtual Gordion within the means of an excavation and through the initiatives of individuals, the digital medium is convenient for the presentation of this virtual city. Even slightly more than superficial knowledge of an archaeological site makes one aware that the history of a site is far more than a simple succession of events. There are complex, and somewhat contradictory processing going on in an ancient city. In this respect, ancient cities are no different from contemporary cities. For example, the processes of building in the Old Citadel in Gordion were always accompanied by the processes of dismantling. Even if the relative dating suggested for each of these processes was taken to be true, and represented, a single sequence showing them would be hardly intelligible. Although cinema is not without its means in coping with complexity, the purpose of delivering information about an ancient site would be better served by the digital medium. A non-linear narrative consisting of related yet separate clips that can be seen multiple times would communicate the complex processes better by simpler components.

**Network Structure.** The digital medium stores information as a matrix of undifferentiated cells and makes this information available in several different ways. If

47 Lord of the Rings, The Two Towers Special Features Disk
we consider in terms of text, pieces of written work are not necessarily brought together in the format of a book that flows from a beginning to an end. The information that can be offered digitally is far from being confined to text: it includes any form of information that can be transferred to the digital medium. Text, visual and audio files can be brought together to constitute the multimedia.

A digital reconstruction also consists of various fragments of information in different formats. However, the visual materials have precedence, as their language is more accessible to a large audience. Each of the renderings of a digital model as still images and movie clips concerns a specific phase, process or building in the architecture of an ancient city. It is possible to edit these separate pieces into one single movie that has a certain, linear narrative. However, such a presentation does not exploit the potentials of the medium. Rather than a single, linear narrative or a neutral mesh that offers any combination, the pieces of information can be organized as a tree pattern that regulates the senses to be made of the clips and does not strictly define them or leave them to chance. This enables multiple linear narratives to be created within the same structure, meeting the linear narrative’s objective of communicating a meaning in a coherent manner while also responding to the diversity of audience with flexible delivery.

DVD releases of feature movies best illustrate the difference between the conventional movie experience and the digital one. For instance, the DVD version of the “Lord of the Rings” trilogy presents the movies as they were shown in movie theaters, however the movies are divided into chapters that can be accessed from the menus. Each of these chapters belongs in a certain place within the final cut of the movie, but they also
have a unity within, and can be enjoyed separately. The DVD release also includes behind the scenes information that may not be practical to fit into a theatrical release, but enriches the digital presentation and promotion of the work. The various uses of similar material from the movie in theatrical trailers, presentations for the TV, and production information also hints at how the movie clips can be organized in different ways to stress different aspects of the same work, or to create different meanings.

**Interactivity.** One asset of the digital medium is the possibility of interaction between the viewer and the information presented. The technical capacities of the medium make it possible for it to process the viewers’ inputs and respond accordingly. The visitor of a digitally reconstructed environment can pick the order and the depth in which he/she will view the materials presented. The digital presentations can be designed as a layering of information that goes from more general to more detailed. This structure is open to exploration, but also avoids overexposing the viewer beyond his/her desire or interest.

In addition to regarding the choice of viewers, interactivity is a better learning environment than sheer exposure, as interactivity engages the learner in the process. The degrees of interactivity range from simple audio, visual or text responses to the viewer’s clicks to situations where the computer expects the viewer to respond in specific ways for specific outcomes and culminate in involving the viewer in the reality of the digital medium as an operator, navigator or actor.49

---

The grapheine.com website, designed by a graphic design firm, presents an interesting example of interactive online entertainment. In addition to promoting the graphic products of the firm, the website offers clips that can be manipulated by the site’s visitors. Under the heading “Bombay TV”, a wide range of clips from Bollywood movies are presented along with their original soundtrack. One can pick from these clips, arrange them in any order, and write ascribed subtitles to the conversations in the native language of the movies. The author of this new work can save and share it online.

Similar entertainment is available with clips from old black and white movies under Classik-TV, or soccer matches under Futebol TV.\(^\text{50}\)

\(^{50}\) http://www.grapheine.com
Chapter 4

SOURCES AND METHODS OF RECONSTRUCTION AT GORDION

This chapter explains the architectural interpretation of Gordion as an archaeological site. This interpretation is based on current and documented evidence from Gordion and related sites, and translates them into architectural design by deriving design principles by studying Phrygian designs. The digital presentation of Gordion is built upon the archaeological evidence, the process of reconstruction based on this evidence, the outcomes of reconstruction, and finally the relationship between the actual and reconstructed environments.

The suggested structure for this presentation is an interactive web design that comprises historical, archaeological, and architectural information about Gordion. While the spatial aspects of Gordion would best be described by visual media, some text is necessary for further explanation. Visual materials would include real time Virtual Reality, digital clips and images, photographs, maps and real footage. The clips focus on how the reconstructions derive from available information, as well as simulating the processes of construction and spatial experience. Because Quicktime VR has a spatial interface that can link sets of data to hotspots on certain locations, it offers a good medium of navigation for various types of visual information. In the design of the necessary interface, Phrygian content and style would dominate. Characteristic patterns, like the Phrygian meander, or representative pieces of art like decorated vases are examples of visual cues that can guide such design.
Archaeological Remains

Archaeology explores the physical remains of a past culture as a means to describing the life that once populated these places and used these objects. Even after the findings have been carefully studied and recorded, a new study of the remains can add to or challenge former views as to the meanings of these remains. A study cannot exhaust the potential of archaeological remains: new meanings keep emerging in parallel with the changes in the cultural or scientific background such as new research techniques, or a new paradigm. The fact that archaeological sites are continuously fresh, dynamic sources of information is but one reason for their preservation.

Figure 65: General view of the excavated area

Tumulus MM. At Gordion, the Midas Tomb is a good example of historic structures that are well preserved in their location, and rich with secrets to be explored. Therefore, the reconstruction of the tomb is basically the translation of measurements taken from the structure into a three dimensional digital model. However, it is readily obvious how reductive this process is. An imaginary grid is set up, from which the furthest extensions
and elevations of each building member is measured and recorded. These members consist of irregularly shaped juniper logs and squared pine timbers, which have deflected and bent at different points in different angles. In the digital model, the wooden elements are restored to a non-deformed state based on measurements from key points that are assumed to be in their original locations. For the sake of simplicity, these elements are represented as conical shapes with grooves or as prisms. Some measurements are taken from scarcely reachable points and all measurements are rounded off to the nearest centimeter.

Figures 66 and 67: Photograph of the west wall of the tomb (http://www.livius.org/a/turkey/gordium/tomb_chamber2.JPG) and reconstruction of the tomb from southwest corner

It may be possible to produce a more faithful representation of a standing structure by 3-D scanning. However, leaving aside the practical difficulty of this option in terms of cost or operation within the tomb environment, a simplified model can better serve the purposes of understanding and communicating how the building was put together. Besides the exploration of the tomb’s structural properties, this study seeks to exploit the potential of this simpler model in conveying its spatial quality. Realistic renderings with light effects and material assignments including digital images from the tomb’s surfaces are employed to this end. The general configuration of the tomb
structure as a rectangular prism covered with a saddle roof can also hint at the general configuration of the buildings in the Citadel Mound. Besides, features like the gutter that is visible on the western edge of the roof suggest that similar details may have been used with the Citadel Mound structures.

![Figure 68: View of the palace area with Megaron 4 in the foreground](image)

**The Citadel Mound.** The Citadel Mound, unlike the tomb chamber in Tumulus MM, offers far less to be seen to a contemporary observer. As a measure against rapid weathering, Megaron 1 has been reburied while the floors of Megarons 2 and 3 have been covered with earth and their walls have been encased. Long before any excavation, the formation of a mound involves the destruction of earlier stages of settlement by each consecutive phase. It has been common practice to dig for building materials when building on a settlement mound. Besides confusing the archaeological record, this habit has left much less of the buildings. In some cases, what remains of a building is the void left by its foundations while its stones were ripped off. The structures in the Old Citadel are slightly better than those in the New Citadel in that they usually stand to a height of approximately 1 m. with some architectural details, thanks to the fire that rendered their
stones useless for subsequent builders. The walls of Megaron 2 bear another interesting architectural clue: doodles that seem to represent building façades with saddle roofs and akroteria as can be seen in figure 48. The few surviving remains of the New Citadel include some architectural terracottas that offer invaluable information about the surface treatment of the buildings in the New Citadel.

The Gate Building of the Old Citadel is an exception: it stands at a height of 10 m. and preserves a sense of architectural enclosure. Going into the city up the ramp through the gate is one of the very few spatial experiences from the ancient city that can still be replicated. This is true despite the fact that it is reduced from its original height, parts of it have been taken down during the big rebuilding project in the Old Citadel, and it has suffered considerable weathering damage. The tapering stone walls consist of faces of cut stone and a rubble core, with layers of timbers against tension. Patches of the original mud plaster can still be seen on the walls.

Right above the Old Gate, with a slightly different orientation is the Gate structure of the New Citadel. What can be seen on the site today are some of the lowest course of stones from this gate, its rubble foundation covering some of the Old Citadel Gate and
fortifications, and the stepped glacis leading up to the gate from the plain. From the short segment exposed, the glacis seems to have a pattern of projections and recesses.

A. Archaeological Documentation

Archaeological documentation is selective by nature. Because the full complexity of even the simplest object can never be fully captured in any recording format, the significant aspects of the object to be documented are selected. The decision about what these significant aspects are depends partly on what the excavators expect to see when they excavate, which may limit what they can actually see. There is difference between excavation photographs and drawings: while the former may present details that were never mentioned in reports, and do not appear in drawings; the latter seem quite limited. This is due to the relative levels of selectivity between these two forms of documentation: unlike a drawing that has to be simple, a photograph records every detail within its range even if the photographer does not see them. However, photography also records only the frame which the photographer considers to be significant.

Despite the limits set by the selectiveness of the documentation process which sometimes casts doubt on its reliability, reconstruction may have to be based on archaeological documentation. Most of the time, documentation is all that remains of ancient buildings after excavation, because the excavators proceed by removing layers of settlement as they dig down for earlier levels. The reliability and thoroughness of this documentation usually depends on the rigor with which the excavation has been carried out.

In the case of Gordian, the reconstructions of the Citadel Mound rely mostly on archaeological documentation. During the excavation in the levels of the Old Citadel,
detailed survey drawings accompanied the archaeological work. However, this careful
recording has been done almost exclusively for these levels. Due to an understanding of
archaeology as a quest for the mythical and the monumental that strove for the city of
Midas, the New Citadel excavations have not been recorded nearly as well as the ones in
the Old Citadel. Ironically, while new developments in the theory of archaeological
practise favors a less heroic and more meticulous work method, current reflection also
suggests that the New Citadel that was so hastily removed might actually have been the
city of Midas. Attempts at the reconstruction of this settlement level rely basically on the
supposed similarity of buildings to those on the earlier level. The plans of individual
buildings and their locations in the city plan are so similar as to suggest a similar
architectural configuration overall.

Some of the most useful archaeological documents from the earlier phase of
Gordion excavations are the excavation photos. Because photographs are less selective
than drawings, they can even capture details that miss the attention of the photographers.
A careful examination of the photographs of several stages of excavations of the
megarons brings some such details to the fore. The pebbled floors of Megarons 1 and 2
show a pattern of damage that seems to be related with heavy timber elements falling
during the fire. Patches of pebbles have been lifted off the floor, in the shape of
rectangles, sometimes cutting each other diagonally. These might as well hint at the
piling up of burning timbers one on top of the other as a diagonally braced superstructure.
The floor of Megaron 2 has received special treatment and been transferred to the
Gordion Museum, because it is a mosaic of brightly colored pebbles. Yet the old
photographs of this floor give more information than its current state, because the lifting and mounting of the pebble mosaic was so poorly executed.

Because the New Citadel Gate Building is almost totally gone, most of our current knowledge comes from excavation reports. From the relevant report, the remaining walls of the New Citadel Gate have been measured to a height of 3m. (much lower than its original height), consisting of two 3-course sections separated by an inset with exposed beam ends. It is suggested that terracotta tiles recovered in this area were nailed to these beam ends. This report also presents a restored plan of the gate structure, and mentions a ramp along the face of the outer walls which is now barely perceptible. This ramp provided access into the city, up the glacis and along the city walls, exposing the visitors to the city’s defense that would be positioned at the top of the walls. The direction of the ramp also seems to be related with the warfare techniques of the time, as the visitors to the city would need to walk with their right side to the wall, unprotected by shields that most warriors had on their left.
B. Analogical Evidence

The information gathered from a single archaeological site is usually insufficient in composing a complete picture of the architecture of that site. Archaeological remains are fragmentary and it is uncommon to encounter a building that is more or less intact. Classical architecture, for instance, has abundant examples of buildings in a large territory built with similar principles. These principles have been well studied and can be used to reconstruct a building relatively accurately even if there is little remaining of it.

However, Gordian architecture lacks such a well-defined set of principles. The Phrygian civilization was founded in Central and Western Anatolia, and it had unique characteristics. Moreover, not all Phrygian sites have been studied. It would be justified to say that most of what is known on Phrygian architecture comes from excavations at Gordion. However limited this information may be, it is not without its complements.

Architecture is above all a matter of architectonics, or how a building is put together to serve its purpose and resist the forces of nature. Despite variations of local traditions and conditions, there are consistencies among architectural techniques in comparable areas and eras. Some practices are dictated by very basic physical principles, such as using timber reinforcement in masonry, tapering defensive walls, or weatherproofing walls with plaster that they can be assumed universal. For Gordion reconstructions, Rudolph Naumann’s book on Anatolian architecture has offered examples of how the structures might have been built.
There are also reconstructions of architecture from other Phrygian sites as Pazarli by Mahmut Akok. These are mostly later than the Old Citadel buildings and relatively contemporary with the New Citadel at Gordion. Although these drawings are essentially his interpretations of the archaeological findings, they are nevertheless consistent with the general style of architecture that can be imagined for Gordion based on the finds from here.

However, the most intriguing and prolific evidence for the architecture in Gordion comes from another site in the vicinity: the rock-cut building facades in the Phrygian highlands west of Gordion, especially at the cult center now called Midas City. This site
includes building façades carved in rock faces, with intricate geometric patterns. It is noteworthy that representations of architecture have taken on a ritualistic value when they were transferred from the urban context to nature. For the purposes of reconstruction, these monuments were considered to have closely followed the same design principles as their real life counterparts, because the treatment of timber reinforcements in the buildings on the Citadel Mound at Gordion is beyond what would be necessitated by mere utility. These reinforcements seem to have formed an intricate patterning whose intervals do not fall far from those of the façade monument decorations either. Another interesting aspect of these carvings is their representations of roof framing, which almost look like trussed roofs.

Figure 77: Aslantaş Monument in the vicinity of Afyon (Uçankuş, Hasan Tahsin. Phrygia, T.C. Kültür Bakanlığı Yayınları, Ankara, 2002)

Although there is no evidence from the site about the missing upper sections of the citadel walls, the excavation reports suggest that they were of mudbrick. This seems reasonable, as mudbrick would easily be destroyed as the walls were continuously leveled down for new construction, and mudbrick disintegrates into debris that is not so different from the clay filling of the site. The tops of these mudbrick walls may have
been crenellated, although again there is no direct evidence. Any representations of city walls from the period, including the vivid war scene depictions in Assyrian reliefs, show crenellations. It only makes sense to imagine the city’s defenders taking shelter behind them while shooting down from the openings.

C. The Reconstruction Process

Reconstruction is a process of design in the manner of an ancient civilization. Even with the most faithful reconstruction that is based on abundant and reliable information, the outcome is unlikely to represent exactly what was actually there. Rather, the reconstruction seeks to present what might have been by synthesizing available data.

In Gordion reconstructions, the absence of established architectural principles such as those that abound in classical architecture requires that these principles be derived by the modern designer. As for materials and construction techniques, the excavation reports inform that masonry walls with half timbering were used all across the site. From roof tiles found in the New Citadel level, the roof of the tomb structure, doodles on the walls of Megaron 2, and façade monuments at Midas City, it can be deduced that most of the structures, particularly the freestanding ones, had saddle roofs. All of the megarons have been reconstructed with saddle roofs. The only exception is the Terrace Building Complex, where the excavations yielded burnt chunks of clay and reeds that the excavators believe came from the flat roof covering these structures, at least the anterooms.  

As for overall proportions, the rupestral monuments of the Phrygian highlands have formed the basis for comparison. Megarons have been paired with façade

---

monuments with corresponding door to façade width ratios in order to derive possible height. The possible building proportions derived by this method were also consistent with varying wall thicknesses; that is, the higher the building was supposed to be, the thicker were the walls of the megaron in question. It also turned out that each corresponding façade monument had a different roof shape and pitch, which has been carried over to the respective megarons. In the Old Citadel, there is no evidence of terracotta roofing tiles, and the roofs were apparently covered with clay, or less likely, shingles.

Figures 78, 79 and 80: Drawing of Maltas Monument by Taciser Tüfekçi-Sivas (Uçankuş, Hasan Tahsin. Phrygia, T.C. Kültür Bakanlığı Yayınları, Ankara, 2002), and two possible façade reconstructions for Megaron 1

While the reconstructed Megaron 1 has an overhanging eave as seen in Figures 79 and 80, as well as on the far left of Figure 85, on the sides and has simpler roof profile with exposed mud covering suggested by the soft contour at the top of the façade monument, the reconstructed Megaron 2 has no overhang, and a lower pitch. Of the three, the reconstruction for Megaron 3 is the most conspicuous. While it also has no overhang, its top coating is concealed by decorative planks on the gable, and possibly along the sides. These planks might have been pierced by spouts although there is no such evidence. Megaron 3 also has an acroterion like those depicted on the doodles, as
its sister monuments also does, and an acroterion found on the site offers grounds for at least one building for an acroterion. Besides adding variety and reflecting the façade monuments that were the source for reconstruction, such different treatment of the roofs, can also suggest an architectural evolution as these buildings were built at different times, even though the actual process of such an evolution remains a mystery.

The rows of columns in the main chambers of Megaron 3 and the Terrace Building Complex that can be observed in figure 23 pose different possibilities. In each of these units, a row of posts flank each side of what is essentially a wide central aisle. It is possible that these columns bore a second storey or a mezzanine, which means that the buildings are not to be much less than 6 m. high. The dimensions of Megaron 3 already suggest a greater height than that, but whether or not there was a second storey in this building has consequences for the spatial quality and the supposed use of the building. Assuming that the excavators’ conclusion that Megaron 3 must have been a palace was true, the mezzanine or the upper storey might have been the living quarters, or an extension of the formal palace. While these possibilities were being discussed, an interesting insight was offered by Conor Power, the structural engineer who has developed the conceptual design for the new support system for the tomb chamber of Tumulus MM. He suggested that these posts might have been standing to the full height of the building, making the central space soar up and look more monumental much like a hypostyle Seljuk mosque with timber posts.\(^{52}\)

\(^{52}\) Personal communication with Conor Power.
The posts in the Terrace Building Complex would probably have had less to do with monumentality than with utility. The excavators argued that these posts supported a mezzanine, either for storage of the goods that were being manufactured at a vast scale in this complex, or to house the people who were working here. However, it is also possible that these posts stood higher than the surrounding walls, forming clerestories as in figure 83 to let light and air into the main rooms which would be needed for activities like weaving. These rooms are adjacent on the sides, and have covered anterooms on the front.
As for surface treatment, the Terrace Building Complex lacks the complex half timbering that the megarons in the palace area have. The wood in this structure seems to have been simple vertical and horizontal tension elements. The only sign of decoration is the patterning on the back wall which is created by the slight projection of every other chamber. It also appears that this pattern is repeated by red and beige stones alternating from one chamber to the next. However, it is also possible that this variation is a mere accident, and came from the use of different stones from different sources by separate teams of workers. There is no record of plaster remains on the outside walls, however it is presumable that at least the upper section of the walls was of mudbrick and covered with mud plaster like the interiors, a small piece of which remains stuck to the wall surface.

The façade monuments, as well as similar designs on works of Phrygian art such as pieces of carpentry or pottery, suggest that the megarons were decorated on their exterior surfaces. These decorations were geometric patterns created by interlacing wood with masonry, going beyond structural necessity. Both excavation documents from the site and the façade monuments from the Phrygian highlands are concurrent in the nature of this decoration. The basic element of decoration seems to be the square. A façade is divided up in rectilinear patterns of simulated masonry separated by vertical and horizontal timbers. The spaces thereby created are rectangles, L-shapes, or crosses based on the multiples of the square. This variation on the surface is further supported by the relief of shapes, and squares carved into timber elements. Figure 84 shows an exercise on the Maltaş façade monument marking some of the squares that make up the composition.
The walls of Megaron 1 are made of half-timbered mudbrick, and it is dated earliest among the three megarons discussed here. During the excavations, fragments of stucco was found clinging to the walls, and the greenish color of this burnt plaster led the excavators to thinking that it was a lime stucco that turned this color while it vitrified during the fire. As it appears from excavation documents, the walls all around have a pattern of staggered square masonry panels. The insets left by burning wood suggest that the structural timbers were also patterned by projections and recesses. From the comparison of door to overall width ratios, the model monument for Megaron 1 was found to be Maltaş near Midas City (see Figure 78).
The half-timbered stone walls of Megaron 2 must have been exposed on the outside at least for part of its life because they are covered with ancient doodles depicting scenes from daily life, animals, even building façades. As they were excavated, all the walls were divided into rectangular panes separated by heavy timbers. Although the building has massive stone walls on three sides, there was only a thin timber framework in the front between the porch and the main chamber, and this does not seem to have carried anything more than a lightweight screen wall. The façade decoration of restored Megaron 2 is merely a replication of the timbering at its back wall rather than being modeled on a façade monument. Strong side walls and a flimsy front façade are reminiscent of façade monuments representing Kybele standing in a doorway defined only by two walls or posts and a lintel. Even if these carvings are of a more symbolic nature and their references to actual buildings are less representational, it is somehow tempting to relate this similarity with the religious-public role assigned to Megaron 2 by its excavators.
The half timbering in the side and rear walls of Megaron 3 is neither as regularly shaped nor spaced as those in Megarons 1 and 2. It seems that the decoration in this building was restricted to the front façade where the timbers are regularly spaced and dimensioned. Because it is considered to be the palace and is the largest of the megarons in Gordion, it only seems proper that its matching monument in Midas City is Yazılıkaya. Not only the proportions, but also the horizontal dimensions of these two structures are almost exactly the same. Yazılıkaya is the largest of the monuments in the area, and it has the remains of an enclosed cult area before it. The monument is associated with Midas because his name seems to be included in the inscription carved above it. Although basing the reconstruction on this model restores the building to an astonishing height of about 9 m., this height remains within the limits of possibility because of the wide span and wall thicknesses of the building, as well as the large dimensions for the holes intended for the interior posts.
Conclusion

RESTORING GORDION IN PUBLIC MEMORY AND EXPERIENCE

The purpose and expected outcome of this study is to improve the understanding and appreciation of Gordion among those who know little about the city. Although the name of the city still enjoys fame, its remains are not meaningful for people other than those directly involved with its archaeology. Many people are still attracted to this site because of past heroes and their legends, and these visitors expect to see an environment that matches this glory.

In reality, most of this expected glory has been lost as the built environment has suffered over centuries, through wars, disasters, rebuilding, and neglect. However, the environment can be restored to its former magnificence in the imagination of people. Such restoration could be as compelling as Midas’s wealth or Alexander’s audacity, both of which still occupy the minds and imaginations of people despite the lack of physical remains. The reconstructed images of Gordion can help fill this void. Once they are translated into mental images, visual representations of Gordion can create a greater understanding of the city and civilization that are now grasped by fleeting words and phrases, and glimpsed by crumbling remains of buildings and disconnected artifacts in museum displays.

An image can offer a stronger feeling of presence for Gordion for people everywhere. However, this is all the more important for those people who visit the site with a desire to experience the past first hand. For most people, it is easier to visualize buildings in a place when they see images of it than it is when they see but subtle traces.
If reconstructions display the relationship of architecture to the actual environment, people will be able to project these reconstructed images onto what they see. Being in an historic environment is an intense experience, which can be enhanced by reconstructions when this environment has degraded. Even knowing that many of the hills surrounding Gordion are actually tumuli changes one’s perception of the nature of the area from merely “natural” to Phrygian.

The public is entitled to sharing archaeological knowledge. While the expertise of archaeologists is indispensable for interpreting remains, the communication of their findings that are significant to the general public needs to be accessible to non-experts. The professional boundaries strengthened by specialized language and representation techniques usually better serve communication among peers, but hinders accessibility outside professional groups. Keeping archaeological knowledge within a closed circle of experts actually makes no sense, as archaeology for the archaeologists’ sake has no justification.

There is indeed popular interest in archaeology. Like most popular things, it is often based on sentiment rather than reason. Likewise, however rigorous it may be in its methods, the motivation for archaeology is in its essence emotional. Archaeological knowledge can be presented in an appealing way, so that the people who wish in vain to have their picture taken where Alexander cut the Gordian knot can find something equally interesting and worthwhile to do. To this end, archaeology needs to collaborate with design professionals as mediators between information and emotional appeal.

Getting the general public interested and informed about historic environments would also serve to enhance preservation. In cases when the preservation of sites
measures conflict with the short term interests of individuals, or requires restrictions on
their use of places, preservation seems to be imposed from a higher authority that is
indifferent to persons. It is not uncommon for preservation to be seen as a hindrance to
development. Heightened public awareness of the past can therefore contribute to the
understanding that not only the most spectacular monuments, but also environments are a
part of cultural heritage. Hopefully, the people who are conscious of their strong
connection to historical places will be voluntary preservationists.
BIBLIOGRAPHY


Hancock, John., “Earthworks: Virtual Explorations of the Ancient Ohio Valley”, unpublished implementation report for the National Endowment for the Humanities, 3 February 2003


Serrato-Combe, Antonio., “The Aztec Templo Mayor – A Visualization”, Publication for Symposium Architecture that isn’t There, 2005


Sobchack, Thomas and Sobchack, Vivian C., An Introduction to Film, Boston: Little, Brown, c1980


Websites

http://www.catalhoyuk.com/

(http://www.csulb.edu/library/new/news/piranesi.jpg)

(http://www.electaweb.com/electa/media/caracalla_viollet.jpg)

http://www.grapheine.com

http://www.imdb.com/

http://www.learningsites.com/Frame_layout01.htm

List of Movies:


Berlin, the Symphony of a Great City [videorecording] (Berlin, die Symphonie der Grossstadt); [presented by] Blackhawk Films; production, Fox-Europa Film; supervision, Karl Freund; a film by Walther Ruttmann, 1927


Indiana Jones and the Last Crusade, Lucasfilm Ltd. And Paramount Pictures, produced by George Lucas and Frank Marshall, story by George Lucas and Menno Meyjes; screenplay by Jeffrey Boam, directed by Steven Spielberg; 1989


Man with a Movie Camera (Chelovek s Kino-Apparatom), written and directed by Dziga Vertov; cameraman Mikhail Kaufman, 1929

Playtime, presented by Jolly Film and Specta Films; produced by Bernard Maurice and René Silvera; written by Art Buchwald, Jacques Lagrange and Jacques Tati; directed by Jacques Tati, 1967