

Paper Space: The Library of Nysa Revisited

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Abstract A computational environment for the description and interpretation of three existing architectural reconstructions of the Hellenistic library of Nysa is presented and several new interpretations based on the original language are suggested as outcomes in the computation.

Introduction The history of the architectural form of the ancient library is still an unresolved puzzle. This history is typically confined to a very small corpus of ancient writings and an equally small corpus of surviving monuments including buildings such as the Hadrian Library at Athens, the Trajan Library in Rome, the Library of Celsus at Ephesus and few more. A part of this puzzle is the lesser known library of Nysa in Asia Minor, a Hellenistic monument of the 2nd century CE, currently under excavation.

The project here takes the case of the library of Nysa and proposes a three-dimensional immersive computational environment that permits a critical description of all existing proposed architectural reconstructions. The key idea behind this proposal is that all existing architectural interpretations can be seamlessly retrieved in whole or in part and juxtaposed one upon the other from any angle nonesover revealing aspects that typical pictorial representations do not achieve. Perhaps more importantly from a pedagogical standpoint, new recombinant versions can be produced to suggest valid hypotheses about the initial state of a monument. The computational tool of the analysis is based on shape grammars (Stiny, 2006, Knight, 1994) and the implementation technology with the coding of the vocabulary of the library and the design of the interface is based on Unreal Engine technologies (Busby, 2002).

The ancient library The modern definition of a library as a public institution where books are stored and are accessible to the public has its origins in the fourth century BCE. By the second century CE libraries had been developed into complex institutions with a highly trained

staff and a series of specialized spaces for reading, lecturing, copying, repairing, etc. (Boyd, 1915; Casson, 2001). Figure 1 shows some of the most prominent libraries of the Greco-Roman world. All libraries are drawn in the same scale to illustrate their comparative similarities and differences. Most contextual relations are omitted and only the very adjacent buildings or complexes are shown. From left to right: a) Academia of Plato; b) Library of Pergamon; c) Palatine Library, Rome; d) Hadrian's Library, Athens; e) Militine Library, Pergamon; f) Ulpian Library, Rome; g) Celsus Library, Ephesus; h) Neon Library, Sagalassos; i) Library of Nysa; j) Rogatinus Library, Timgad; k) Library in the Baths of Trajan, Rome.

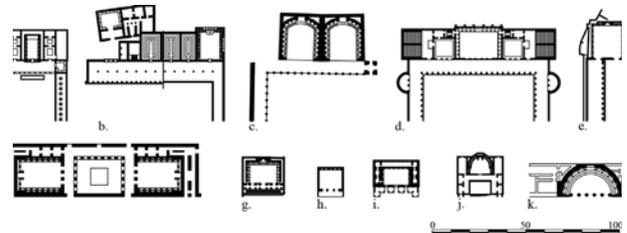


Figure 1. A pictorial representation of some ancient libraries drawn in the same scale.

The Library at Nysa Nysa in Meander in Asia Minor has been known primarily through the writings of the historian and geographer Strabo, who studied there (Jones, 1917). A series of archaeological excavations since the beginning of the twentieth century have identified a building in the west side of the city with a library (Diest, 1913; Kourouniotis, 1924; Idil, 2003). The telltale sign of the



identification of the building with the ancient library is its striking similarity with the contemporary libraries of Ephesus and Sagalassos, both built in the second century CE and relatively close to Nysa – and mostly the podium, the niches and an auxiliary support space for prevention of humidity, all significant characteristics of Hellenistic and roman libraries (Makowiecka, 1978; Johnson, 1984).

The building is oriented along the north-south axis of the city and has its major entry to its wide side to the south facing the gymnasium. The building proper consists of a central rectangular space and a series of auxiliary rooms and corridors organized around it on two sectional levels along the east, north and west side. The overall structure has dimensions about 28 by 15 meters and the central hall 14 by 9 meters. The east and west walls have each three niches for books developed in two sectional series.

There is no consensus about the possible initial form of the library. Three major theses about the design of its initial state have been given so far by Diest (1913), Hoepfner (2002) and Idil (2003). Still, current excavations, led by the archaeologist Strocka are under way and they promise new data for the solution of the problem. Figure 2 shows the three different existing proposals by Diest, Hoepfner, and Idil.

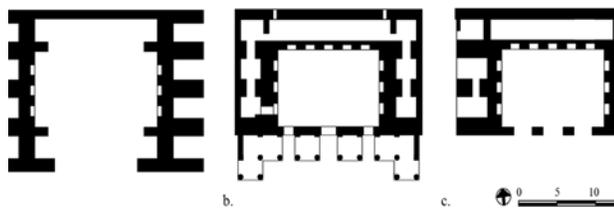


Figure 2. Alternative realizations of the plan of the Library of Nysa a) Diest b) Hoepfner c) Idil

All above interpretations offer different realizations of the building. Moreover, the typology of the library, as suggested by the corpus of the identified libraries in the whole roman world readily suggests more variations too. A more systematic superimposition of those proposals is needed to make clear which could be possible and which not.

Application The application consists of three main components: a) the carrier space with the current state

of the site and the ruins; b) the invariant architecture with all the architectural elements and site conditions that remain invariant in all reconstructive versions; and c) the variant architecture with the architectural elements and site conditions that vary in some degree in all reconstructive versions – historical and logical ones; Details about all three components of the design of the application are presented below.

The geometry of the carrier space includes the geometry of the existing site and the ruins and has been based on topological maps of the contemporary geological condition as well as point data, archaeological drawings, and photographs. This component of the application has been rendered in a realistic manner with photographs from the site and monument taken by the authors.

The three-dimensional model of the invariant architecture has been constructed from scratch following closely the published drawings of the three reconstructions and keeping only those parts of the drawings that were common in all versions. The model comprises as well the geometry of the reconstructed contextual space. This component has been rendered in black and white hidden-line drawing fashion to approximate architectural conventions of representation and simulate aesthetically the rendering of depth in the medium of drafted architectural drawing.

The three-dimensional model of the variant architecture is the most complex of all and comprises all the alternative architectural elements such as roof structures, stairs, interior galleries, windows, porticoes and so forth. More importantly these options have been further decomposed in smaller units to allow for variability and flexibility in the sequencing of reconstructive scenarios. All options have been organized in an overlap chart to foreground theoretical combinations and potential incompatibilities between the versions (Mitchell, 1994). As before all models have been rendered in black and white hidden-line drawing fashion.

The design of the interface of the application addresses two different functions: a) a seamless translation between the existing world and the valid architectural



reconstructions within the same perspectival framework, and b) an intuitive access to the permissible rules at any stage during the immersive visit within the virtual archaeological site the construction of the variations.

The first function of the system has been addressed with a slider that allows the superimposition the retrieved geometries over the ruins. The user has the op-

tion to choose the level of transparency from 0% to 100% and either to navigate in the ruins or in the reconstruction, or in both worlds at any time. Figure 3 shows two alternative settings of the virtual environment for two different levels of transparency.

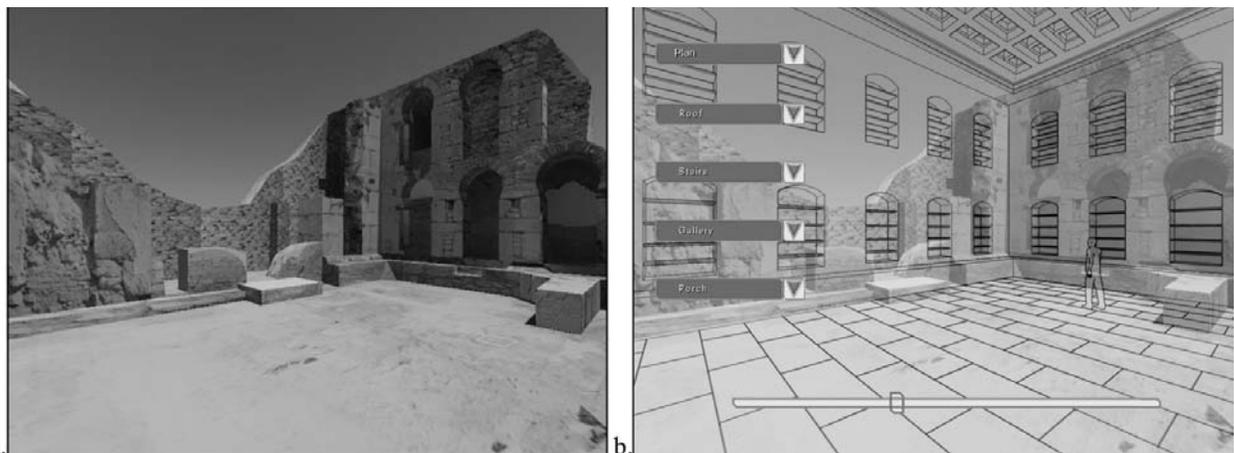


Figure 3. View of the virtual environment with transparency set a) to 0% and b) to 50%.

All programming of the application has been written with UnrealScript, the scripting language of Unreal2Engine Runtime, a current powerful game engines technology. The specific engine has been chosen here because it has an easy workflow with common three-dimensional modelling

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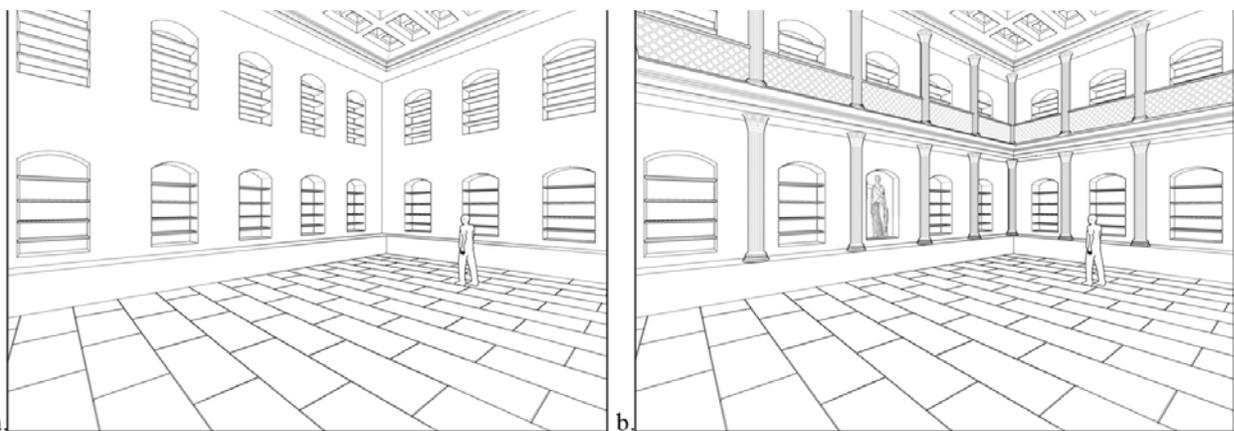


Figure 4. View of possible variations of the northern and eastern facade of the main hall.



software, it has pre-existing agents, a large knowledge-base, and is accessible by everyone –it is free for academic purposes. Everything in the world apart from the agents and terrain function were done through scripting to control interface issues related to transparency, interactivity, menu, and state management.

Discussion The description of a software application for an immersive, active and constructive understanding of the archaeological evidence for the Library of Nysa in Asia Minor was given briefly. The problems with the description of the library type as an architectural type were briefly introduced and the library of Nysa was presented as a case study that instantiates several of the key characteristics of this class of buildings of antiquity.

The first run of the project brought to the foreground several exciting elements: a) the three-dimensional representation of the three models and their variations revealed a good gap in the initial dataset and suggested a generous look on existing languages of Hellenistic and Roman architecture to supply a vocabulary to complete the building; b) the construction of all three existing variations in terms of a common dataset brought to the foreground several similarities and discrepancies among them that were tacitly assumed; c) the attempt to simulate the convention of architectural representation with typical software showed the incredible complexity that is deeply founded in this mode of pictorial representation, and d) the ability to critically reflect upon a given set of archaeological evidence and even more importantly to propose valid architectural designs that can be immediately tested, situated the project in the thresholds of the domains of architecture, archaeology, design cognition and computer graphics and within these terms it drew upon them all.

The next major goal for the project is the exact delineation of the shape grammar of the library of Nysa and of the library type of the Hellenistic and Roman world at large – not a small project in its own right given the immense repercussions these early buildings have played in the evolution of the library type itself.

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