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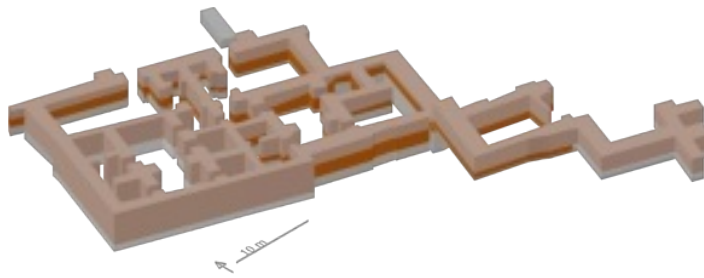
Three-dimensional
Volumetric Analysis
in an Archaeological Context

The Palace of Tupkish at Urkesh
and its Representation

Federico Buccellati

Urkesh/Mozan Studies 6

Three-dimensional Volumetric Analysis: the Palace of Tupkish



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Federico Buccellati

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The volume offers a detailed architectural analysis of the Palace of King Tupkish, built around 2250 B.C. and of the process of construction by examining the steps in the process through the chaîne opératoire method.

In order to quantify these steps, the volume deals extensively with methodology through a series of algorithms by which the energetic investment in a construction project can be quantified. These algorithms are applicable in general to structures in stone and mudbrick, and can be used to define and compare the cost and value of such structures in a meaningful way. This allows the archaeological record to play a central role in wider theoretical discussions such as questions relating to monumentality and prestige or the economy and the social setting that made the construction possible. This methodology proposes an objective standard of measurement that can be used beyond the case study presented here.

By combining the understanding of the individual steps in the process of construction with the general algorithms and the volumetric measurements from a precise 3D model of the Royal Palace, this study calculates the effort needed to construct the building.



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to my parents

“If I have seen further it is by standing on ye shoulders of Giants.”
- Isaac Newton

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Foreword

This volume by Federico Buccellati deals with a theme that has developed from his many years of work at the excavation in Tell Mozan (Northeast Syria) – the analysis, interpretation and reconstruction of the AP Palace from the 3rd millennium BC. In general, it should be stated that this monograph is an unusual, very impressive work – here is not a 'compendium of data' of digging results, but a very highly theoretical treatment of an architecture complex at a high intellectual level.

Striking is the use of the *chaîne opératoire* method for analyzing the individual steps of the building of the palace – a method that has increasingly become the focus of archaeological research in recent years, albeit seldom applied to architecture. The method is based on the assumption that technical processes and social actions can be understood in a step-by-step analysis. The implementation here has been highly successful, not only on the technical side but also including the social dimension (commissioning ruler, workers) – in particular the inclusion of the Garshana texts, references to the work process, a consideration of the persons involved and a study of the working time make this study such a success. Thus, it becomes possible to reconstruct not only the society in which the architectural complexes were created, but also the social context, the actions and the ideas connected with the building. As an example, the author uses elements of sociology to consider architectural forms, analyzing the effects of a physical environment on social behavior, such as communication, by means of sensory perception – acoustic, optical, haptic, olfactory.

Striking is also the verification of the analytical and material- or production-related results by means of theoretical models. For this study two 'qualities' are selected and pursued from the multitude of possible approaches: ethno-archaeological and historical analogies. This ability of the author to reformulate the ideas developed in other contexts for his own line of questioning can be seen in the inclusion of the exhibition concept "Shrinking Cities" in the German Architectural Museum, Frankfurt am Main in 2007-08. The ideas developed in the exhibit (which was neither archaeological nor centered on the Ancient Near East) were applied by the author to the reconstruction of the urban texture in the Ancient Near East, in particular for the case of Tell Mozan / Urkesh. The author consistently goes far beyond the presentation of the archaeological findings and attempts to develop approaches which aim to understand the human and social conditions tied to the

architecture. In developing these approaches, the value of digital 3D models becomes clear as a heuristic tool for analysis, especially in regard to the interpretation of architecture. A large portion of the volume is thus the presentation of the methodological foundations (BlockGen) and the development of these 3D models. This software is based on AutoCAD and can be integrated into a GIS program, which can be extended by means of animated animation programs (lighting, possibilities for walking through, avatars). This allows the user to experience the 'real' experience of the relevant architecture and its environment, while at the same time providing a deeper understanding of the interpretation of archaeological field work. At the same time, 'primary data' in the archaeological record, such as different stratigraphic observations, can be relatively easily integrated. Thus the 3D model developed can already be supplemented during the course of the excavation and possibly used to alter the excavation strategies in realtime. In addition to providing an environment in which to experience the architecture and integrate diverse archaeological data, it also provides a didactic platform: this tool can be used as a portal for a wider public to encounter and understand archaeological results.

This volume presents an extensive body of excavation material which has been expertly documented, interpreted by means of an impressively innovative approach. This approach, as well as the theoretical considerations, speak to the wide impact that this work will have in our field, while at the same time being a real pleasure to read.

Jan-Waalke Meyer

Preface

My initial interest was in providing a documentary description of the AP Palace, in the excavations of which I have taken part since the beginning. In particular I was responsible, in whole or in part, for the excavation of units A10, A13 and A16. The publication of the AP Palace as excavated is presented in chapter 2.

At the same time, I developed a strong interest in two aspects of architectural analysis that went beyond the “philological” dimension, in two parallel directions.

The first aimed at understanding the architectural process as it took place in antiquity, with regard to the way in which a structure would be both constructed in practice and planned in a design phase. This has involved me in a serious confrontation not only with the underlying theory, but also with a project of experimental archaeology with which I tested some of the inherent assumptions. The use of the *chaîne opératoire* method helps to see the individual steps as a series of linked moments in a complete process of construction. While the *chaîne opératoire* method can aid in understanding the individual steps, what is still needed is a way to quantify the energy (in terms of manhours) needed for each step. Thus the analysis of the process of construction is augmented by a series of generalized algorithms designed to determine the cost in terms of energy for as many of the steps detailed in the *chaîne opératoire* as possible. This is presented in chapter 3.

The second theoretical aspect that I developed pertains to the use of 3D modeling not only as a technical tool, but as the application of a method that impacts the field of archaeology by showing how a 3D model is a tool for research. My main effort in this direction was to show how the development of a flexible tool for creating recursive 3D models in the field would help in a major way to produce a record at a higher level of documentary sophistication, and integrate it with the ethnographic data in order to quantify the specifics of construction. The model of the AP Palace is thus more than documentation: it is a tool with which one can calculate, through the general algorithms defined in chapter 3, the 'cost' in energy of choices made in the construction of the Palace or study questions regarding visibility. I argue for this in chapters 5 and 6.

The ability to link the archaeological data on an epistemological level, with questions on an interpretative level, such as prestige, is a fundamental aspect of the research presented here. Often questions which focus on

theoretical, social or interpretative aspects are not directly tied to the archaeological data, and this problem is particularly felt when speaking of architecture: this study presents a method for how to link, on a very specific level, data and interpretation.

In dealing with these aspects of analysis a number of themes arose on a theoretical level which, because of their level of abstraction, were tangential to the discussion being made in each chapter. However, these theoretical themes have influenced the work I have done and help contextualize the material being presented – thus they are included in chapter 4.

I feel that this approach yields rich results for the understanding of an otherwise mute ancient record and for an innovative use of techniques that are typically invoked as an after the fact, *deus ex machina* type of intervention.

Federico Buccellati

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