Monumentality: Research Approaches and Methodology

Federico Buccellati

Having discussed a terminological framework for monumentality in the previous chapter, the next step is to focus on the means by which monumentality can be explored in diverse archaeological and historical contexts. One of the most important and debated problems related to the term 'monumentality' in such contexts is the question of perspective.[1] When the modern public sees a monument as 'monumental' they do so from their own perspective – while this certainly has validity, also within our discipline, as scholars we strive to understand ancient architecture within the context of the ancient society that constructed the edifice. This challenge, which lies at the core of archaeology in general, is particularly relevant when considering the longevity of architecture: as our modern built environment is heavily conditioned by architecture built by previous generations, adapted and repurposed to suit current needs and institutions, so too were ancient buildings reused over generations and modified to suit the changing needs of ancient societies. Thus, studies on ancient monumentality are, on the one hand, hampered by these changing constellations of meaning, but on the other hand benefit from them as they show the link between diverse functions (e. g. institutions) and monumental structures over a wider chronological span.

This chapter aims to investigate the methodological approaches and tools that scholars have at their disposal to explore monumentality in ancient societies. These are fruitful only in some contexts, and provide only incomplete answers to questions relating to monumentality; nevertheless it is only by means of such approaches and tools that questions relating to monumentality can be addressed through documentation in the archaeological and/or historical record. Many of these approaches are used to explore diverse research questions in a wide gamut of archaeological contexts – the aim here is only to elucidate how they can be used to explore monumentality, what problems are inherent in their use, what other complementary approaches might be used, and to give a limited range of examples. Thus a detailed explanation of the diverse methods will not be provided, rather only each method's applicability to the question at hand.

1 See also the chapter by Levenson this volume.

The tools can be grouped under six general categories as follows: (1) construction process, (2) context, (3) building as source, (4) perspective, (5) interpretation (in a narrow sense), and (6) building as object.[2] Several tools could be considered as pertaining to more than one category, and in such cases the most pertinent has been chosen.

1. Understanding the construction process

One of the most useful tools in understanding monumentality in ancient contexts is to analyze the construction of an edifice. Such an approach lends itself to understanding the investment, in terms of labor-time and resources, required for a construction. To understand the steps required in a construction, a *chaîne opératoire* can be produced to discern the individual steps in the whole process. By combining the understanding of these steps together with calculations based on the time required for the individual steps, the cost (in terms of energy) required for a construction can be calculated based on a precisely measured edifice. Parallel to an examination of the materials, for some contexts a study of the workforce is possible, both in terms of skills and composition of the labor force.

1.1 Chaîne opératoire

Chaîne opératoire is a well-known method for investigating the process of production, behavior and use of technology; it is primarily applied to objects, particularly lithics (Lemonnier 1986; Bar-Yosef et al. 1992; Gamble 1998; Bleed 2001; Martinón-Torres 2002; Schlanger 2005; Bar-Yosef and Van Peer 2009). One of the strengths of this method is the combination of technological process and the production organization which reflects social processes. A term employed in English is 'operational sequence', and this is often used as a synonym for *chaîne opératoire* despite a few differences. One aspect of the *chaîne opératoire* method which differentiates it from 'operational sequence' or 'operational chains' of the English-language literature is the focus on the cognitive processes involved (Julien/Karlin 1994; Bleed 2001: 105–108). Bleed (2001: 118) suggests that the *chaîne opératoire*, arising as it does from the French Humanist tradition, places more emphasis on the cognitive aspect of such modeling, as opposed to the sequence models more prevalent in the American tradition: such sequence models tend to focus more on material aspects (Bleed 2001: 114).

2 A list of methodological approaches and tools was made by the participants in the Size Matters workshop during the final discussion and formed the point of departure for this article. These approaches and tools were then subsequently divided into these categories by the author.

A further term which is sometimes used in conjunction with *chaîne opératoire* is 'behavioral chain' but this term brings time and space into the analysis of the activity (Schiffer 1975a), which produces a specific study of a specific event in a specific space, as opposed to the *chaîne opératoire* which produces a more general sequence which can be applied to various events in various places. Behavioral chains reach this level of abstraction in a second stage, in their contribution to the formation of cultural transformations ('c-transforms') and the interaction of humans or objects through natural agents ('n-transforms' – the cases in behavioral chains where the energy source is non-human, for example) (Schiffer 1975b: 1999).

Four studies which approach architecture using such a methodology are: F. Buccellati for Syro-Mesopotamian Architecture (2016), V. Izzet for Etruscan Architecture (2007), K. Ryan for Dorset Architecture (2009) and C. B. Smith for the Egyptian Pyramids (2006).[3] There are some methodological differences between the application of the *chaîne opératoire* to lithics as opposed to architecture which should be noted. The first is the diverse end-products: in a sense, lithic production can be compared to the production of each of the individual elements making up a building – mudbricks, roofing beams, stone blocks, plaster etc. These elements are, however, not entirely 'understood' unless considered in the wider perspective of the construction as a whole. The second difference between lithics and architecture is the diversity in the skills of the actors and the materials that they use, even when considering the complexity of the construction project as a whole. While in lithic production actors, tools used, operation locations and materials are rather limited, the study of architecture entails much greater diversity. Finally, the last link in an operational chain dealing with lithics is the moment of discard; the last link when applying this method to architecture is more difficult to distinguish.

Despite such differences, which can greatly complicate the analysis of a structure, the *chaîne opératoire* method can be of considerable use when looking at monumentality since it helps scholars discern individual choices made during a construction project. Some choices will be conditioned by material availability, the topographic context, or other compelling factors. Some of the choices, however, may turn out to be a choice between two viable options, and it is in analyzing these alternatives and the final decision taken that the monumentality (as perceived by the ancient society) of a structure may come to light.

1.2 Energetics

By using energetics as a tool to explore the concept of monumentality, one is led to examine specific elements of the constructed space, looking in detail at the reasoning behind specific choices made at the moment of planning and construction.

3 See also Knappett (2011) on the chaîne opératoire method.

Sometimes the reasoning behind the decision is based on an improvement to be had on the technological level, but in some cases a social or ideological level can be posited.[4]

The following quote regarding Mayan architecture can help in understanding the relevance of energetics in this context:

> "Architecture, as a collection of raw and manufacture components, is translated into the composite cost of procuring and transporting those materials, manufacturing necessary parts, and assembling the final product." (Abrams 1994: 2)

Further:

> "The analyses focus on the comparison and interpretation of collective measures of architectural cost rather than on the more symbolic or psychologic dimensions of the architecture, although these factors are in reality not disarticulated" (Abrams 1994: 7)

An example of the usefulness of energetics in determining value is related to how one can ascribe meaning to specific choices made in constructing a monumental building. In a discussion of construction and considerations of the materials, one sees how the use of stone in the building meant a greater expenditure of work or energy than would have been the case had the building been built entirely of mud-bricks. One is led to ask why this material was used; there are clearly technological benefits to stone, primarily its ability to block humidity rising from the ground into the walls and damaging them. However it is a further interpretative step to say that stonework is linked to the definition of the structure, be it either to say that the use of stone (in parts of the structure or its entirety) is a symbolic necessity or to say that only the economic/energetic resources available to a specific person or institution could have constructed buildings out of stone – both considerations which tie directly into our definition of a building as 'monumental'. It is energetic analysis as a tool which allows one to show that a certain choice (use of stone, fresco, or secco painting of plastered walls, wide rooms necessitating unusually large roofing beams) implies a cost which can be put in relation to other similar calculations. These other calculations can be derived from the same structure, or from a typologically similar structure, or can even allow for a hypothetical comparison to a case where a different choice had been made for the same building. Thus a stone-paved courtyard can be compared, in terms of energetic cost, to other beaten-earth courtyards in the same building, or to other stone-paved courtyards in another typologically similar structure, or one can compare the stone-paved

4 As to some of the problems inherent in this line of questioning, see Meijer (2008).

courtyard to the hypothetical case of the same courtyard paved in baked brick.[5] There is, in other words, a correlation between costs and the final result: one may say that monumentality comes at a price – and to the extent that we can gauge this price (always keeping in mind the limitations of the data available as well as all of the factors that a 'cost' based approach leaves out), we get a better handle on what the monumentality meant to those who produced it.

1.3 Costly signaling

Linked to studies of energetics are analyses based on costly signaling; this approach attempts to see expensive (in a broad sense, including imported materials, advanced technical know-how, or labor-intensive work) elements of architecture as being vehicles of communication. This approach is derived from biology, where animals lay claim to desirability through physical attributes or works. It has been applied to literary texts by R. Corbey and A. Mol in an article where they analyze the weapons within the saga of Beowolf as elements of costly signaling (Corbey/Mol 2011). Its usefulness in the study of monumental structures lies in the focus on 'costliness' as communication, whereby the cost of aspects of a building (materials used, decoration, or size to name a few) are examined as a 'signifier' (in the sense of Saussure's *signifiant*). Combined, for example, with energetics, this type of analysis can aid scholars looking at how investments in certain rooms or areas of a structure, as well as the specific choices made during construction regarding materials used and techniques employed, may have been aimed at impacting specific audiences. Whereas energetics looks at the costs of building the structure as a whole in terms of materials and labor costs, a costly signaling approach considers the impact of the most costly elements in terms of audience, allowing scholars to add a consideration of the human aspect or human impact to the more abstract and material-oriented energetic analysis.

1.4 Organization

A further aspect of monumentality is the way in which the necessary workforce was organized. While not all monumental structures were built by workers organized under a higher authority, and not all work done by such a higher authority is necessarily monumental, still the workforce should be taken into account when ascribing 'monumentality' to a construction.[6]

5 For more on energetics see also the articles by Hageneuer and van der Hyden, as well as by Hageneuer and Schmidt, in this volume, as well as the online resource www.EnCAB.net by the author.

6 For more on labor refer to the chapters by Levenson and by Bernbeck in this volume.

There are several ethnographic studies detailing how workers can be organized within pre-industrial societies, and some textual information from the Old Babylonian period (c. 1800–1600 BCE) in particular (Burke 2008: 146). Without detailed records it is difficult to propose specific models for individual construction projects. However, these studies do give general parameters for various systems, and can be useful when considering the general parameters of worker organization within monumental construction projects.[7]

Two workforce systems play a primary role in many pre-industrial construction projects: the *corvée*-system and slavery. These two systems can be identified in the Garshana archives (Heimpel 2009: 45–90) in great detail; this archive dates to the Ur III period of Mesopotamia (c. 2100–2000 BCE), and the extensive archive provides a fascinating look into the day-to-day workings of a large building project. It is important to keep in mind, however, that the *corvée*-system is a modern term which is used to define a work relationship which predates the term by millennia, and is thus to be seen as an analogy which should be used only in so far as it helps understand this ancient work relationship.

The *corvée*-system is considered a form of 'custodial recruitment', and is sub-divided into two types: 'American' and 'African' *corvées* (Udy 1959: 79–81). 'American' *corvées* are more common in North and South America, and are primarily a political organization with only minimal or no economic support. Thus a political figure can command the participation of members of the society in public projects; each person normally is obliged to contribute only a certain amount to public projects over a set period of time. 'African' *corvées*, on the other hand, are more tied to the economic control of the official over the resources of the community. Thus the people working in an 'African' *corvée*-system contribute to the economic resources which belong to the community, for example by tilling communal land or as a shepherd of communal flocks.

The Garshana archives indicate that at least part of the workforce there came from a *corvée*-system, most likely of the 'American' type, since the control over the workers seems to be primarily political as opposed to economic. In this type of *corvée*-system the workers possessed their own means of production for periods when they were not working for the state (Schloen 2001: 263).[8] One difference in the *corvée*-system which seems to be at work in Garshana is that it draws on family structures as opposed to drawing directly on individuals. Further evidence of the *corvée*-system in the Ancient Near East can be seen in the Old Babylonian period (Yokoyama 1994) as well as in the Amarna texts.[9]

7 See, for example, the author's work on the Palace of Tupkish (Palace AP) at Tell Mozan, ancient Urkesh (Buccellati 2016).

8 *Pace* Diakonoff (1972, 1976).

9 Moran 2000 EA 365, Biridiya Letter 7 of 7.

The second group of workers participating in the work were slaves (Udy 1959: 86–87; Heimpel 2009: 45–90), who belonged directly to the political organization of the state or to the families who supplied workers under the *corvée*-system described above. Thus the use of slaves is not in parallel to the *corvée*-system, but is rather integrated as a part of the workforce, be it under the *corvée*-system or directly as state-controlled labor.

2. Considering context

A further category of conceptual tools used in understanding ancient monumentality is the wider context in which a building can be examined. Here the structure being analyzed is considered as one element within a typological category, and as such it demonstrates conformity or diversity to a general model extrapolated from the group as a whole. Such an approach lends to the individual building the strength of a wide range of examples from the same cultural and geographic context, allowing conclusions drawn in other cases to be applied (judiciously) to the example under investigation. Another means of analyzing context is to look beyond the cultural borders of the edifice in question, and to draw conclusions by analogy from other contexts with similarities which justify such an intercultural comparison.

2.1 Typology

Typological analysis is one of the mainstays of archaeological research, and plays an important role in the study of monumentality as well. Two aspects are particularly pertinent to understanding monumentality: recognizability and standardization vs innovation. Recognizability and standardization refer to aspects of a structure which are taken from other buildings, 'citing', as it were, the other structure and thus assuming (or attempting to assume) traits of the other structure; thus elements taken from another monumental structure confer monumentality to a new building by inference. Innovation, on the other hand, is the inclusion of a 'new' element (including both elements which had never been used or those imported from foreign contexts), making the structure unique and thus, in the case of monumental architecture conferring monumentality through the prestige of novelty.

When using typology as a method to study monumentality, there is the danger of creating a circular argument – collecting buildings which are monumental, and then showing that the collection demonstrates traits of monumentality. To counteract this risk, typological studies are best paired with other types of analysis which allow one to define a limited number of structures as monumen-

tal and then to see the position of these structures within the wider architectural field.[10]

A typological study of a class of buildings can be used to demonstrate their similarities – similarities which are apparent in the archaeological record, and which would have been evident to the ancient peoples as well. Using a typological study can aid in identifying elements of recognizability among classes of buildings, and, when used together with other methods, can attempt to define certain elements as being tied to monumentality. One of the best examples of this type of analysis is the study on Mesopotamian Palaces by J.-C. Margueron (1982); one particularly relevant graphic composition can be found in Figure 366, where Margueron places the floorplans of a series of palaces in the same scale and with their original orientation on a single page, graphically demonstrating similarities in overall building size as well as commonalities of orientation.

Typologies group buildings which are in the same class by identifying the presence of common elements, as discussed under recognizability. What is not common, but is rare or unique or a foreign import in one or more of these buildings can also be a marker of monumentality, as these elements can be signs of innovation. An example of this is the unique building material used in the Stone-Cone Building *(Steinstiftgebaeude)* in Uruk, as described by Hageneuer and Levenson (2018).

2.2 Analogy

The use of analogy is similar to typology, but draws on examples from different contexts that parallel the building under question but do not offer a direct link. Such examples can be of particular use when examining what is missing from a certain context, and may be drawn from ethnographic as well as archaeological contexts from other cultural regions.[11] An example of the benefit of ethnographic studies as a source for archaeological interpretation is the 'Fortress of the Elephant Hunter' in Burkina Faso, a structure where room function, rooftop usage, gardens and cultic practices can all be seen as analogies to better interpret elements found in the archaeological record (Buccellati 2014b; Schneider 1991). Analogies can be employed to argue that a building is monumental based on parallels from other contexts; this would be particularly useful for situations where monumentality is not immediately apparent and a case needs to be made. The 'Fortress

10 On some examples of monumentality and the 'copying' of architecture in a 'poorer' form (and thus perhaps not monumental) see Micale (2016).

11 A very interesting discussion of the value of ethnographic analogies can be found in a dialogue between Gould, Watson and Wylie (Watson/Gould 1982; Wylie 1982). For a recent treatment of the subject and bibliography see Bernbeck (2017: 251–322).

of the Elephant Hunter' could be used to describe a monumentality in which a single edifice contains all of the community and all structured functions of that community. An analogous example is the modern town of Whittier, Alaska, USA, where a town of over 200 people currently inhabit a single building (Begich Towers; in 1960 the towers housed 800 residents). This building serves not only as the residence for the community, but also includes schools, markets, a police station, and the town administrative offices.

3. Buildings as a source

Another approach to understanding the monumentality of buildings is in an analysis of the building as a source which can speak to the institution which it houses, attempting to understand the monumentality of a certain structure through the social role of the institution housed within. The building also acts as a frame for what is occurring within the building on a practical level, considering also audiences – thus the built environment enables the function of certain spaces as well as enhancing certain spaces through perceptual impact. These functions can also be seen in a diachronic manner, laying claim to monumentality through the duration of the activity (over generations). Finally, the impact of the structure on the surrounding urban environment is also an indicator of the monumentality of a certain structure.

3.1 Building as home to an institution

One approach to monumentality rests on the understanding of the social institution which the structure embodies, as the architecture develops into a symbol for that institution. The structure itself, then, becomes a way of examining the 'value' of the institution which it houses, and vice-versa (this is particularly apparent when considering temple complexes and royal palaces). This relationship between the social and the physical worlds is by far the most difficult to explore, meaningfully as archaeologists, and the most difficult to tie back to data from the archaeological record. Yet it is worthwhile despite these risks, since it is through these types of questions that the social aspect of ancient society can be discussed, and if such questions are not confronted by archaeologists, who have a unique grasp of the data from the archaeological record, then who should attempt such questions?[12]

12 Of course, one might argue that such questions should not be asked at all; such an argument is made for religion by Oppenheim in his famous chapter "Why a 'Mesopotamian Religion' should not be written" (1977: 172–182).

Perhaps the most fruitful approach here is not to find examples which show that important institutions or individuals from the elite are housed within monumental buildings, but to focus on those cases where this relationship does not hold: monumental buildings which do not house significant institutions or members of the elite, or, conversely, where important institutions or individuals from the elite are housed in seemingly un-monumental structures.[13]

3.2 Building as frame

The next approach is to consider the building as a frame for certain activities.[14] The installations or the presence of elements of material culture (e. g. seal impressions) are some of the primary elements which one can use to define the diverse functions present in specific areas of a building. By studying the built spaces where these functions were carried out, both in terms of construction materials as well as position within the building, conclusions as to monumentality can be drawn. One of the most stark examples of this is the presence of the king within a royal palace, leading to an emphasis on the throne room and private quarters; *babanu* and *bitanu* are two terms used in the literature discussing Mesopotamian architecture to refer to the reception area and living area of the king (Heinrich 1984; Margueron 2005; Kertai 2015).

A further approach contributing to considering the building as a frame lies in how the building uses the senses to produce a reaction in a viewer.[15] One example of this is the formal courtyard in the Royal Palace of Tupkish (Palace AP, dating to c. 2150 BCE) at Tell Mozan, ancient Urkesh (Buccellati 2016: 69); this courtyard was paved in massive white limestone blocks, and would most likely have been approached from a roofed area. The transition from the relative dark of the roofed area to the paved courtyard area, which is nearly blinding on a sunny day, would have made a great impact on the visitor, and, as it was the route to reach the king, would have been a monumental approach enhancing the perceived power of the king.

13 Examining such a relationship also raises the question of what the opposite of 'monumentality' is; perhaps 'vernacular', although any public building would be the opposite of vernacular, be it monumental or not. 'Common' does not fit either, as monumental buildings are not necessarily unique – if anything, their monumental character is enhanced by emulating other monumental structures.

14 This section is clearly closely tied to the preceding section on building as institutional home; the difference lies in the type of data available, as references to an institution would rely heavily on textual sources while a focus on activities draws primarily on the archaeological record.

15 For more on sensory perception see section 4.2 Touch, hearing and smell below.

3.3 Use analysis

The functions of the institution, as embodied in the installations and finds uncovered, can also speak to a building's monumentality when considered diachronically. The continued presence of certain functions over a long period is primarily to be found in temple architecture, where long architectural traditions of sacred architecture in the same location can often be discerned.

One of the most prominent examples of this type of continued presence is the E-Abzu temple of Eridu, modern Tell Abu Shahrain, dedicated to the god Enki. Here archaeologists uncovered a sequence of more than 14 different temple phases in the same location beginning around 5400 BCE and ending 2000 years later (Delougaz 1938; Frankfort/Roaf/Matthews 1996: 18; Oates 1960). Such a sequence shows an astounding continuity of tradition – even if the first structures were very limited in terms of the architecture, they are monumental because they form the beginning of a long architectural tradition.

3.4 Contextualization within the urban landscape

Buildings can also be seen as sources when viewed as individual elements within a wider urban context. A building's monumentality may be defined by what is removed in order to make space for the new building as well as its ability to affect what lies around it. What buildings or structures were removed to make room for the new construction? How does the new building affect the road/path network within the settlement? Is access to the primary entrance to the new structure privileged? Is the position of the building designed to highlight its visibility within the settlement and/or the surrounding rural areas? These questions aim to focus on the importance of the building as seen in relation to what is affected by its construction and presence within the urban landscape.

One particularly interesting example of monumentality as defined by urban context is the site of Tell Chuera. A very intensive geophysical survey allowed archaeologists to determine the road network within the city, thereby placing the monumentality of buildings within a wider urban context (Meyer 2013b; 2013a; 2007a). These monumental buildings had been uncovered in the course of archaeological excavations (the well-known *Steinbauten* of Tell Chuera), but these structures were examined individually. The geophysical survey allowed scholars to understand the buildings as a single complex, linked by a network of radial streets which underlined the structures' visibility and importance. It is also worth noting that the geophysical survey allowed archaeologists to explore these interconnections through excavation, making this urban monumentality at the site a research question in its own right (Meyer 2007b). The exploration of this particular organization of the urban space led to further research on a known type of urban plan-

ning, called *Kranzhuegel* sites (Akkermans/Schwartz 2002: 256–259; Meyer 2006), thus contributing not only to our understanding of the organization of urban space at Tell Chuera but also giving insight into a wider cultural phenomenon – and its implications for monumentality.

4. Perspective

The monumentality of a structure can also be proposed on the basis of the perceptual impact that a visitor would have; this would be primarily visual, but could also include other senses such as touch, hearing or smell. These senses can communicate on a wide variety of different levels (Ankerl 1981: 45–46).[16] Ankerl's work (1981) combining architecture and sociology provides great insight into the combination of space and communication. For him, architecture is a "system of multilinearly interlinked spaces" (Ankerl 1981: 171), and a proper analysis of these links and spaces can help define the style and function of a building, even in the absence of the users' self-expression in this regard.[17] This makes his work of particular use to archaeologists, since his interpretation of architecture is based on many of the same elements of material culture that are available to (and limit) archaeological research.

4.1 Visibility and the viewer

The work of Richard Bradley (Bradley 1997; 2000; 2009) shows how the correlation between viewpoint and landscape can be examined within a semantic framework – a similar approach might prove fruitful when applied to questions regarding the monumentality of buildings. Such an analysis would examine visibility in two directions, from the building to the surrounding area (be it the urban context of the building and/or the surrounding rural area) as well as from the surrounding area to the building. How much of the building could be seen from the outside (and vice-versa) can lead to questions regarding presentation, communication, and the iconography of power. Furthermore, such an approach can also examine who is doing the viewing – who could access portions of the building with views outside the walls, such as rooftop areas? How much could be seen from the outside through the external doorway? Was the access leading to the external doorway accessible to all, or was it limited? Some of these questions have been posed

16 *Pace* Preziosi, who limits perception to optical perception: "In connection with the nature of its perceptual address, architecture employs visually palpable means to broadcast its messages" (Preziosi 1983: 211).

17 Ankerl's book was not well received (Michelson 1984; Sydie 1984; Ankerl/Michelson 1985), but the criticism focuses primarily on other aspects of his book. Relevant for this study is his discussion of these "multilinearly interlinked spaces" which was not criticized by reviewers.

regarding the Palace of Tupkish at Mozan, ancient Urkesh (Buccellati 2014a) and the Temple Terrace at Urkesh (Buccellati 2010) by the author, and show how perception in general and visibility in particular can be examined with regard to the question of monumentality. Here 3D reconstructions can be of use in order to test and visualize the hypotheses developed.[18]

A second tool relating to visibility studies is the use of isovists to determine what is visible from a wide range of points (Benedikt 1979; Batty 2001). This tool can be employed to investigate enclosed spaces (but not necessarily roofed spaces) to examine how visible certain elements are within a space. Using this tool one can map a space in relation to a single point, determining how central, in terms of visibility, that point is. For example, an altar is visible from virtually every point within a sacred space, while a side chapel has more limited visibility. In this way the 'centrality' of certain points can be determined and codified in a way that allows for comparison to other points in the same space or when compared to other spaces. Additionally, such an approach can help codify the relationship between two points, for example between the position of a visitor entering a throne room and the king (or visitor and deity in the case of religious contexts), as is the case with so-called bent-axis approaches. A particularly successful use of this tool is the study of the courtyard of the Neo-Assyrian Palace of Sargon at Khorsabad (706 BCE) by A. McMahon (2013). Here McMahon shows how the approach from the entry gate (Gate B) is not centered on the entrance to the palace itself, but reveals, to the entering visitor, the perimeter wall of the palace. McMahon interprets this use of visibility as "a nuanced, innovative use and manipulation of space at the interface between the ideology of monumentality and the praxis of visual experience" (McMahon 2013: 172).

4.2 Touch, hearing and smell

The sense of touch can be examined in the layout of the rooms, for example a high number of small rooms increases the haptic space and decreases the optical space by increasing the number of walls. Put another way, the visitor cannot see very far, but has a lot of surface area within reach. The high level of surface area means that there is more space along the walls for storage, be it for shelving or larger objects on the floor along the wall.

The sense of sound[19] is much more difficult to project based on the architectural footprint as we have it, since sound would be most affected by the elements of the building which are no longer present: doors, the roof, windows, and the

18 There is a great deal of literature on 3D reconstructions of architecture; here I will only cite Wendrich's study on the Temple of Karnak (2014) as it relates directly to monumentality.

19 For a seminal study of sound in Neo-Assyrian palaces, see McMahon (2016).

presence of textiles in the rooms which would have affected how sound traveled as well. Such considerations should also be made for people outside the structure, who would have been able to walk up to the outer walls and presumably hear some of the sounds emanating from inside, primarily from the courtyards.

The final sense to be discussed here is that of smell. The placement of kitchen or workshop areas would have had a direct impact on portions of the structure which would have been affected when the wind carried in smells of cooking, smelting, or kiln fires. As wind direction is often determined by the topography of the city and by local geography, it is possible to estimate the space in which wind conditions might have carried such odors.

These elements,[20] considered for various portions of the building, can help understand how architecture shapes and is shaped by social space. Such an approach, in addition to studies on interaction and space syntax (Hillier 1988; Deblauwe 1992; 1994; 1997; Seamon 2013), can lead to a deeper understanding not only of the architecture itself but also of the uses for which it was designed, as well as how changes over time show shifting functions of the rooms. Such an approach can aid in the study of monumentality by examining how a structure focuses the senses on specific functional areas or social spaces within the building itself. A building is most often monumental because of what it contains, and such an approach allows scholars to define how individual elements of the structure bring those functions or areas to the fore.

5. Interpreting architecture

While all of the methods presented here are interpretive, two approaches are interpretive in a more narrow sense: reception and reconstruction. Reception studies examine the impact the building had on an (ancient) societal level, looking at how the building impacted future constructions in other contexts, how the urban landscape was affected post-construction, and depictions or descriptions of the structure in artistic or written sources. In the modern context, the reconstruction of the building (as a model, virtual or real, or in drawn reconstructions) also explores ancient monumentality by attempting to communicate that attribute of the building to modern audiences. The problems in 'translation' highlight differences in modern and ancient understandings of monumentality, bringing new research perspectives. Clearly, the two approaches are inexorably linked, as reconstructions impact directly on how ancient monumentality is perceived and vice-versa, but each is a separate approach to the interpretation of ancient monumentality.

20 There is a wide range of literature on the subject; for further reading and a more extensive bibliography, see Hamilakis (2013); Neumann (2014); Pink (2015); Turner (2012).

5.1 Reception

One criterion for monumentality is the impact of the structure on the cultural sphere it occupies; do similar buildings which postdate it echo some part of its monumental nature?[21] Does the structure impact the urban environment for a long period of time? Do textual or artistic sources refer to the structure as iconic or emblematic in some way? Many of these points have been raised above, in particular under typology and contextualization within the urban landscape – the particular emphasis here is the conscious choice to copy or emulate in some way a particular structure, giving monumentality to that original structure through this act of appropriation.

5.2 Reconstruction

There are a variety of techniques for reconstruction, all with the aim of reproducing to a certain degree of accuracy the ancient building as it would have been seen in ancient times. Many of these techniques produce three-dimensional models, either real or virtual, but the question of reconstruction predates such modern methods. In fact, reconstructions of ancient buildings produced by archaeologists have influenced modern architects, thus showing how ancient material culture can (through the less-than-perfect medium of archaeological interpretation)[22] be a source of inspiration for modern material culture (Micale 2007; 2010) and demonstrating how reconstruction and reception are inexorably linked. This impact on the modern world is often tied to monumentality, as it is ancient monumental structures which inspire modern monumental structures, such as the Tate Modern in London (Micale 2013; Pedde 2010).

6. Building as object

The last group of tools relate to architecture as an object. The material used in the construction of the building is also an aspect of the energetics and the perception approaches, yet the material as such and how it relates to questions of prestige or costly signaling are best considered separately. In keeping with the title of the conference which was at the origin of this volume (Size Matters), the dimensions of a building play an important role in many cultural contexts with regard to monumentality; thus scalarity – both larger and smaller than a 'norm' – can be an indi-

21 As reception is discussed in more detail in the following chapter by Hageneuer and van der Heyden I have limited the discussion here to a few questions relating to the other methods discussed.

22 See also Hageneuer (2016).

cator of monumentality. Finally, an examination of the life of a building through its object biography explores not only the initial form and function of a building but considers also how the building changes (in a myriad of ways) over time.

6.1 Materiality

The symbolic valence of materials is particularly difficult for archaeologists to determine since what is missing is not only the ability to interview the inhabitants of these buildings but also a series of other potentially symbolic elements which might have altered or enhanced the symbols available to us. An example of this is color in the form of fresco or secco wall painting (e. g. Til Barsip), which is only rarely preserved in the architectural remains in the ancient Near East[23] but which possibly played a major role in defining the significations, connotations, and usages of architectural space (Preziosi 1983: 210). Further considerations of material are made by Preziosi in his study of Minoan architecture:

> "If the Minoan corpus resembles other architectonic systems, then it will likely be the case that certain materials may come to take on more direct signification than is evident here. It may turn out that for the Minoan, the use of certain materials may have had connotations of its own. One may imagine, for example, that such is the case with respect to contrasts in texture and finishing of stone; it is generally the case that the major (western) facades of great public structures such as the palatial compounds were composed of finely hewn and squared hard limestone (vs. many private structures). The presence of such material may thereby have perceptually cued (or enhanced the geometric perception of) certain social and functional contrasts." (Preziosi 1983: 210)

6.2 Multi-scalarity

While the title of this book is Size Matters, size is not the primary criterion for monumentality, as the examples above and the other chapters in this volume show.[24] Small buildings can certainly be monumental, even perhaps more monumental than others which are larger in size. The examples above from Uruk and Eridu show that the use of a costly material or a humble structure which begins a 2000-year tradition of religious structures can be just as monumental, if not more, than their counterparts.

The concept of size is also relative. When determining that a building is 'large' or 'small' one must keep in mind that such determinations are relative, and the

23 On wall decorations see Nunn (1988); Albenda (2005).

24 For a discussion on size and monumentality see also Osborne (2014: 4–8).

context from which such a definition is drawn must be made explicit. The Citadel of Khorsabad (706 BCE) dwarfs the Palace of Tupkish at Tell Mozan (c. 2150 BCE), but each are large structures for their chronological period and cultural context.

6.3 Object biography

Object biography is one of the broadest methods for the study of material culture, and can incorporate many if not most of the methods discussed here. Due to its broad scope it will be discussed in detail in the following chapter by Hageneuer and van der Heyden; it is included as a heading in this chapter for the sake of completeness, as it is a method with which monumentality in architecture can be explored.

Concluding remarks

Monumentality, as an over-arching concept, is difficult to concisely define, and asking whether a structure is or is not monumental can, at times, lead to unending (and unfruitful) debate. The panorama of methodological approaches and tools given here is meant not only as an overview but also as an attempt to draw a boundary within which discussions of monumentality can take place. These limits are not inherent to the buildings we study, nor are they distilled from a totality of cultural contexts – they are instead boundaries inherent in our field, as they describe the mechanisms by which a discussion of monumentality can take place while remaining firmly anchored in archaeological, philological, and historical data. As with any boundary, however, the mere definition of a limit is also a challenge to go beyond – new methodological approaches and tools with which to explore monumentality are certainly awaiting discovery, and by expanding the reach of these discussions they will enrich our understanding of monumentality and the distant past.

Bibliography

Abrams, E. (1994): How the Maya Built Their World: Energetics and Ancient Architecture, Austin: University of Texas Press.

Akkermans, P./Schwartz, G. (2002): The Archaeology of Syria: From Complex Hunter-Gatherers to Early Urban Societies (c. 16,000–300 BC), Cambridge; New York: Cambridge University Press.

Albenda, P. (2005): Ornamental Wall Painting in the Art of the Assyrian Empire, Leiden; Boston: Brill; Styx.

Ankerl, G. (1981): Experimental Sociology of Architecture: A Guide to Theory, Research and Literature, New Babylon: Studies in the Social Sciences 36, The Hague; Paris; New York: Mouton.

Ankerl, G./Michelson, W. (1985): "Comment on Review of Experimental Sociology of Architecture – How Do Critics Skim a Book? [& Reply]" In: Contemporary Sociology 14/2, pp. 150–152.

Bar-Yosef, O./Van Peer, P. (2009): "The Chaîne Opératoire Approach in Middle Paleolithic Archaeology." In: Current Anthropology 50/1, pp. 103–131.

Bar-Yosef, O./Vandermeersch, B./Arensburg, B./Belfer-Cohen, A./Goldberg, P./Laville, H./Meignen, L. et al. (1992): "The Excavations in Kebara Cave, Mt. Carmel [and Comments and Replies]." In: Current Anthropology 33/5, pp. 497–550.

Batty, M. (2001): "Exploring Isovist Fields: Space and Shape in Architectural and Urban Morphology." In: Environment and Planning B: Planning and Design 28/1, pp. 123–150.

Benedikt, M. L. (1979): "To Take Hold of Space: Isovists and Iaovist Fields." In: Environment and Planning B: Planning and Design 6/1, pp. 47–65.

Bernbeck, R. (2017): Materielle Spuren des nationalsozialistischen Terrors. Zu einer Archäologie der Zeitgeschichte, Histoire 115, Bielefeld: transcript.

Bleed, P. (2001): "Trees or Chains, Links or Branches: Conceptual Alternatives for Consideration of Stone Tool Production and Other Sequential Activities." In: Journal of Archaeological Method and Theory 8/1, pp. 101–127.

Bradley, R. (1997): Rock Art and the Prehistory of Atlantic Europe: Signing the Land, New York: Routledge.

Bradley, R. (2000): The Good Stones: A New Investigation of the Clava Cairns, Edinburgh: Society of Antiquaries of Scotland.

Bradley, R. (2009): Image and Audience: Rethinking Prehistoric Art, Oxford, England: Oxford University Press.

Buccellati, F. (2010): "The Monumental Temple Terrace at Urkesh and its Setting." In: J. Becker/R. Hempelmann/E. Rehm (eds.), Kulturlandschaft Syrien: Zentrum und Peripherie Festschrift für Jan-Waalke Meyer, AOAT 371, Münster: Ugarit-Verlag, pp. 71–86.

Buccellati, F. (2014a): "Diachronic Developments at the Central Monumental Complex of Ancient Urkesh (Tell Mozan)." In: Proceedings of the 8th International Congress on the Archaeology of the Ancient Near East: 10 April-4 May, 2012 University of Warsaw, 1, Wiesbaden: Harassowitz, pp. 313–322.

Buccellati, F. (2014b): "Understanding Households – a Few Thoughts." In: F. Buccellati/T. Helms/A. Tamm (eds.), House and Household Economies in 3rd Millennium B. C. E. Syro-Mesopotamia, BAR International Series 2682, Oxford, England: BAR International Series, pp. 35–42.

Buccellati, F. (2016): Three-Dimensional Volumetric Analysis in an Archaeological Context: The Palace of Tupkish at Urkesh and Its Representation, Bibliotheca Mesopotamica 30, Malibu: Undena Publications.

Burke, A. (2008): 'Walled up to Heaven' – the Evolution of Middle Bronze Age Fortification Strategies in the Levant, Studies in the Archaeology and History of the Levant 4, Winona Lake: Eisenbrauns.

Corbey, R./Mol, A. (2011): "'By Weapons Made Worthy': A Darwinian Perspective on Beowulf." In: E. Slingerland/M. Collard (eds.), Creating Consilience: Integrating the Science and the Humanities, New York: Oxford University Press, pp. 372–384.

Deblauwe, F. (1992): "A Study of Accessibility and Circulation Patterns in the Sin Temple of Hafagi from the Third Millennium B. C." In: Mesopotamia 27, pp. 89–118.

Deblauwe, F. (1994): "Spacings and Statistics, or a Different Method to Analyze Buildings. A Test with Mesopotamian Houses from the Late Bronze and Iron Ages." In: Akkadica 89–90, pp. 1–8.

Deblauwe, F. (1997): "Discriminant Analysis of Selected Spatial Variables Derived from Mesopotamian Buildings of the Late Bronze Age till the Parthian Period." In: Mesopotamia 32, pp. 271–288.

Delougaz, P. (1938): "A Short Investigation of the Temple at Al-'Ubaid." In: Iraq 5, pp. 1–11.

Diakonoff, I. (1972): "Socio-Economic Classes in Babylonia and the Babylonian Concept of Social Stratification." In: D. O. Edzard (ed.), Gesellschaftsklassen im alten Zweistromland und in den angrenzenden Gebieten, München: Beck, pp. 41–52.

Diakonoff, I. (1976): "Slaves, Helots and Serfs in Early Antiquity." In: J. Harmatta/G. Komoroczy (eds.), Wirtschaft und Gesellschaft im alten Vorderasien, Budapest: Akademiai Kiado, pp. 45–78.

Frankfort, H./Roaf, M./Matthews, D. (1996): The Art and Architecture of the Ancient Orient, New Haven: Yale University Press.

Gamble, C. (1998): "Palaeolithic Society and the Release from Proximity: A Network Approach to Intimate Relations." In: World Archaeology 29/3, pp. 426–449.

Hageneuer, S. (2016): "The Influence of Early Architectural Reconstruction Drawings in Near Eastern Archaeology." In: O. Kaelin (ed.), Proceedings of the 9th ICAANE, 1, Wiesbaden: Harassowitz, pp. 359–370.

Hageneuer, S./Levenson, F. (2018): "Das Steinstiftgebäude in Uruk – ein gescheitertes Experiment?" In: K. Rheidt/W. Lorenz (eds.), Groß Bauen – Großbaustellen als kulturgeschichtliches Phänomen, Basel: Birkhäuser, pp. 109–121.

Hamilakis, Y. (2013): Archaeology and the Senses: Human Experience, Memory, and Affect, New York: Cambridge University Press.

Heimpel, W. (2009): Workers and Construction Work at Garshana, CUSAS 5, Bethesda: CDL Press.

Heinrich, E. (1984): Die Paläste im alten Mesopotamien, Berlin: Walter de Gruyter.

Hillier, B. (1988): The Social Logic of Space, Cambridge: Cambridge University Press.

Izzet, V. (2007): The Archaeology of Etruscan Society, Cambridge; New York: Cambridge University Press.

Julien, M./Karlin, C. (1994): "Prehistoric Technology: A Cognitive Science?" In: C. Renfrew/E. Zubrow (eds.), The Ancient Mind: Elements of Cognitive Archaeology, Cambridge; New York: Cambridge University Press, pp. 152–164.

Kertai, D. (2015): The Architecture of Late Assyrian Royal Palaces, Oxford: Oxford University Press.

Knappet, C. (2011): "Networks of Objects, Meshworks of Things" In: T. Ingold (ed.), Redrawing Anthropology: Materials, Movements, Lines, Burlington; Farnham: Ashgate, pp. 45–63.

Lemonnier, P. (1986): "The Study of Material Culture Today: Toward an Anthropology of Technical Systems." In: Journal of Anthropological Archaeology 5, pp. 147–186.

Margueron, J.-C. (1982): Recherches sur les palais mésopotamiens de l'Âge du bronze, Paris: Geuthner.

Margueron, J.-C. (2005): "Du bitanu, de l'étage et des salles hypostyles dans les palais néo-assyriens." In: Syria 82, pp. 93–138.

Martinón-Torres, M. (2002): "Chaîne Opératoire: The Concept and Its Applications within the Study of Technology." In: Gallaecia 21, pp. 29–43.

McMahon, A. (2013): "Space, Sound, and Light: Toward a Sensory Experience of Ancient Monumental Architecture." In: American Journal of Archaeology 117/2, pp. 163–179.

McMahon, A. (2016): "A Feast for the Ears: Neo-Assyrian Royal Architecture and Acoustics." In: J. MacGinnis/D. Wicke/T. Greenfield (eds.), Assyrian Provinces Conference Proceedings, Cambridge: McDonald Institute, pp. 129–139.

Meijer, D. (2008): "Cracking the Code? Aspect and Impact in Mesopotamian Architecture." In: H. Kuehne/R. Czichon/F. J. Kreppner (eds.), Proceedings of the 4th ICAANE, 1, Wiesbaden: Harrassowitz, pp. 431–436.

Meyer, J.-W. (2006): "Zur Frage der Urbanisierung von Tell Chuera." In: P. Butterlin/J.-C. Margueron/M. Lebeau/J.-Y. Monchambert/J. L. Montero-Fenollos/B. Muller (eds.), Les espaces syro-mésopotamiens: dimensions de l'expérience humaine au Proche-Orient ancien. Volume d'hommage offert à Jean-Claude Margueron, Subartu 17, Turnhout: Brepols, pp. 79–90.

Meyer, J.-W. (2007a): "Town Planning in 3rd Millennium Tell Chuera." In: J. Bretschneider/J. Driessen/K. van Lerberghe (eds.), Power and Architecture: Monu-

mental Public Architecture in the Bronze Age Near East and Aegean, Leuven; Dudley: Peeters, pp. 129–142.

Meyer, J.-W. (2007b): "Veränderungen der Grabungsstrategie in Tell Chuera (Syrien) aufgrund der Ergebnisse der geomagnetischen Prospektion." In: M. Posselt/B. Zickgraf/C. Dobiat (eds.), Geophysik und Ausgrabung: Einsatz und Auswertung zerstörungsfreier Prospektion in der Archäologie, Rahden/Westf.: Leidorf, pp. 223–236.

Meyer, J.-W. (2013a): "Stadtgründung, Stadtstruktur und Zentralität – Zur Stellung von Tell Chuera bei der Urbanisierung Nordostsyriens." In: D. Bonatz/L. Martin (eds.), 100 Jahre archäologische Feldforschungen in Nordost-Syrien – eine Bilanz, Wiesbaden: Harassowitz, pp. 117–132.

Meyer, J.-W. (2013b): "Urbanisierung, Stadtplanung und Wirtschaftsweise in 'marginalen Gebieten' Nordostsyriens." In: E. Cancik-Kirschbaum/J. Klinger/G. G. W. Müller (eds.), Diversity and Standardization. Perspectives on Social and Political Norms in the Ancient Near East, Berlin: de Gruyter, pp. 81–98.

Micale, M. G. (2007): "Riflessi d'architettura Mesopotamica Nei Disegni e Nelle Ricostruzioni Architettoniche Di Assur e Babilonia: Tra Realtà Archeologica e Mito Dell'architettura Monumentale." In: J. Córdoba/M. Mañé/F. Escribano (eds.), Further Approaches to Travellers and Scholars in the Rediscovering of the Ancient Near East, II, ISIMU 10, Madrid: Universidad Autónoma de Madrid, pp. 117–140.

Micale, M. G. (2010): "Designing Architecture, Building Identities. The Discovery and Use of Mesopotamian Features in Modern Architecture between Orientalism and the Definition of Contemporary Identities." In: P. Matthiae/F. Pinnock/L. Nigro/N. Marchetti (eds.), Proceedings of the 6th ICAANE, Rome, 5th-10th May 2008, Wiesbaden: Harassowitz, pp. 93–112.

Micale, M. G. (2013): "Architecture and Ancient Near East in Drawings, Buildings and Virtual Reality: Issues in Imagining and Designing Ancient and Modern Space." In: L. Feliu/J. Llop/A. Millet Albà/J. Sanmartín (eds.), Time and History in the Ancient Near East. Proceedings of the 56th Rencontre Assiriologique Internationale, Barcelona, 21–25 July 2010, Winona Lake: Eisenbrauns, pp. 379–390.

Micale, M. G. (2016): "Lo spazio sacro e la sua rappresentazione: considerazioni storico-metodologiche sull'interpretazione e sulla ricostruzione dell'architettura templare di Siria." In P. Matthiae (ed.), L'archeologia del Sacro e l'archeologia del culto. Ebla e la Siria dall'Eta' del Bronzo all'Eta' del Ferro, Roma: Bardi Edizioni, pp. 415–443.

Michelson, W. (1984): "Architecture and Communication: A Framework." In: Contemporary Sociology 13/3, pp. 264–66.

Moran, W. (2000): The Amarna Letters, Baltimore: Johns Hopkins University Press.

Neumann, K. (2014): "Resurrected and Reevaluated: The Neo-Assyrian Temple as a Ritualized and Ritualizing Built Environment." Ph. D. Thesis, Berkeley, CA: UC Berkeley.

Nunn, A. (1988): Die Wandmalerei und der glasierte Wandschmuck im alten Orient, Leiden: Brill.

Oates, J. (1960): "Ur and Eridu, the Prehistory." In: Iraq 22/1-2, pp. 32–50.

Oppenheim, A. L. (1977): Ancient Mesopotamia: Portrait of a Dead Civilization, Chicago: University of Chicago Press.

Osborne, J. F. (2014): "Monuments and Monumentality." In: J. F. Osborne (ed.), Approaching Monumentality in Archaeology, IEMA Proceedings, Albany: State University of New York Press, pp. 1–22.

Pedde, B. (2010): "Reception of Mesopotamian Architecture in Germany and Austria in the 20th Century." In: P Matthiae/F. Pinnock/L. Nigro/N. Marchetti (eds.), Proceedings of the 6th ICAANE, 1, Wiesbaden: Harrassowitz, pp. 121–129.

Pink, S. (2015): Doing Sensory Ethnography, Los Angeles; London: Sage.

Preziosi, D. (1983): Minoan Architectural Design: Formation and Signification, Berlin; New York: Mouton.

Ryan, K. (2009): "The Significance of Choice in the Late Dorset Technology of Domestic Architecture." Ph. D. Thesis, Toronto: University of Toronto.

Schiffer, M. B. (1975a): "Behavioral Chain Analysis: Activities, Organization, and the Use of Space." In: Fieldiana. Anthropology 65, pp. 103–119.

Schiffer, M. B. (1975b): "Archaeology as Behavioral Science." In: American Anthropologist, New Series, 77/4, pp. 836–848.

Schiffer, M. B. (1999): "Behavioral Archaeology: Some Clarifications." In: American Antiquity 64/1, pp. 166–168.

Schlanger, N. (2005): "The Chaîne Opératoire." In: C. Renfrew/P. Bahn (eds.), Archaeology: The Key Concepts, London; New York: Routledge, pp. 25–31.

Schloen, J. D. (2001): The House of the Father as Fact and Symbol. Studies in the Archaeology and History of the Levant 2, Winona Lake: Eisenbrauns.

Schneider, K. (1991): Die Burg des Elefantenjägers: Geschichte des 'Grossen Hauses' von Bindouté Da (Lobi, Burkina Faso), Stuttgart: F. Steiner.

Seamon, D. (2013): "Environmental Embodiment, Merleau-Ponty, and Bill Hillier's Theory of Space Syntax: Toward a Phenomenology of People-in-Place." In: R. Bhatt (ed.), Rethinking Aesthetics: The Role of Body in Design, New York: Routledge, pp. 204–213.

Smith, C. B. (2006): How the Great Pyramid Was Built, New York: Harper Paperbacks.

Sydie, R. A. (1984): "Review of Ankerl – Experimental Sociology of Architecture." In: The Canadian Journal of Sociology 9/4, pp. 473–476.

Turner, B. (2012): Routledge Handbook of Body Studies, Abingdon, Oxon; New York: Routledge.

Udy, S. (1959): Organization of Work: A Comparative Analysis of Production among Nonindustrial Peoples, New Haven: Human Relations Area Files Press.

Watson, P. J./Gould, R. (1982): "A Dialogue on the Meaning and Use of Analogy in Ethnoarchaeological Reasoning." In: Journal of Anthropological Archaeology 1/4, pp. 355–381.

Wendrich, W. (2014): "Visualizing the Dynamics of Monumentality." In: J. F. Osborne (ed.), Approaching Monumentality in Archaeology, IEMA Proceedings, Albany: State University of New York Press, pp. 409–430.

Wylie, A. (1982): "An Analogy by Any Other Name Is Just as Analogical." In: Journal of Anthropological Archaeology 1/4, pp. 382–401.

Yokoyama, M. (1994): "The Administrative Structure and Economic Function of Public Service (Ilkum) of the Old Babylonian State in the Old Babylonian Period." Ph. D. Thesis, Los Angeles, CA: UCLA.