

# Temporal clustering at Urkesh

A structural analysis of strata, phases, horizons<sup>1</sup>



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*The chronological system of an ongoing excavation has to be responsive to the ever changing suggestions emerging from the stratigraphy. The relationship between strata and phases as excavated at Mozan on the one hand, and the historical development of the ancient city on the other, as defined by the concept of strata, phases and horizons, has been the object of a finely tuned methodological concern of the Urkesh Archaeological Project and in particular of the Urkesh Global Record. The paper will illustrate the theory behind the system and show how it functions concretely within the framework of the excavation project.*

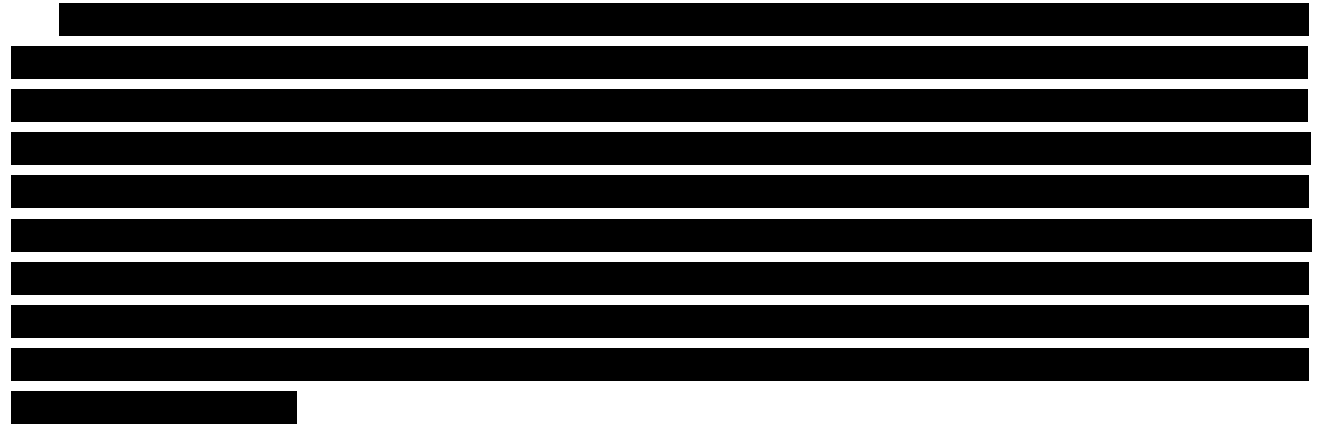
Strata and phases, and to a lesser extent horizons, are essential archaeological concepts and do not seem, at first blush, to require explanation. They deal with the chronological organization of the data, a stratum being a minimal unit in the system, restricted to shorter temporal spans and limited to data from the excavations, while phases and horizons expand the chronological range and introduce data from outside the excavations. Ultimately, a phase is a subdivision of an horizon, and a stratum is a subdivision of a phase, which is true. But this may tend to obscure the deeper structural difference among the three, to which we wish to call attention in this paper.

Inherent to this difference, there is an additional problem that emerges with the implementation of any such system, particularly within the context of an ongoing and multi-season excavation at a very large site, because each excavation unit presents its own sequence to which the sequence established in another unit at the same site may not immediately apply. The problem is then one of correlating sequences within a system that ought to be based on a method sufficiently dynamic and flexible to reflect all the nuances in any given

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unit, and yet able to maintain, at the same time, the sense of the overall development at the site as a whole.



## 1 The theory

### 1.1 Types of analysis

There are two major ways of looking at, and defining, archaeology.<sup>2</sup>

The first is to consider archaeology as the inner-referential trace analysis of material cultural remains, i. e., to determine how material remains are found as to emplacement in the ground, and consequently how the originating depositional process may be inferred from this emplacement. This is an approach that is exclusive to archaeology.

The second is to consider archaeology as the extra-referential analysis of material cultural remains seen apart from their emplacement, i. e., in their distinct typological identity. This approach relies on a variety of different disciplines other than archaeology, e. g. philology for the reading of textual material remains; architectural theory for an assessment of the built environment; or laboratory analysis for obtaining C<sup>14</sup> determinations, to name only a few.

Accordingly, three types of analysis may further be distinguished.<sup>3</sup>

At the inner-referential level we have *stratigraphic* analysis, which deals exclusively with contact associations of elements in the ground: starting from emplacement, one can infer depositional processes that are predicated on the initial nature of the contact association in the ground.

The other two types obtain at the extra-referential level.

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<sup>2</sup>For a full discussion see G. Buccellati, *A Critique of Archaeological Reason. Structural, Digital and Philosophical Aspects of the Excavated Record*. Cambridge: Cambridge University Press, 2017, chapter 2.

<sup>3</sup>See Buccellati 2017, chapters 5-7.

*Typological* analysis looks at the formal identity of the elements, and shows how the ensuing categorization can contribute to their chronological sorting. This analysis draws on methods derived from disciplines other than archaeology, for instance epigraphy for the reading of texts (cuneiform tablets in the case of Urkesh), or architectural history, or the laboratory analysis of samples for  $C^{14}$  determinations, both of which link temporal sequencing to chronological frames that are independent of stratigraphy (absolute chronology).

While typological analysis remains anchored to the data from a given excavation, and to that extent it is still inner-referential in nature, *integrative* analysis is abundantly extra-referential: it brings to bear on the data a wealth of information from other sites, and it aims to construct a far-reaching hermeneutic framework within which each element acquires a broader sense.

## 1.2 Temporal clustering of elements

Conceptually, strata, phases and horizons may be understood as referential clusters: they relate elements from the excavation with reference to a temporal frame – just as, for instance, the concept of typological assemblage relates the same elements with reference to a morphological frame. A temporal cluster brings together elements that share a degree of contemporaneity (e. g., a building and floor accumulations that are in physical contact), just as a typological assemblage brings together elements that share a degree of morphological similarity (e. g., jars of a given shape).

Strata, phases and horizons can thus be defined as temporally conditioned clusters of elements. There is a structural difference among strata on the one hand, and phases and horizons on the other: strata are based exclusively on inner-referential analysis, while phases and horizons add the extra-referential dimension.

A *stratum* is exclusively inner-referential, so that it can be defined as a cluster of elements arranged according to the type of contact, and sorted according to nesting criteria that result in discrete wholes. These wholes are defined by the congruence of the elements in contact (e. g., a series of pits cut into a single accumulation), and by broad elements that extend to an entire volumetric unit (e. g., floor accumulations in adjacent rooms).

Phases and horizons, on the other hand, are based on extra-referential considerations.

(1) *Phases* extend the notion of clustering beyond the sphere of immediate contact. They are, in effect, non-contact clustering of contact based clusters (the latter being represented by the strata). Very importantly, phases add typological criteria, on the basis of which one may define the functional dimension of the spaces, such as the ceramic inventory that speaks to the uses of structures. Phases are also defined in terms of substantial re-organization of space, for example restructuring of the space used within a building (blocking of

doors, raising of walls) or abandonment and rebuilding using a different footprint.

(2) *Horizons* are defined on the basis of broader integrative considerations, especially with regard to regional comparative evidence, absolute date determinations, textual references, and the like. For example, they may link a given structure and its use, through a given developmental period, to the reign of a known king based at a different locality but in control of the site at the time of that particular period.

We may chart these relationships as follows:

analysis		cluster
inner-referential	stratigraphic	stratum
extra-referential	typological	phase
	integrative	horizon

### 1.3 Sequences and frames

There is a potential conflict between (1) the dynamics of an excavation in progress, which constantly adds new tesserae to the mosaic of contact associations, and thus to the strata, and (2) the need for an overarching stable chronological scaffolding as defined by phases and horizons. In the measure in which excavations expand, the web of contact associations increases and becomes more and more complex, while the temporal frame of phases and horizons tends toward permanence.

A resolution of this conflict is found in allowing for distinct sequences to be produced progressively, in the measure in which the stratigraphic web expands, and to keep an indexing system that maintains the distinction while making it possible to establish overarching connections. We use the term *sequence* for the ordering of strata, and *frame* for the ordering of horizons and phases.

A *sequence* reflects our understanding of the tight web of stratigraphy at any given moment in the process of excavations, and in any given operation throughout the archaeological site. The logic of the system requires that strata be sequenced independently in each operation, since properly stratigraphic considerations can only apply to contiguous excavations. The content of a sequence will change within the same unit as the excavation area is expanded and new contact associations are discovered.

A *frame* provides the larger chronological context within which sequences fit, and is thus focused on phases and horizons, within which the sequences will in turn fit. A frame will expand in two directions: on the basis first of the increase of excavated material (reflected in

the sequences), and second of new information from typological analysis or from integrative analysis beyond the site itself.

#### 1.4 Indexing

Given the existence of distinct and progressively more complex sequences and frames, it becomes indispensable to register the differences, and to keep the correlation among them perfectly clear. To this end, a suffix may be added to each stratum, phase or horizon: it links each element to the sequence or frame to which it belongs.<sup>4</sup>

The system may seem cumbersome, but the fluidity it allows is a major gain. We will see some examples in the second part of this paper.

#### 1.5 Nesting

The multiple levels represented by the sequences are autonomous, but they can be nested within each other. The concept of nesting refers to the potential for each temporal cluster to be nested within a higher level cluster, of either the same or a different type.

Thus a stratum may be subdivided into component parts, or substrata, which are nested with the stratum itself. In this case there is structural homogeneity among the clusters.

Another type of nesting is dis-homogeneous: strata are nested within phases, and thus within horizons, even though they are not defined on the basis of the same parameters.

#### 1.6 Archival versions

The different phase/strata generations that were in use for different units and different areas prior to any given date should be archived for permanent future reference, even though only the latest one is in use in any given of the process. In this way, one may instantly place any given stratum or phase in its full context as it was at the time the generation was active.

## 2 The Urkesh project

### 2.1 A website based system

All excavations have their own system of organizing stratigraphic sequences into strata and phases, and sometimes horizons as well, and each system provides charts of different types. Here, we will give examples from the Urkesh system.

The system is structurally geared towards a browser style presentation, hence one can have a full appreciation of its effectiveness only through an online approach. The Figures

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<sup>4</sup>See also Buccellati 2017, 2.7.2 - 2.7.3.

given here should be seen as an invitation to go to the website, to which links are given in the text.

This is in line with the digital approach which we have developed with regard to the website as a special epistemic system.<sup>5</sup>

## 2.2 Sequences

A stratum is identified by the prefix "s" followed by a number, and it must always be followed by a suffix that identifies the sequence and the generation. Thus J5s130<sup>J5B</sup> (also written J5s130-J5B) refers to stratum 130 of unit J5, belonging to the sequence J5B.

The full information about this particular stratum is shown in Fig. 1, but one should look at the relevant page on the J5 website ([urkesh.org/J5s130](http://urkesh.org/J5s130)). Here one can find a definition of the stratum and one can click on any of the features that are included in the stratum, where one will find all the details pertaining to the contact associations recorded.

The suffix in J5s130<sup>J5B</sup> (also written J5s130-J5B) links to generation B of the J5 sequence, which can be seen in Fig. 2 (online at [urkesh.org/J5-strata](http://urkesh.org/J5-strata)).

Such sequences may belong to either a single excavation unit (such as J5) or to a broader area (e. g., JP for the area of Temple Plaza): such sequences become possible as individual units come either in physical contact with each other, or are sufficiently close to allow a logical extrapolation.

A complete list of current sequences, including an archive of earlier generations, is found in the site wide website MZ (Fig. 3, online at [urkesh.org/MZ-strata](http://urkesh.org/MZ-strata)).

Strata sequences are connected to the system of phases and horizons, of which they appear as subdivisions. As argued above (1.5), the two sets (strata on the one hand and phases/horizons on the other) are structurally dis-homogeneous, but the former can be nested in the latter, in function of the fact that they all serve the purposes of temporal definition. This nesting is shown in the strata sequences (see for example the link to the phase in the left column in Fig. 2), and is fully developed within the site wide frame.

## 2.3 Frames

For frames, too, we have indexing, which may be labeled with suffixes identifying the site, in our case, MZ, thus MZA refers to the A version of the mainframe for the whole site.

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<sup>5</sup>See G. Buccellati and M. Kelly-Buccellati, "Archaeological Digital Narratives: The Case of Urkesh Ceramics," in Alexander Ahrens, Dörte Rokitta-Krumnow, Franziska Bloch, and Claudia Bührig (eds.), *Drawing the Threads Together. Studies on Archaeology in Honour of Karin Bartl*, maru: Studien zur Vorderasiatischen Archäologie, Vol. 10, Münster: Zapfen, 2020, pp. 380-397. G. Buccellati, "Transformative Transitions: Learning from a Distant Past," in *Diritto Politecnico* 1 (2022), pp. 127-139. Both articles are available online at <http://urkesh.org/eL-articles>. See also [d-Discourse.net](http://d-Discourse.net).

In the 2008 season at Mozan we introduced for the first time a site wide frame (MZA, see Fig. 4, online at [urkesh.org/mza-frame](http://urkesh.org/mza-frame)), which is the one uniformly in use in the current version of our record. More than a proper sequence, this serves as a broad frame of reference within which actual phases, and especially actual strata are correlated, identified and defined. In other words, while the same numbers are used to allow for a correlation across chronological lines, this should not be taken to imply that the depositional processes embodied in the different sequences are the same. While the numbers for phases and especially strata may be the same, the definitions for phases and strata will generally differ from area to area, and even from unit to unit. In practice, this means that we retain distinct unit and area sequences (e. g., J5B or AAC), but assign numbers within the range of the MZ frame (currently MZA). For example, phases 5c<sup>MZA</sup> through 6c<sup>MZA</sup> are richly represented in area AA; they are, however, missing in area JP. Using the MZA sequence simply means that there will be a gap in the numerical sequence of the JP phases: this will call attention to a depositional phenomenon that requires a particular explanation.

The interdigitation of all three temporal clusters is clearly brought out in the Mozan Frame, from both the data excavated at Urkesh and from the wider connected historical record of Syria and Mesopotamia. An example of this is the subject of Urkesh in letters found in the Mari archives from two “governors” of Urkesh (Terru and Haziran) to the Mari king, Zimri-Lim, speaking about the difficulties of governing Urkesh in his name.

## 2.4 Urkesh ceramic horizons

A significant use of the horizon frame can be seen in the pertinent section of the ceramics digital book (Fig. 5, top portion of page only; online at [urkesh.org/ceram-horiz](http://urkesh.org/ceram-horiz)). On the upper part of the right side bar one sees a list of the Urkesh horizons. Clicking on any of them, a window opens which has two major components.

The first is a detailed description of this horizon in terms of the ceramics materials. Fig. 6 (online at [urkesh.org/ceram-horiz-EDIII](http://urkesh.org/ceram-horiz-EDIII)) gives a view of the top part of the page. The rest is too long to include in the figure; online, one can scroll down and read a full essay on the subject. Clicking on any of the samples, given as drawings, brings to the full page of that particular vessel or sherd, where the full information is given for that particular item.

The second is a list of shape types that are characteristic for that horizon (Fig. 7; online at [urkesh.org/ceram-EDIII-cups](http://urkesh.org/ceram-EDIII-cups)), accessed from the second side bar on the right. Here, too, by clicking on any drawing, one gets to the full description of the pertinent vessel or sherd (e. g., Fig. 8, online at [urkesh.org/OH2q3-p5](http://urkesh.org/OH2q3-p5)).

The total corpus utilized for the horizon section consists of 1435 between whole vessels and sherds. A number of indices analyzes the data from different points of view, as exem-

plified for quantity by period in Fig. 9, online at [urkesh.org/ceram-freq](http://urkesh.org/ceram-freq)).

### 3 Conclusion

The Urkesh system is properly intended for use within a website framework. In this regard, it is an example of the scholarly use of websites as developed in the project *Cybernetica Mesopotamica* ([cyb-mes.org](http://cyb-mes.org)), which we are carrying out under the auspices of the Balzan Foundation. The power of this digital approach, as it applies to a particular aspect of the archaeological record, i. e., the linkage between stratigraphy and chronology, is apparent, for it is ideally suited to combine two seemingly opposite needs. There is on the one hand the need to maintain the utmost flexibility in the record of an ever fluid stratigraphic record, one that is limited to the narrow confines of a given excavation unit were there is physical contiguity among features. And there is on the other the need to link this to a permanent chronological framework and to link it at the same time to a growing, and typologically diversified, universe of data from a number of very different stratigraphic settings in the overall excavation of the site.

It is only with a digital approach that we can do justice to these two conflicting needs – more specifically: this is ultimately possible only with a system that relies on the interlacing of multiple websites, unified by a coherent grammatical vision of how the data are treated and by an equally coherent digital discourse capable of articulating the interaction inherent in the extensive multiplanarity of levels and dimensions. Our paper gives a glimpse of how this is possible with regard to two major aspects, that of the single excavation unit on the one hand, and, on the other, that of the extremely large ceramic inventory resulting from our excavations. Limitations inherent in a printed representation, as it is done in this paper, are indicative of why the full fruition of the system is possible only in a digital environment like the one to which we have referred.

The nature of this digital discourse can only be intimated here. It goes beyond the current use of the digital medium, which is effectively restricted to databases. It proposes a dynamic interaction along the lines of a narrative which develops multiple arguments concurrently – such as, in our case, the stratigraphic restrictions of the stratum understood as the clustering of elements in physical contiguity; the wider range of a chronological frame that defines phases and horizons on the basis of typological and integrative analysis; the organization of a massive ceramic database that builds on a highly detailed record for every sherd excavated, even the smallest one. If the nature of such a digital discourse is only intimated here it is because it cannot, by its very nature, be embodied in the static medium of the printed page. But we hope that our paper will be provocative enough to encourage colleagues to become more familiar with the results of the work we are conducting as part of the *Cybernetica Mesopotamica* research project.