Research Article

« Inquiring into the Origin of the Minoan Civilization via Information Systems Modelling in Humanities »

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Abstract:

The present study inquires the direct evidence about the origin of the Minoan civilization and about those settlers that initialized the relevant social process. This inquiry had been originally based on linguistic evidence, demonstrating that the Aegean scripts of Bronze Age consist of signs, which depicted objects and notions that their phonetic value corresponds to the Archaic Sumerian word for the equivalent object or notion. Occasionally, this equivalence is pictorial, as well, and relevant to the pre-cuneiform Sumerian script. For a few years, direct and indirect evidence, other than linguistic, have been gathered, organized, studied and presented in a systemic manner, by using the Organizational Method for Analyzing Systems (OMAS-III). This conceptual tool is a typical one of Information Systems, being compatible to the comprehensive theoretical framework of Systems Inquiry. The presentation herein briefly summarizes the indirect aspects, previously published and augmented (socio-economic, anthropological, chronological, geographical and naval), and comments upon a plethora of direct cultural evidence that connect the Minoan civilization with the Archaic Sumerian one.

Keywords:

Systems Inquiry, Minoan civilization, Sumerian Origins Theory, Information Systems.

1. Introduction:

The Minoan civilization (henceforth: MiC) flourished mainly in Crete, during the Bronze Age (2nd and 3rd millenia BCE). A conventional chronological classification is set according to the periods of palaces (Loizos, 2014): the Prepalatial period (3rd millenium BCE); the Protopalatial period (19th - 17th centuries BCE); the Neopalatial period (16th - 15th centuries BCE); the Postpalatial period (14th - 10th centuries BCE). So far, this civilization is regarded as the first indigenous European civilization (*Chaniotis, 2004*), although the intensive contemporary archaeological research has started revealing older ones (*Haarmann, 2008*). Herein, the term "European" is merely perceived in a geographical sense (*Papakitsos, 2019*). The emergence of MiC in Crete has been originally attributed to the arrival of settlers of the "armenian" anthropological type from East, during the 28th-26th centuries BCE (*Douvitsas, 2005; Kyriakidis, 1971, 18*). Their place of departure has been

Considered at Minor Asia, only because of its geographic proximity. These settlers were assimilated by the locals (Kyriakidis & Konstas, 1974b), yet, their influence to the emergence of MiC seems to have been profound.

The study herein inquires the direct evidence about the origin of MiC and consequently of those Eastern settlers, based on a plethora of linguistic and other cultural evidence. In addition, it briefly summarizes the indirect aspects (socio-economic, anthropological, chronological, geographical and naval), previously published and augmented (*Papakitsos, 2019*). A variety of diverse elements is better studied if conducted in a systemic manner, through a common conceptual framework. Such a methodology of Information Systems is described next, abided by the theoretical framework of Systems Inquiry (*Banathy, 1995*), utilizing the modelling technique of Organizational Method for Analyzing Systems (OMAS-III).

2. Information Systems Methodology:

The systemic methodology may provide powerful conceptual tools that can enhance the interdisciplinary approach to Archaeology (*Johnson, 2010*). In this respect, Systems Inquiry is a comprehensive theoretical framework that has been also applied in social systems (*Banathy & Jenlink, 2001*), comprising philosophy, theory, methodology and applications. The part of methodology includes techniques for the study of complex systems. Such a modeling technique is OMAS-III (Fig. 1), derived from similar methods of Information Systems (*Papakitsos, 2013*).
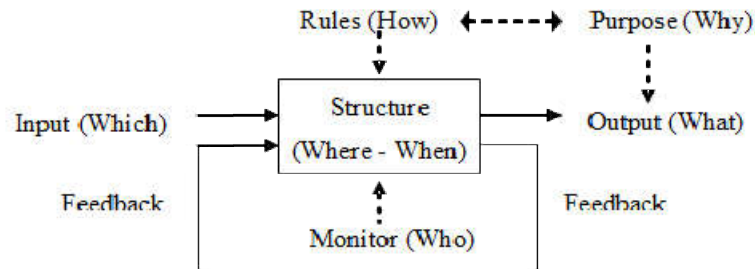

Figure 1: The notational tool of OMAS-III (Chatzistratidi et al., 2016).

Hence, the modeling and study of a system is conducted by determining its seven aspects that are classified as Input, Output, Purpose, Rules, Monitor and the composite Structure, consisting of Spatial and Temporal aspects (Fig. 1). These aspects are tagged according to the seven *journalists questions* (Which, What, Why, How, Who, Where and When) respectively (Fig. 1).

Regarding the inquiry into the origin of MiC as a social system, OMAS-III has been applied in seeking, determining, classifying and studying the available evidence accordingly (*Papakitsos, 2019*):

- The cultural aspects (Input/Which) as expressed by linguistics and archaeological discoveries (artefacts and technology, constructions, religion and other cultural evidence).

- The answer to this inquiry (Output/What) as expressed by the Sumerian Origins Theory (henceforth: SOT), arguing that the settlers from East were persons of Sumerian cultural background.

- The causal aspects (Purpose/Why) as expressed by socio-economic conditions.

- The aspects of manner (Rules/How) as expressed by the contemporary maritime technology.

- The anthropological aspects (Monitor/Who) as expressed by the related genetic data.

- The spatial aspects (Structure/Where) as expressed by geographical data.

- The temporal aspects (Structure/When) as expressed by chronological data from various historical and literary sources.

Most of these aspects (causal, manner, anthropological, spatial and temporal) have been already discussed (*Papakitsos, 2019*), except from the cultural ones, excluding linguistics. They will be briefly summarized and augmented, wherever appropriate, in the next section (section 3). The section after the next one (section 4) is exclusively devoted to the cultural evidence, which are extended and direct.

3. Related Work:

The previous related work (*Papakitsos, 2019*) initially demonstrated that there is no reason for excluding the Sumerians from the debate regarding the origin of MiC (SOT). Their society exhibited conditions that favour immigration.

3.1 Causal Aspects (Why)

The estimated period of the emergence of MiC (2800-2600 BCE) practically coincides with the Jemdet Nasr / Early Dynastic I-II period of the Sumerian history (3000-2700 BCE). During this period, the Sumerian society suffered from urbanization and overpopulation, lack of strategic raw materials for their advanced technology and political agitation (increased warfare and poverty for the lower classes). Yet, knowledge existed of an extended commercial network that was exploited.

3.2 Aspects of Manner (How)

The maritime technology of sailing vessels was known and available for several hundreds or even thousands of years (*Carter, 2006; Van de Moortel, 2017*). Various kinds of watercrafts are depicted in Sumerian iconography and textual sources (*Carter, 2012*). The contemporary ships were capable of sailing for hundreds of miles with relatively heavy loads, especially alongside the coastlines. The Sumerian merchants/inhabitants of the Levantine coast could have arrived to Crete in 9-13 days, through Cyprus and alongside Southern Anatolia.

3.3 Anthropological Aspects (Who)

The recent genomic studies identify the majority of the inhabitants of Bronze Age Crete as local people of the Mediterranean race of Neolithic European origin. Yet, there is also a genetic part of "Iranian/Armenian" origin of about 15% that has been revealed, which is what supports the SOT herein.

3.4 Spatial Aspects (Where)

Extended commercial networks existed in the late Neolithic Age, through which strategic raw materials, other goods, information and people traveled from Ethiopia at South to Scandinavia at North and from India at East to the British Isles at West, with the center of this network on Mesopotamia. The cultural evidence of this network in Bronze Age extend as North-East as Margiana (*Lyonnet, 2005; Salvatori, 2008; Sarianidi, 1994; 1998*), while the far West (e.g., Cornwall) is the more likely candidate for the tin required by the bronze industry of Minoan Crete (*Woudhuizen, 2017*). Crete is geographically located on the center of the northwestern branch of this network, which is favourable for persons knowledgeable enough to settle.

3.5 Temporal Aspects (When)

Crete was known as "Kaptara" in the Bronze Age, mentioned on the tablets of Mari (18th century BCE). According to these texts, the island was known at least since the era of Sargon-I the Great (24th-23rd centuries BCE), where it is recorded that his "hand" (sovereignty, delegations?) had reached it. The tablets of Mari also describe the contemporary results of trade with Minoan Crete, through the city-port of Ugarit, in terms of Minoan artefacts (*Foster, 2018*). Even before that (28th century BCE), the rule of Sumerian kingdoms had been extend to the Mediterranean coast of Levant, during the reign of the king of Uruk, Meskiaggasher.

4. Cultural Aspects:

Although the influence of the Sumerian civilization to MiC has been observed since 1952 (*Poulianos, 2014*), this observation has been ignored. The present study argues against it, since the nature of both civilizations in their entirety is very similar (but not identical). Therefore, it is claimed herein that MiC is an evolution of the Archaic Sumerian culture, because of the immigration of people bearing it. Apart from the linguistic evidence (subsection 4.1), the rest of the presented evidence so far (subsections 3.1-5) are indirect, indicating nothing but there were no conditions to prevent Sumerians from arriving to Crete at the Early Bronze Age. After all, it is reasonable to assume that "The palace culture, featuring its characteristic architecture, hieroglyphic writing and sophisticated administration system including seals, appeared so suddenly on Crete that a transfer from Asia Minor and/or Syria/Palestine is likely" (*Zangger, 2016, 82*). The cultural evidence that will be presented in this section are more direct,

classified in the following categories: structures and decoration (subsection 4.2), artefacts and production practices (subsection 4.3), administration and commerce (subsection 4.4), customs and religion (subsection 4.5).

4.1 Linguistic Evidence

To summarize the main linguistic arguments about the origin of MiC (*Papakitsos, 2019*), a reverse chronological order will be followed, from the latest script found to the earliest ones. These scripts are: Linear B (henceforth: LB), Linear A (henceforth: LA), Cretan Hieroglyphics (henceforth: CH) and the original model of Cretan Protolinear (henceforth: CP) . The latest script of LB is a refined CP script, compared to LA, to be utilized for the needs of the Achaean kingdoms by a rather strictly closed guild of scribes and administration experts. The existence of this guild is evident by the stability of this writing system in the Achaean world of Crete and of mainland Greece alike, throughout the entire Postpalatial period (*Thalassinos, 2004b*). This script though (LB) is not suitable for the phonotactics of the Greek language (*Kenanidis & Papakitsos, 2015*), as it is attested by the application of universal principles of writing systems and languages (*Stephens & Justeson, 1978*). Thus, there was a donor language, which is also expressed in LA. Both scripts (i.e., LA/LB) are required to explain particular features that are found in specific cases of inscriptions (*Finkelberg, 1998*). This is possible if there was an original script (namely, CP) that both LA/LB evolved from (*Willetts, 1977, 100; Kenanidis, 1992; 2013; Kenanidis & Papakitsos, 2015*). The CH script is a more ritual and ornamental version of CP (*Papakitsos & Kenanidis, 2016*). It has been demonstrated that the phonetic value of each syllabogram of CP is the exact monosyllabic (and rarely disyllabic) Sumerian word (in an archaic dialect) of the depicted by the sign object (*Kenanidis, 1992; 2013; Kenanidis & Papakitsos, 2015; Papakitsos & Kenanidis, 2015; 2016*). An example is given below:

Elephants are depicted in CP (Fig. 2) through their longer proboscis and their shorter tusk by syllabogram {u} (*Papakitsos & Kenanidis, 2015*). The tusk is found in cuneiform as "u_2", named /u(s)/ in Archaic Sumerian (for a detailed discussion see: *Kenanidis, 2013*).

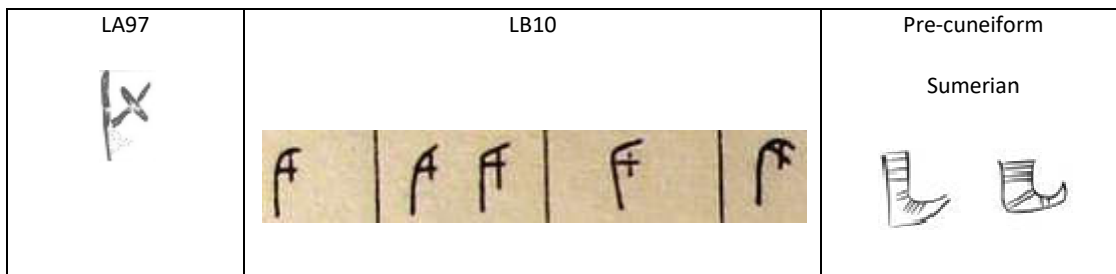| LA97	LB10	Pre-cuneiform Sumerian

Figure 2: CP syllabogram {u} and decorated tusks in Pre-cuneiform Sumerian.

This feature accounts for the 97% of the abstractly depicted objects by the syllabograms. The signs of the scripts (CP, CH, LA, LB) exhibit significant similarities or they are identical to the Sumerian pre-cuneiform or proto-cuneiform ones (*Castleden, 2002, 100; Glarner, 2002; Davis, 2011; Kenanidis, 2013; Kenanidis & Papakitsos, 2015; Papakitsos & Kenanidis, 2015; 2016*), while the underlying donor language looks more agglutinative than anything else (*Duhoux, 1978; Davis, 2014*). The designing of such a script could have only been the work of Sumerian speaking people.

4.2 Structures & Decoration

At the beginning of the 20th century CE, modernist archaeologists made an effort to demonstrate that MiC was an autochthonous European civilization, comparing it to a contemporary "Victorian" model with "Edwardian" elements. This effort was not irrelevant to the political conditions of that period of disintegration of the Ottoman Empire (*Sofianos, 2015*). Nevertheless, the influence of the Near Eastern civilizations is evident in architecture, as well as in other aspects like iconography and pottery, during the rise of the first palaces regardless of their role (*Georganas, 1998*). The most prominent palace, that of Knossos, consists of buildings arranged around a large central yard (*Thalassinos, 2004a; Paparrigopoulos, 2010*), which was called *bitanou* in Akkadian (*Mathieu, 2002, 59*) and is reminiscent of the ancient Mesopotamian palaces (*Kyriakidis & Konstas, 1974a*). The function of those palaces appears to be as much religious as it is administrative, even industrial as well, since the best artefact makers (e.g., Jewellers, potters, etc.) were living and working in the palace complex (*Elson et al., 2010*). A

syllabogram of CP, related to the palaces was {na} (Fig. 3), that depicted the characteristic inverted tapered column of the Minoan palaces (*Papakitsos & Kenanidis, 2015*). The Archaic Sumerian word for "column" was /na(r)/, where the last consonant was silenced (*Kenanidis, 2013*).
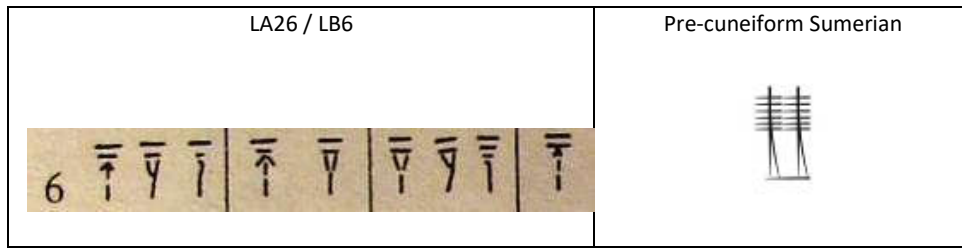

Figure 3: CP syllabogram {na} with the equivalent Pre-cuneiform Sumerian sign.

The architectural similarities to Near East were not confined just to palaces but also to individual architecture, additionally depicted in CP script. The similarity of buildings to some of Minor Asia (i.e., at Beycesultan) has been noticed (*Douvitsas, 2005*). In CP, the common houses had been depicted by the syllabogram {wa} (Fig. 4), which was the word for "house" in Archaic Sumerian (*Kenanidis, 2013*). This syllabogram is an obvious simplification of the relevant Archaic Sumerian ones (*Kenanidis & Papakitsos, 2015*), which in turn are reminiscent of the Minoan miniature houses made of faience that are exhibited in the Heraklion Archaeological Museum (Crete). Syllabogram {wa} is not the only one regarding architecture.
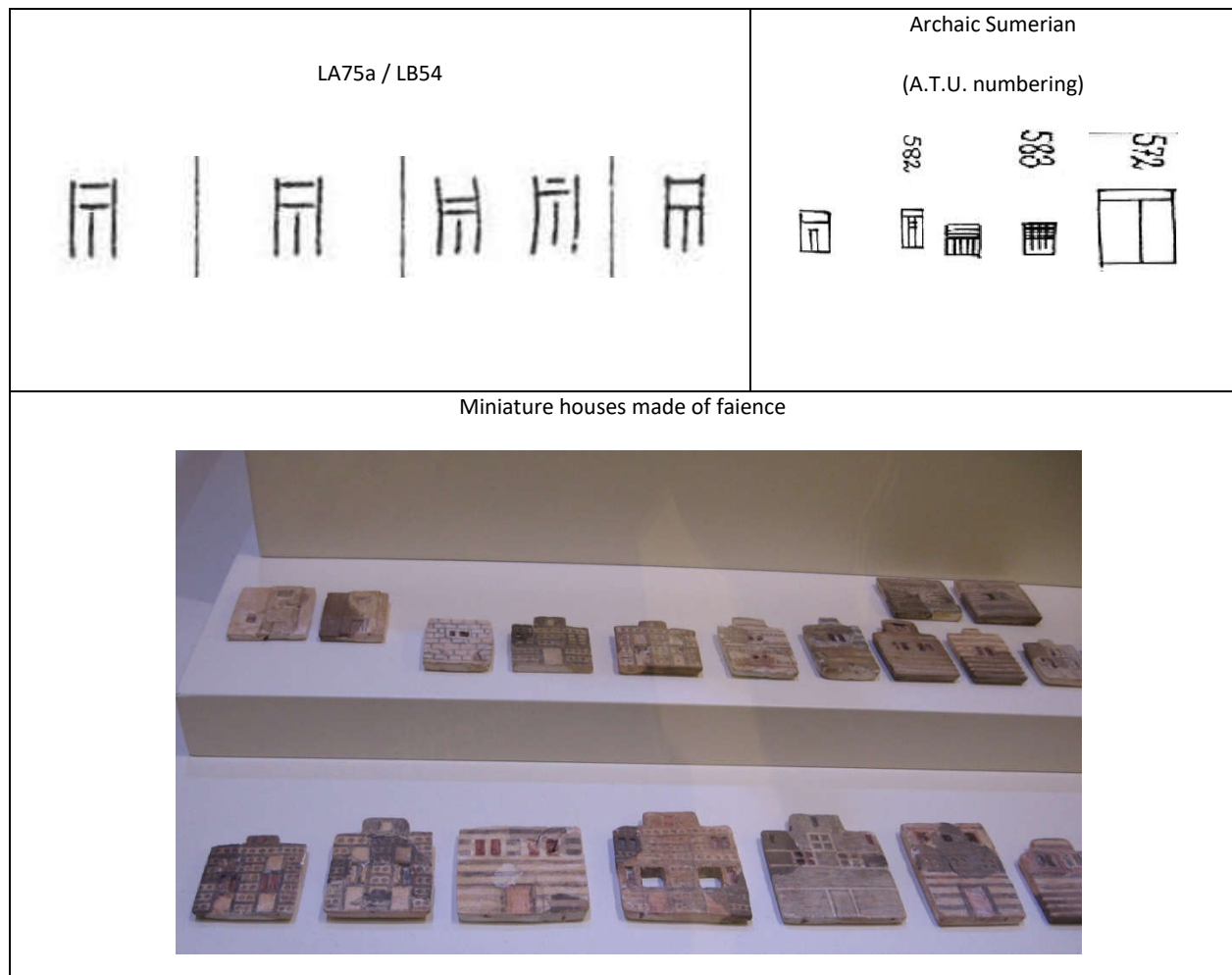

Figure 4: CP syllabogram {wa} with relevant Sumerian signs and Minoan artefacts.

There are two more syllabograms referring to buildings. The first one to be mentioned is {e} (Fig. 5). It depicted a tall building, different from common houses that was called /e(z)/ or /e(θ)/ in Sumerian (*Kenanidis & Papakitsos, 2015*). Occasionally, this type of buildings could have a ground floor being built with stones or bricks, while the upper floors were built with plaited reeds, having a plaster layer (*Kenanidis, 2013*). Reed-built houses were common in the older Sumerian architecture (*Guisepi, 2003a*) and their shape is quite reminiscent of syllabogram {e}.

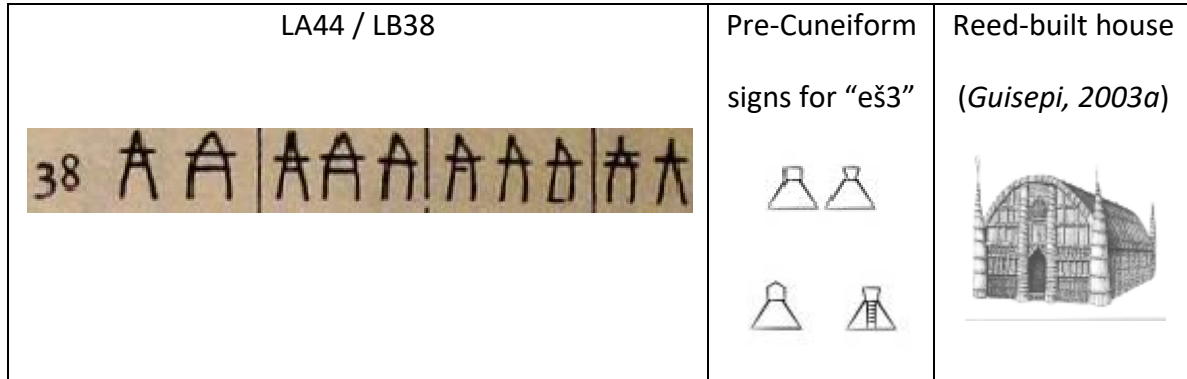| LA44 / LB38	Pre-Cuneiform signs for "eš3"	Reed-built house (*Guisepi, 2003a*)

Figure 5: CP syllabogram {e} with the equivalent Sumerian signs and buildings.

The second syllabogram to be mentioned is {jə}. This syllabogram and the denoted syllable is not found in LB but in LA (AB188), meaning the "city-state" that comprises a complex of tall buildings (*Kenanidis, 2013*). It has a similar form to the equivalent Sumerian signs that depicted the skyline of a city as observed from a distance (Fig. 6). This notion is exemplified by the wall-paintings of the city of Akrotiri, Thera Island (*Marinatos, 2015*).

AB188	Sumerian A.T.U. 621-629

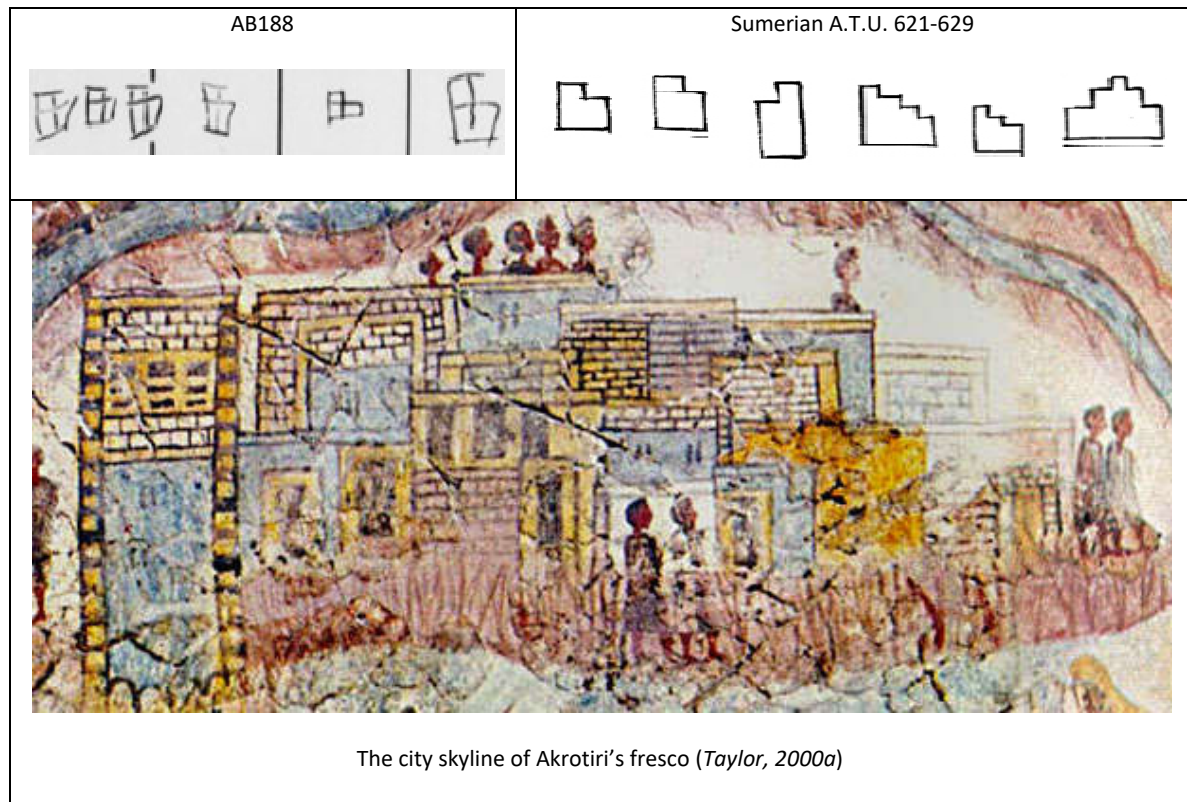The city skyline of Akrotiri's fresco (*Taylor, 2000a*)

Figure 6: CP syllabogram {jə} with the equivalent Sumerian signs and Akrotiri skyline.

Generally in individual architecture, the usage of poor materials was not uncommon (*Mantzourani & Vavouranakis, 2005*). The related syllabogram of CP is {ja} (Fig. 7) that depicts a bundle of reeds, bound at their two ends (*Papakitsos & Kenanidis, 2015*), which is also found in Proto-cuneiform Sumerian (*Davis, 2011*). The bundle was called exactly /ja/ in Archaic Sumerian (*Kenanidis, 2013; Kenanidis & Papakitsos, 2015*).

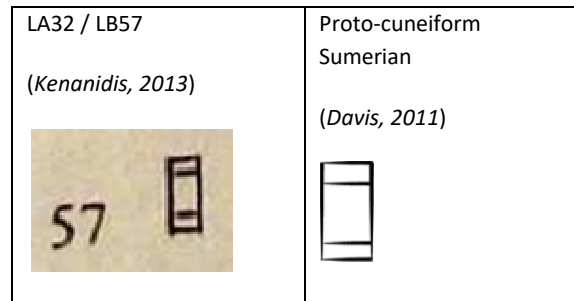| LA32 / LB57 (*Kenanidis, 2013*)	Proto-cuneiform Sumerian (*Davis, 2011*)

Figure 7: CP syllabogram {ja} with the equivalent Proto-cuneiform Sumerian sign.

Closely related to the Minoan architecture is the associated decoration. The palatial iconography reveals the aesthetics of an exceptional civilization (*Alexakis, 2013*). To quote Johnstone (*1988*):

"*This art history shows us the fertility of the bull was celebrated on these islands as in Egypt and Assyria and the iconography of the boats matches that of artefacts found in the ancient city of Ur. The best guess scenarios for the seeds of this culture favor the influences from the Tigris and Euphrates valleys as well as Egyptian and North African influences. The various forms of iconography throughout the culture suggest cultural exchanges through sea faring and trade were a regular event throughout the Aegean Islands. This conclusion is supported by the depiction of animals that were not indigenous to the Islands such as monkeys and Oryx antelope. The knowledge of these particular species would have been dependant on a broad base of travel to foreign lands by members of this culture.*"

Besides the palatial iconography, wall-paintings that were discovered in the city of Akrotiri, on Thera Island, depicting the Archimedes' spiral, reveal that the Minoans possessed advanced mathematical knowledge (*Papaodysseus et al., 2006*). At that period, similar kind of knowledge was manifested only by the Mesopotamian and Egyptian scholars (*Torra, 2011, 9-29*).

4.3 Artefacts & Production

The contacts of Crete with Near East allowed the importation of both artefacts and production techniques (*Wiener, 2013*). The argumentation about production practices will start with securing knowhow. It has been claimed that craftsmen and scribes belonged to the palatial personnel, enjoying special privileges (*Elson et al., 2010*). Those privileges were granted because of their knowledge and skills that their protection was of crucial importance for the tradesmen welfare. The formation of guilds, like the one of scribes (see subsection 4.1), could secure the knowhow within a confined group of persons, in a controllable manner similar to modern copyright. The acquisition of such knowledge outside the guild is analogous to modern industrial espionage.

The practice of securing knowhow was known and widespread. The Sumerian metalworkers have been described as a group of secretive persons that practice an enigmatic art, under the protection of their warrior-clients (*Keegan, 1997, 411*). Accordingly, the first encrypted text that has been found so far is a Sumerian tablet of 2500 BCE, having words of distorted spelling. It describes a method of producing vitrified pottery. The description, if not being the work of a semi-literate person, could have been readable only by the craftsman or his apprentice (*Gómez, 2011, 9*). This is the reason for arguing that innovations were initially introduced through knowledgeable persons and not as transmission of information (*Papakitsos, 2019*).

A large list of original cultural achievements is attributed to the Sumerians, for a span of 2000 years since the 4th millennium BCE (*Guisepi & Willis, 2003; Kyriakidis & Konstas, 1974c*):

i)   The construction of grand scale irrigation systems;

ii)   the domestication of horses next to other already domesticated animals (donkeys, oxen, cattle, pigs, sheep, goats, dogs and cats, important for protecting the crops from rats);

iii)   the invention of wheel and chariots;

iv)   the pottery, making use of the relevant potter-wheel;

v)   the plough, equipped with a small tube for inseminating the fields;

vi)   the fundamental elements of architecture: the column, the dome and the arc;

vii)   complex social organization with the first known public schools;

viii) cylindrical seals and currency (mainly in the form of silver) for facilitating commercial transactions;

ix)   a calendar, with a huge influence on the modern one, and the manner of measuring the angles (*Torra, 2011, 18*);

x)   The first undisputedly known writing system (although see the opening comments in *Kenanidis & Papakitsos, 2013*), documented since 3500 BCE at least.

Considering the above achievements, it seems strange to the author herein why the Sumerians where left out from the overall debate about the origin of MiC, since the Prepalatial era and onwards. Therefore regarding the manufacturing practices, some milestones and their reflection to CP will be mentioned next.

The introduction of potter-wheel is estimated around 2700 BCE (*Paparrigopoulos, 2010*), which is a key-period for the herein argumentation (see subsection 3.1). Metallurgy in Aegean had been known since 3500 BCE (*Elson et al., 2010*), although "*between 3200 and 2700 BCE there was a limited interest in metals in the Aegean in general*" (*Sherratt, 2007, 245*). Yet, the furnace had been introduced in Crete around 2200 BCE (*Douvitsas, 2005*). The furnace is represented in CP by syllable {de} (*Kenanidis, 2013*). This syllable is depicted by many symbols and their variations in LB (LB45, LB140), LA (LA45, LA327) and in CH (*Papakitsos & Kenanidis, 2016*). The corresponding Archaic Sumerian words were either /de(m)/ {= metal or metallurgy furnace} or /de(ŋ)/ {= thermal treatment of metals}.

The manufacturing technology of glass (*Henderson et al., 2010*) and especially of faience (*Foster, 2008*) denotes a strong link to Egypt and Mesopotamia. Actually, Panagiotaki (*1999, 617*) states and wonders:

"*It is, however, very possible that the Minoans did not invent the technique of faience-making themselves but learned it either in the Near-East or in Egypt, where it had appeared long before it did in Minoan Crete. To assume that faience-making was learned implies contacts with Near-East or Egypt, not contacts at the level of trade or royal exchange but a more 'intimate' relationship, that of 'master' and 'apprentice', since the knowledge of a specialised craft is involved, a craft which cannot be learned by just looking at a craftsman working, as it requires the knowledge of the properties of quartz and metals.*

How can such a craft be learned, especially in times when knowledge of this kind must have been highly valued and therefore carefully guarded? Even in the twentieth century, some craftsmen do not give away the secrets of their craft, or they share them only with members of their family. Should the question of immigrants or of itinerant Egyptian or Eastern faience-makers be considered? Did the Cretans learn the skill of faience-making in Egypt or the East and bring it back to Crete with them? Did it come with a bride? …"

Indeed, Panagiotaki caught the essence of the origin of MiC in just two paragraphs! No, the Cretans could not learn the skill in the East, because the local craftsmen wouldn't teach it to foreigners. Yes, the question of immigrants has been answered affirmatively by Kenanidis, since 1992 (also see: *Kenanidis, 2013*), it didn't come with a bride but with a groom (see subsection 3.3) and obviously a coveted one.

Finally, some interesting artefacts and their representation in CP will be presented in this subsection. Minoan vases are masterpieces of pottery and stone craftsmanship (*Huebner, 2003; Rumpel, 2007*), while being quite reminiscent of the Near Eastern ones from around 2500 BCE (*Taylor, 2000b*). Two syllabograms are associated with them. Syllabogram {ne} depicts a vase of small capacity with one handle and a thin spout (Fig. 8a). The Archaic Sumerian word is related to the Prototurkic root /nek/ (= pour moderate quantity), while in Sumerian cuneiform is found as /nigin/ (= a special vase for libations) and in Akkadian as *naqû* (= to pour [a libation], sacrifice) (*Kenanidis, 2013*). Syllabogram {tu} depicts a larger vase (Fig. 8b).

A vase in Archaic Sumerian was called /tug/ (*Kenanidis, 2013*; Fig. 8d). Both of them are present in CH as well (Fig. 8c).
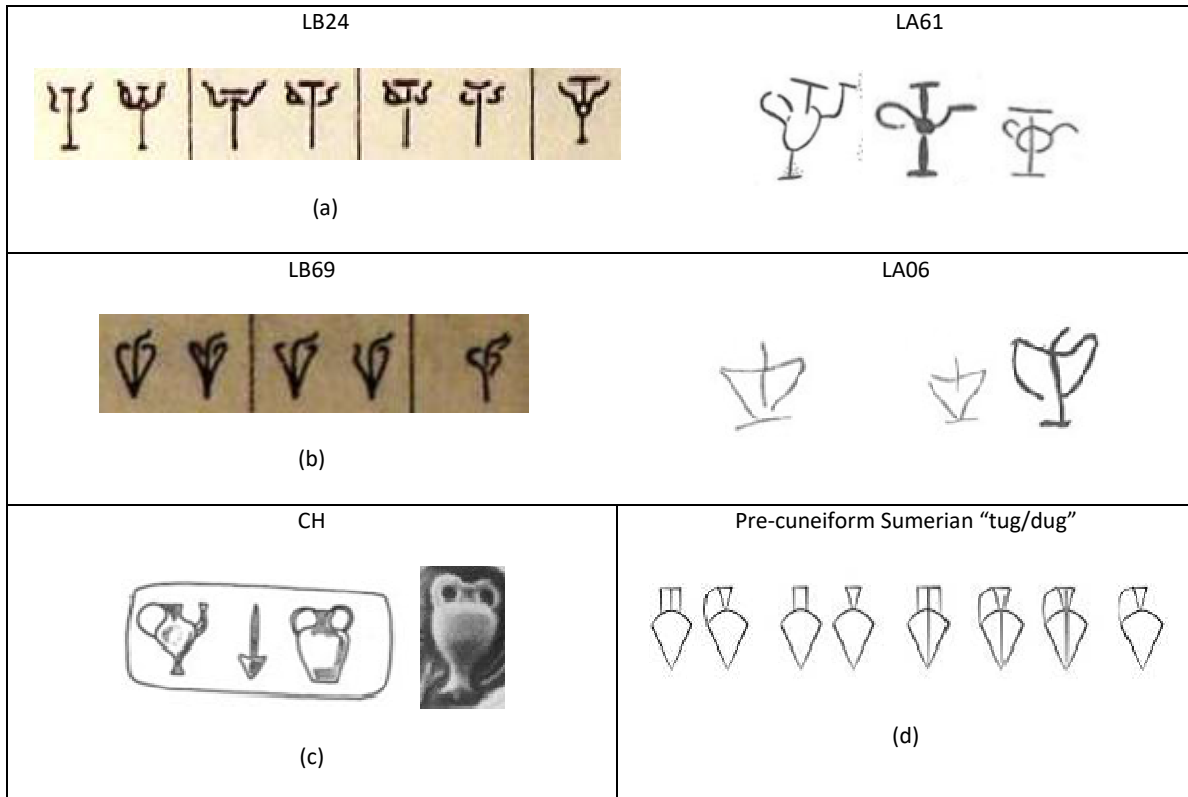

Figure 8: CP syllabograms {ne} and {tu} for vases (Kenanidis, 2013).

Another interesting class of artefacts is the musical instruments. Two of them are presented in CP. Syllabogram {ba}, found only in LA, depicts a rattle (Fig. 9a), which was called /ba(l)/, /balaŋ/ or /bal-tag/ in Sumerian (*Kenanidis, 2013*). It was found at the excavations of Archanes (*Pagkalou-Zervou, 1988*). Syllabogram {ta} depicts a harp/lyre (Fig. 9b), which was a very common musical instrument (*Papakitsos & Kenanidis, 2015*).

The musical instruments were called /ta(b)/ in Archaic Sumerian (*Kenanidis, 2013*). The particular sign is also found in Proto-cuneiform Sumerian (*Davis, 2011*). The oldest known lyres and harps have been found in the Sumerian city of Ur, dated to about 2750 BCE (*Lazos, 1983*), while music and the seven-tone musical scale had been developed at the large urban centers of 3000-2500 BCE (*Clough & Rapp, 1979*).

| A 321 ... TY3a.1 HT6a.3 IOZa7 (a) | LA74 / LB59 ... Proto-cuneiform Sumerian (*Davis 2011, 67*) ... (b) |

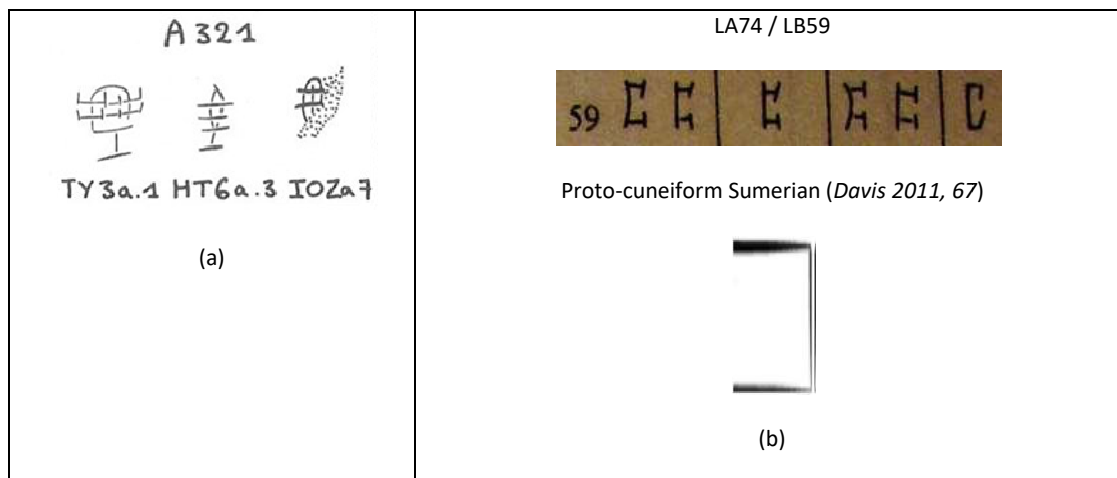*Figure 9: CP syllabograms {ba} and {ta} for musical instruments (Kenanidis, 2013).*

4.4 Administration & Commerce

Writing had been initially invented as an economic activity, for accounting and long-term trade contracts (*Clough & Rapp, 1979*). The Minoan economy is classified as a pre-monetary one (*Elson et al., 2010*), although this is not entirely precise. The Minoans used standard cups as monetary units, filled with silver for their commercial transactions, which was also a common monetary practice of the Sumerians (*Kenanidis, 2013*). This practice is manifested in CP by syllabogram {ci/ki} (*Kenanidis & Papakitsos, 2015*), which is found both in LA (LA103) and LB (LB67). The bureaucrats of the palaces had the complete control of commerce (*Drakopoulos et al., 2011*). An integral part of this system that originated in Sumer was the usage of seals (see subsection 4.3.viii). It has been therefore argued that this particular system of administrative sealings was imported, along with the concept of the palace, from Anatolia in the Middle Minoan period (*Tartaron, 2008; Weingarten, 1986; 1990*). The seals had firstly appeared though in Minoan Crete since the Prepalatial era (*Pagkalou-Zervou, 1988; Douvitsas, 2005*) and to quote Olivier (*1986*) about their purpose: "*As in the Near East such objects generally served to secure the integrity of the contents of various types of container.*" The technical quality of these artefacts indicates seals-makers of exceptional skill, similar to faience-makers (Fig. 4), while the depiction topics are not only of heraldic nature (*Papakitsos & Kenanidis, 2016*) but they also include productive activities of the economy (*Harissis & Harissis, 2009*).

Along with a script, a writing system also includes a related technology consisting of writing materials and tools. The common writing material of the Aegean scripts was unbaked clay. No other script in the entire history had been written on unbaked clay tablets except the Sumerian pictography and all the other scripts that were derived from it, like the cuneiform of Akkadians, Hittites, Persians, Phoenicians, etc. (*Guisepi, 2003b; Waal, 2012*). Interestingly, the main material for writing alphabetical Greek was the expensive papyrus, imported from Egypt through the Phoenicians, and, much later, the costly parchment. Other materials for writing concise and important texts (e.g., contracts or letters) had been the wooden tablets, reported by various sources for various purposes (*Herodotus, VII; Christidis, 2005*). The Greeks never used unbaked clay tablets as their usual writing material unless for the Aegean scripts (LB and perhaps Cypro-Minoan), although clay and a reed stylus would cost nothing. The earliest clay tablets that have been found in Crete are dated to the 30th century BCE, along with "inkstands" (namely pen-stands) similar to the Mesopotamian ones (*Hood, 1971*). Therefore, the choice of writing technology should be in itself sufficient to show that the Aegean scripts originate from Mesopotamia and more precisely from the Sumerian literate culture (*Kenanidis, 2013*).

4.5 Customs & Religion

About the rest of the cultural aspects, religion is a most important one. To quote Marinatos (*2004, 206–207*), referring to the Minoan religion: "*It is reasonable to assume that both the organization and the rituals, even the mythology, resembled the religions of Near Eastern palatial civilizations.*" This influence is evident in practically every religious aspect of the MiC (*Warburton, 2013*). There is not a single religion in Near East that has not been influenced by the Sumerians (*Lyberidis, 2010*).

The religions of the East were reaching Greece through merchants, settlers and slaves (*Lyberidis, 2010*), throughout History (*Trianti et al., 2011*). To outline this (Mesopotamian and Minoan) religion:

i)   A goddess Mother-Gaea marries a god who is being born and dying every year (*Elson et al., 2010*).

ii)   The more ancient faith included a single deity with dual substance, a male and a female one, who were gradually separated in two distinct deities (*Paparrigopoulos, 2010*).

iii)   The rituals were possibly complemented by the worship of the Sacred Bull (*Douvitsas, 2005*).

iv)   Deities were substituted by symbols (*Douvitsas, 2005*), roughly equivalent to the Christian Holy Cross.

The religious practice was supplemented by various rituals. These features will be exemplified in the next paragraphs, regarding the linkage of the Minoan with the Sumerian religion.

A prominent symbol of the Minoan religion was the Labrys (Double Axe). It was neither a tool nor a sacrificial axe, since it has never been found in such a context, while its true symbolism is unknown to the mainstream archaeologists (*Marinatos, 1993*). The Labrys is present in CP (LA52 / LB08), having the phonetic value {a} (*Kenanidis & Papakitsos, 2015*). It is also present in Proto-cuneiform Sumerian (*Davis, 2011*), being also a primary religious symbol of the Sumerians during the Halaf (5500 - 4500 BCE) and the Ubaid (until 3000 BCE) periods (*Roux, 1993*). The predominant Sumerian deity from the 4th millennium BCE until 2500 BCE was An, god of Heavens (*Guisepi, 2003c*). An ("Anu" in Akkadian) was the patron deity of the Uruk city-state (*Kenanidis & Papakitsos, 2015*) and a dual deity, both male and female (see 4.5.ii), symbolized by the Sumerians with double-edged swords (*Kenanidis, 2013*). Presumably, each edge symbolized a single nature of the deity. In the Cretan caves that served as Minoan sanctuaries, many double-edged swords have been found next to Labryses, as votive offerings (Kyriakidis, 1971) devoted to the honoured deity (*Kenanidis, 2013*). It should be noted here that the closing consonant of a Sumerian word was silenced (*Kenanidis & Papakitsos, 2015*), thus An was pronounced /a/, exactly like the syllabogram of the Labrys. Consequently, the Labrys should have been the symbol of god An (see 4.5.iv), the dual deity of the Minoans (*Kenanidis, 2013*). Each edge of the double-axe symbolized a single nature of the deity (see 4.5.ii) and it was manifested as such in CP, having the same phonetic value.

The assignment of a specific content to a symbol, like the Labrys, additionally facilitates the decipherment of the related inscriptions. Such a case is the Arkalokhori Axe and its siblings (*Rumpel, 2009*). The relevant attempts have been based on the supposed recognition of the word {i-da-ma-te}. The confusion is evident by the interpretation of this word/term in different contexts. One attempt relates the term to a goddess of combat (*Kaczyńska, 2002*): {i-da} (= combat, battle, fight), as the word is found in the Hesychian dictionary, and {ma-te} (= mother). Other viewpoints regard {i-} as a prefix to {da-ma-te} (= Demeter, the goddess) or {-te} as a suffix (*Karnava, 2016*). The religious context of Labrys, as a symbol of the dual-substance god An, combined with the linguistic context of Archaic Sumerian, provides a coherent decipherment of the inscriptions on Arkalokhori Axe and its siblings, different from the previous ones (*Kenanidis, 2016*).

Another predominant symbol of the Minoan religion is the so called "Horns of Consecration" (henceforth: HoC). Although it is related to the worship of bull (Fig. 11), the symbolic meaning of HoC is unknown to mainstream archaeologists, despite the observation that it is somehow structurally connected with the Labrys on buildings (*Marinatos, 1993*). Another recent interpretation relates HoC to the worship of Sun, based on similar Egyptian symbols (*Banou, 2008*). The Sun though is present as a disk on the Egyptian symbols but absent from HoC, although it wouldn't be technically difficult for the Minoans to copy precisely the Egyptian symbol. HoC are also found to the altar in the temple of Moon at Bahrain (*Rohl, 1999, plate 34*), where the Sumerians had settled since at least 3000 BCE (*Rohl, 1999*). HoC are found both in CP, as the dual-syllabogram {pete} (not /pte/), and in Sumerian pictography (Fig. 10). The pre-cuneiform versions ATU 298-304 appear on top of a pole (*Kenanidis, 2013*). The Sumerian signs are etymologically related to the word /petɪ/ (= mate, husband/wife), so the sacred symbol meant the pair in a sense of completeness. This is the symbolic relation to the complete god An, being a pair of both male and female substance (see 4.5.ii), thus the reason to the previous structural connection with the Labrys. The Sumerian signs depicted also the ears of an animal, which were called /peθe/ or /peθa/, with the addition of suffixes (*Kenanidis, 2013*). Notably, the great goddess of the Minoans is associated with the cat that is depicted with raised pointed ears (*Papakitsos & Kenanidis, 2016*). The

phonetic relation of the ears (/peθe/) is directly related to the phonetic value of sign LB62 (/pete/). So it seems that HoC resembled, as well, the pair of god's ears that listened to the prayers of the believers (*Kenanidis, 2013*).
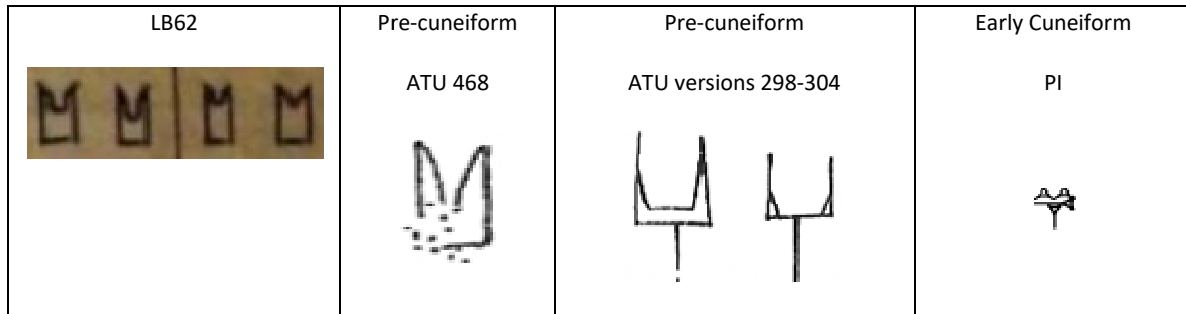
LB62	Pre-cuneiform ATU 468	Pre-cuneiform ATU versions 298-304	Early Cuneiform PI

Figure 10: HoC in Minoan and Sumerian scripts (Kenanidis, 2013).

Another primary religious symbol of the Archaic Sumerians was the bull-head (*Roux, 1993*), which is magnificently presented in the Sumerian art (*Guisepi, 2003d*). The theme of bull in Minoan religion has been attested in rituals (*Trivyza, 1978; Pagkalou-Zervou, 1988*). This theme has been also reasonably connected with the myth of Minotaur that a recent approach attributes to a ritual, where the priests wore bull-head masks (*Kabiotis, 2010*). The theme of bull-head human figures and myths though is not just Minoan (see 4.5.iii). It is much older, also found in Egypt, with the form of god Apis (Fig. 11a), in Indus Valley (Fig. 11b) and in Sumerian mythology (Fig. 11c), where the depicted on a seal bull-man is interpreted as Gilgamesh by Rohl (*1999, 170*).
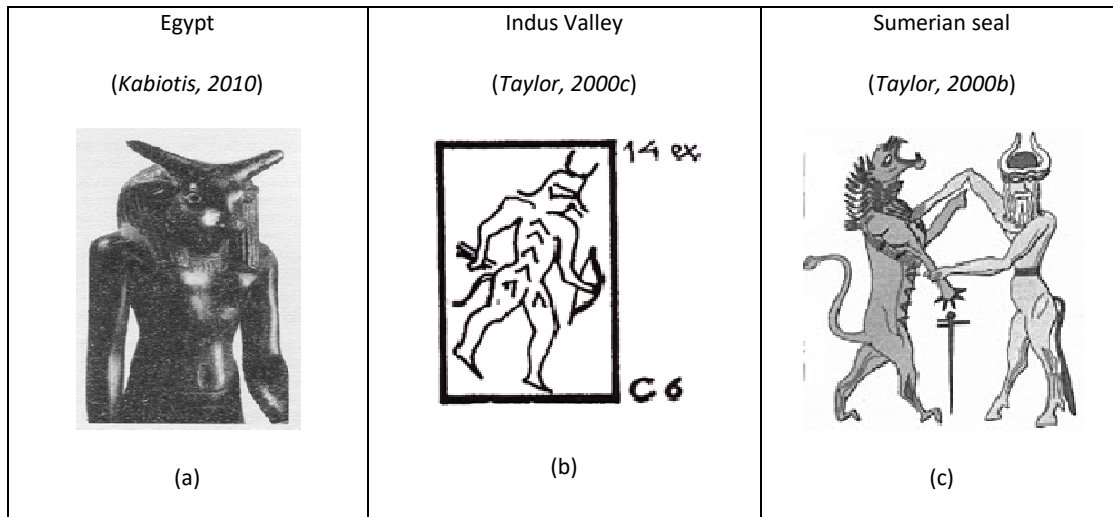
Egypt (*Kabiotis, 2010*)	Indus Valley (*Taylor, 2000c*)	Sumerian seal (*Taylor, 2000b*)
(a)	(b)	(c)

Figure 11: Bull-head mythical figures.

The last Minoan divinity to be discussed herein is the Lady of Animals (*Loizos, 2014*) that is found in inscriptions as {po-ti-ni-ja} (*Trivyza, 1978*) and had been also adopted by the Achaeans (*Drakopoulos et al., 2011*). Once again (Fig. 10-11), she is not exclusive to the Minoans but to other Eastern and older or contemporary civilizations (*Taylor, 2000c*). Apart from the Minoan version holding snakes (Fig. 12a), the Lady of Animals is found in the Harappan art of Indus Valley since 2500 BCE, holding presumably carnivorous animals (Fig. 12b), and in Sumerian art since 3000 BCE (Fig. 12c), holding snakes and being surrounded by carnivorous animals. The Lady of Animals had a male counterpart, the Master of Animals, who is equally widespread (*Taylor, 2000c*).

Minoan Crete

(a)

Indus Valley

(b)

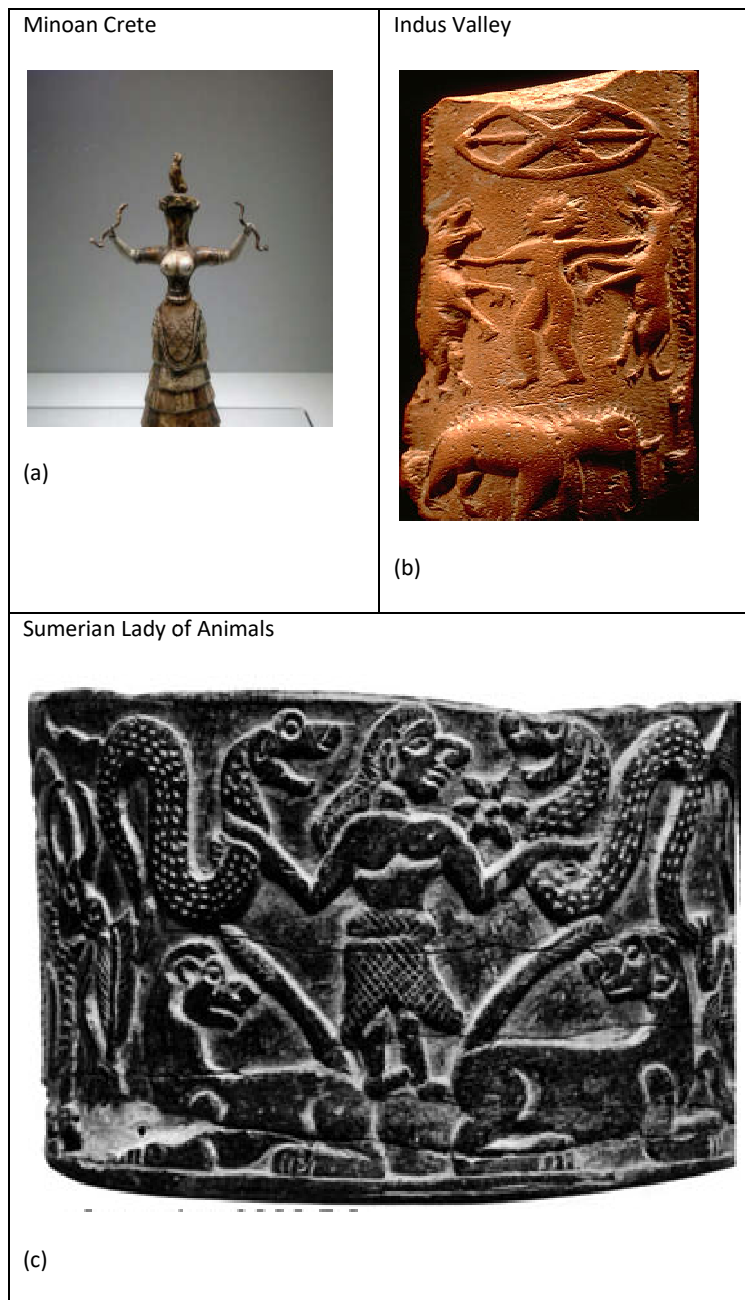Sumerian Lady of Animals

(c)

Figure 12: The Lady of Animals in three civilizations.

Apart from divinities, the Minoan religion also shares other ritual practices with the Sumerian religion, like libations (*Davis, 2008*) and vaulted tombs (*Pagkalou-Zervou, 1988; Marinatos, 1993*) that were used for this purpose at Sumer in the Ubaid period (*Taylor, 2000b*). The last connection to be mentioned between the Minoan and the Summerian religion is the existence of socially powerfull top-ranking priestesses (*Dening, 1996*). The inevitable herein conclusion is that the Minoan religion was the religion of the Sumerians, particularly of the version from Uruk city, which had been introduced to Crete via settlers, arriving from the Sumerian communities of the Levantine coast/cities (*Rohl, 1999*).

5. Conclusion:

Scholars from all over the world discover traces of Luwians, Akkadians and others in Crete, but not of Sumerians, who had a profound influence in every aspect of civilization to the entire Near East for three millennia (4th-2nd BCE), and everyone else from there imitated them one way or another. Considering the presented herein direct and indirect evidence of the Sumerian presence in Crete, each piece can be a coincidence, all together though cannot.

Therefore, reconstructing the birth of MiC through the Information Systems methodology, according to the proposed SOT, all the presented pieces of evidence have been classified in six thematic groups. Accordingly, it is argued that Sumerian settlers from their communities at the Levant had started immigrating to Crete, in moderate numbers for long periods during the Prepalatial era, because of the social conditions in Near East. They were usually single men that were skillful craftsmen (metal-workers, carpenters, seals-makers, merchants, scribes etc.), who married eventually local brides, in the same pattern that was followed by the Ancient Greeks who colonized Southern Italy, 20 centuries later (*Manfredi & Braccesi, 1997*). They brought with them their culture (religion, language and craftsmanship), in a new environment that was more peaceful, rich in natural resources and located on a commercial crossroad. They taught their cultural heritage to their descendants, who eventually became the local social elite (Eteocretans), presumambly near the end of the Prepalatial period (2700-1900 BCE). In a free context, these elite gradually created a civilization with novel features, which is known as MiC.

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