



The epigraphic affinity of the linear syllabic scripts of bronze age Eurasia

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Abstract

This study investigates the epigraphic and paleographic relationships across the major linear syllabic scripts of the Bronze Age from the Aegean Sea to Indus Valley. Through a comparative analysis of sign topologies, we comment on the degree of structural and graphic continuity during script transmission across the Bronze Age civilizations. Our findings demonstrate a strong epigraphic affinity, proposing shared scribal traditions despite distinct underlying languages and long distances. Furthermore, we contextualize the enigmatic Byblos syllabary and the Indus Valley script within broader Mediterranean graphic traditions, examining potential structural parallels with the other scripts. Ultimately, this research clarifies the paleographic affinity of Bronze Age linear writing systems, illustrating how administrative needs, regional trade networks, and material media shaped the development of linear syllabic scripts.

Keywords: Aegean scripts, linear syllabaries, Anatolian scripts, Cypriot scripts, Byblos script, Indus valley script Bronze Age, Minoan Crete

Introduction

Today it is estimated that around 5,000 to 8,000 languages are spoken around the world, which vary in number of speakers, from a few tens to hundreds of millions ^[1]. Of this multitude of languages, only a very small percentage has a written form. After all, modern Linguistics has little interest in the written form of language, given that all languages have an oral form but not necessarily a written representation. Writing systems differ from language to language, not only in terms of the type of graphemes (signs) they use but also in the representational relationship between the symbol and the symbolized element, as expressed in the difference between alphabetic, syllabic and ideographic writing systems ^[2].

Despite the previously mentioned limited interest of modern Linguistics in writing systems, the ability to handle primary documents in many languages is one of the fundamental skills in Historical and Comparative Linguistics ^[3]. In this respect, the writing systems could be classified as:

- Ideographic, pictographic, logographic, logosyllabic (e.g., Sumerian, Ancient Egyptian, Chinese);
- Syllabic (e.g., Akkadian, Minoan/Mycenaean/Cypriot Greek, Japanese);
- Alphasyllabic/abugida (e.g., Indic, Ethiopian);
- Abjad (e.g. Phoenician, Hebrew, Arabic);
- Alphabetic systems (e.g., Greek, Latin, Cyrillic).

Focusing on the ancient writing systems (henceforth scripts), they can be spatially grouped in five major areas, i.e.:

- Ancient Middle and Near East (Mesopotamia, Elam, Levante, Egypt);
- the Indus Valley;
- East and South Asia (mainly China);
- South/Southeast Europe (Balkans, Italy, Aegean Sea/Coasts, Iberian Peninsula);
- Meso-America.

Evidently ^[4], the linear syllabic scripts of the Aegean, Cyprus and Near East played a major role in the history of

writing, both spatially by having been spread from Crete to Indus Valley ^[5] and temporally by bridging the gap between the older pictographic scripts and the modern alphabetic ones. Consequently, the present study is focused on the features and the observed epigraphic affinity of the linear syllabic scripts of Bronze Age.

Context

Recent archaeological evidence indicates that early writing systems developed across the expansive region spanning Egypt to the Indus Valley through the incremental refinement of archaic tallying and labeling mechanisms. To mitigate ambiguity, merchants and administrators enhanced these records by incorporating pictorial representations of the specific commodities being measured, weighed, or enumerated. Crucially, although these early visual symbols consisted of rudimentary pictographs, they intrinsically possessed phonetic values derived directly from spoken language. An early derivative of Sumerian logograms may be preserved in the script of the Indus Valley civilization. Archeological evidence from Harappa, including ceramic shards dating to approximately 3500 BCE, suggests the presence of an antecedent proto-script. It is posited that both the Egyptians and the Harappans, who maintained active commercial networks with Sumer, adopted this system or a comparable method of accounting, utilizing identifiable pictographs to encode specific linguistic sounds at an early stage of their development ^[5].

As humanity's earliest writing system, cuneiform was progressively adopted throughout much of the Near East, with Egypt standing as a notable exception. Driven by the regional dominance of the Akkadian and Babylonian empires, neighboring populations adapted the Sumerian-Akkadian script to accommodate linguistically distinct systems, introducing phonological and orthographic modifications where necessary. By 1400 BCE, Akkadian cuneiform served as the primary *lingua franca* for international diplomacy and commerce, to the extent that even Egypt utilized the script for official correspondence with its northeastern counterparts ^[5, 6].

However, linear writing systems relatively soon also developed, initially in the Aegean as it seems, modeled after the pre-cuneiform Sumerian script ^{[7],[8]}, although a mainstream view is that those Aegean scripts adopted only the concept of syllabic writing from the Levant, likely by way of Cyprus. Their fully developed syllabograms and corresponding phonetic values were entirely Aegean in both morphology and phonology ^[5], relying on the rebus principle to encode the undeciphered so-called Minoan language and a very early form of the Greek language (i.e., Mycenaean). This development of supposedly autonomous script formation evolved in Bronze Age Crete, resulting in the three related scripts, namely Cretan Hieroglyphics, Linear A and Linear B ^[9]. Yet, according to the Cretan Protoliner Script theory (CrPS), there was an ancestor syllabary of Sumerian epigraphic origin that those Cretan scripts evolved from, as fully described in ^[10]. This script was modelled in approximately the middle of the 3rd millennium BCE, where Linear A was its derivative for the Minoan language, Linear B was its adaptation to Mycenaean Greek ^[11], while Cretan Hieroglyphics was merely its ornamental and ritual version ^[12].

At about the same time of the creation of CrPS, if not even earlier as mentioned previously, the Indus Valley Script (IVS) evolved, being also a syllabary as argued in ^[13]. IVS rendered a language of a different proposed phonology than those languages of Crete ^[14]. Furthermore, during the 2004 field season at Tell Umm el-Marra in northern Syria, excavations yielded four lightly baked clay cylinders bearing incised symbols from third-millennium BCE contexts. This study examines the physical properties of these artifacts and analyzes their inscriptions to assess whether they represent evidence of an early non-cuneiform script. Recovered from Tomb 4 (a component of an elite mortuary complex situated on the central acropolis and dated to the Early Bronze III–IVB periods, ca. 2500–2200 BCE), the artifacts feature discrete characters, several of which exhibit pictographic characteristics. These inscriptions are unlikely to serve a purely decorative function, as their execution deviates significantly from established Syrian and Mesopotamian artistic traditions of the third millennium BCE, such as glyptic art or ceramic ornamentation. Furthermore, the recurring sign sequences observed across two of the cylinders indicate deliberate compositional intent rather than spontaneous incision. Although the symbols could potentially represent a semasiographic system, wherein pictograms or ideograms function as mnemonic aids rather than linguistic transcriptions, the presence of extended character sequences increasingly favors a linguistic interpretation. Consequently, these findings lend critical support to the hypothesis that the Tell Umm el-Marra inscriptions constitute an early linear writing system ^[15].

Another noteworthy writing system that appears to integrate both Eastern and Western influences is the nearby linear script of Byblos (Gabal), attested approximately from the 18th to the 15th centuries BCE, thus chronologically situated between the pictographic systems (Cuneiform and Egyptian hieroglyphs) and the early alphabetic ones ^[4]. Although the underlying language is presumed to be Semitic, all attempts at decipherment have thus far proven unsuccessful. While the inventory of signs remains distinctive, many signs exhibit structural similarities to

Egyptian Hieratic, whereas others align more closely with Aegean-Cypriot scripts ^[6]. Then, there is Cyprus.

Given the geographic orientation of Cyprus and the supporting archaeological record, widespread bilingualism between the island and Levantine coastal centers from the Middle Bronze Age onward represents a highly plausible scenario. Regarding the transmission of scripts, virtually any region along the northern coast of the Eastern Mediterranean offers a viable candidate, particularly in light of Cyprus's sustained interaction with southern and southwestern Anatolia dating from the pre-mid-third millennium BCE ^[16]. The two Cypriot scripts are conventionally designated as *Cypro-Minoan* of the Late Bronze Age and the *Cypriot Syllabary* of the Iron Age ^[17]. The former term was introduced by Sir Arthur Evans, who identified marked graphic affinities between this script and Aegean linear scripts, notably Linear A. The Cypriot syllabic tradition exhibits an intriguing convergence of Aegean and Near Eastern epigraphic practices: while sign forms are predominantly related to the Aegean linear models, they were executed using cuneiform-style stylus impressions rather than the incised strokes characteristic of Cretan traditions ^[6]. However, despite general consensus on a genetic relationship between Aegean and Cypriot Bronze Age scripts, the conventional premise that Crete directly transmitted its writing system to Cyprus at or before the onset of the Late Bronze Age has faced increasing scholarly skepticism. Consequently, S. Sherratt advocates for a parallel evolutionary model on the island, proposing the nomenclature “Bronze Age Cypriot” (BAC) over “Cypro-Minoan” ^[16], whereas I. Kenanidis posits a hypothetical “Cyprus Protoliner Script” (CyPS, similarly to CrPS) as the common ancestor of both Cypriot scripts ^[17]. To address terminological ambiguity regarding the Iron Age syllabary, Markus Egetmeyer has recommended the more precise designation “Cypro-Greek” (CGS). Cypriot inscriptions have been found from Levante (e.g., Ras Shamra-Ugarit in Syria or Carmel coast south of Haifa in Israel) to Sardinia (Italy) and from Cilicia (Anatolia/Turkey) to Sakkara (Egypt), exhibiting the large commercial network of Cypriot merchants ^[18].

Whatever the ultimate extent and significance of Minoan influence on Levantine epigraphic traditions, it clearly encountered formidable competition from the Mesopotamian cuneiform system. Nevertheless, despite the widespread dominance of cuneiform, Levantine populations also engaged in stylistic and functional experimentation with Aegean scripts. As an integral component of the Near East, the Levant naturally aligned with the prevailing cultural canon of Mesopotamian civilization. By contrast, an insular entity such as Cyprus maintained the autonomy to adopt an alternative cultural authority, namely, that of neighboring Crete. Consequently, the Cypriots selected a script derived from Cretan models, notwithstanding their geographical proximity to and the political influence of the Levant ^[6].

To complete this overview of Eastern and Western epigraphic interaction in the Levant, it should be noted that the neighboring southern regional power of Egypt remained largely peripheral to this convergence of writing systems. The Egyptian Hieroglyphic script saw a more restricted external dissemination. Egyptian authorities maintained their native script primarily for internal domain use, conducting international diplomacy, including

correspondence with Canaanite vassal states, in Akkadian cuneiform. Amidst these surrounding major powers, each possessing a distinct epigraphic tradition, Levantine societies independently developed innovative writing systems that would ultimately supplant competing scripts. However, the Minoan-Near Eastern relations had a considerable impact on various cultural aspects, besides language and script ^[6].

Culture

Following the emergence of Neolithic cultures and subsequent demographic expansion in the Near East, sustained outward migrations occurred across multiple geographic vectors. Nevertheless, it is crucial to recognize the ethnolinguistic heterogeneity of the region, where populations belonging to distinct language families engaged in prolonged cultural exchanges across the Circumpontic zone. Further east, the Bactria-Margiana Archaeological Complex (BMAC) exhibited clear cultural interactions with the Indian subcontinent. While Victor Sarianidi posited that the BMAC's formation was driven by population movements from the Syro-Anatolian region, the site's inhabitants are widely associated with early Indo-Iranian speech communities ^[19]. Wheeler conceptualizes this affinity as an underlying conceptual continuum that spanned from the Himalayas and Hindu Kush to Anatolia and Crete ^[20].

The earliest textual attestation of Crete occurs in 18th-century BCE documents from Mari, where the island is designated as *Kaptara* (the biblical *Caphtor*) and cited as a primary destination for tin shipments. Merchants from Mari and Crete regularly conducted trade at Ugarit, a cosmopolitan emporium on the northern Syrian coast. Crucially, records note that a merchant of *Kaptara* was accompanied by a *targamannum*, a professional interpreter fluent in both languages. In Egypt, textually documented contacts with the Aegean emerge during the second half of the 2nd millennium BCE. Scholars continue to debate whether earlier direct commercial ties existed between Egypt and Crete, or if 3rd-millennium Egyptian stone artifacts arrived on the island via Levantine intermediaries such as Byblos. Beyond the trade in luxury goods and exotic commodities, mobile Cretan artisans likely traveled throughout the region. Egypt was not their sole destination; comparable, albeit less well-preserved, Aegean-style wall and floor frescoes have been uncovered in late Middle Bronze Age palatial contexts at Alalakh in northern Syria and Tel Kabri in the western Galilee ^[6].

While geographically European, Minoan Crete maintained profound cultural affinities with the ancient Near/Middle East during the Bronze Age ^[21]. Minoan religious practices can be conceptualized as either a regional variation or a highly synthesized expression of Middle Eastern traditions ^[22]. Furthermore, scholars emphasizing the distinct character of Minoan civilization frequently point to its cultural conservatism: numerous traits preserved on Crete represent archaic features that originated in the Near East but persisted insularly after fading in their regions of origin. Consequently, Bronze Age civilizations, ranging from the Indus Valley in the east to Minoan Crete in the west, can be evaluated as components of a broad Eurasian cultural continuum sharing common ideological and material foundations ^[20].

Some final notes regard the midway Oxus Civilization. The extensive spatial distribution of the Oxus Civilization, which, beginning in the Middle Bronze Age, spanned the piedmont of southern Turkmenistan (e.g., Altyn-depe, Namazga-depe), the Murgab delta, classical Margiana, the Amudarya basin in Uzbekistan and southern Tajikistan, and northern Afghanistan (including the oases of Daulatabad, Dashly, Nichkin, and Farukhabad), warrants targeted and rigorous empirical analysis. This Central Asian civilization maintained extensive inter-regional contacts across the Iranian plateau (including the alluvial plains of southwestern Iran and the broader Elamite sphere), the Indus Valley ^[23], Balochistan, and the Arabian Peninsula littoral along the Persian Gulf ^[24], thereby functioning as a critical intermediary within the cultural continuum linking Mesopotamia to Indus Valley.

Comparison

The comparison on the palaeographic affinity of the various Bronze Age scripts started as soon as their individual discovery, in an attempt to achieve their decipherment and discover the potential ancestor-successor relationships. Nowadays, computational methods that include neural networks are also utilized to reveal these relationships, by recognizing signs through machine vision ^[25], determining script families through bioinformatics algorithms ^[26], as well as discovering language families besides scripts ^[27].

Specifically, the palaeographic affinity of the three Cretan scripts to each other is known since their discovery. The computational methods for this purpose ^[28] serve merely as a proof-of-concept that ensures the correct function of the algorithm. Their affinity to the Cypriot scripts is also well-known to the extent that they are classified in the same family of scripts (i.e., Aegean scripts). Yet, the study of these relationships, especially of Linear A to the Cypriot and other Near/Middle East scripts (Ugaritic, Akkadian, Sumerian) is still ongoing ^[29]. For example, in ^[30] there are 23 signs of Linear A (CrPS) presented next to their Sumerian (mainly pre-Cuneiform) equivalent, which are identical or homomorph in form with the same or very close phonetic value (sounds) and semantics (i.e., the object or notion depicted by the equivalent signs in both scripts, e.g., a twig). In ^[31] there are 30 signs of Linear A (CrPS) presented next to their BAC equivalent, which are identical/homomorph in form with the same phonetic value and semantics. Interestingly, 12 signs of the latter group (CrPS/BAC) are identical/homomorph to the former group (CrPS/Sumerian). Furthermore, 28 pairs of identical/homomorph signs are presented common to BAC and CGS, with seven (7) of them being equivalent to the former group (CrPS/Sumerian).

Another palaeographic affinity that was computationally noted is that of Sumerian pictograms to IVS, where 20 signs have been correlated as potentially common ^[28]. Similarly, the palaeographic affinity of Minoan (CrPS) to IVS is noted in ^[32], through 18 equivalent common signs with the same semantics but mostly different phonetic values due to the different rendered language. Three (3) of these signs are common with the CrPS/Sumerian group.

The scripts of the Levantine palaeography also exhibit remarkable resemblances, starting with the clay cylinders from Umm el-Marra mentioned previously ^[15], with symbols that resemble identical syllabic or alphabetic signs (e.g., a reverse Y or a dotted circle), but especially the

enigmatic Byblos script. Comparison tables mapping the Byblos script to other linear scripts have been constructed by several epigraphers and Semitic scholars. Because the script remains formally undeciphered, these tables focus on comparative paleography, aligning Byblos signs with Egyptian Hieratic, Phoenician, Linear A, and Proto-Sinaitic [33], [34]. Maurice Dunand, who excavated the Byblos inscriptions, published the first sign inventory containing comparative matrices to Minoan and Egyptian Hieroglyphs/Hieratic; he argued that about 50 Byblos signs shared graphic traits with Egyptian scripts (25 taken directly from Egyptian repertoires) and also included a comparative chart aligning Byblos signs with Aegean Minoan signs to test external influences [35]. Linguists Jan Best and Fred Woudhuizen compiled side-by-side paleographic tables linking Byblos signs directly to Aegean linear systems. Best argued that key sequence markers in Byblos match Linear A graphic conventions, compiling tables that assign Aegean-derived phonetic values to Byblos syllabic signs [36]. Finally, the Anatolian (Hittite/Luwian) palaeographic identity will be commented [37]. Comparison tables mapping Anatolian/Luwian Hieroglyphs to other Bronze and Iron Age linear scripts, most notably Cretan, Cypriot, and early alphabetic scripts, have been constructed by several Hittitologists, Aegeanists, and Anatolian epigraphers. Because Luwian Hieroglyphs represent a fully developed, native Anatolian logosyllabic writing system (in use from c. 1400 BCE to 700 BCE) [38], comparative tables in academic literature generally fall into two categories: Aegean–Anatolian graphic parallels and Levantine/Cypriot structural influences. Linguist and epigrapher Fred Woudhuizen has published extensive comparative sign charts linking Luwian Hieroglyphic signs directly to Aegean linear scripts. Woudhuizen compiles paleographic tables mapping core Anatolian syllabic signs (such as the double-axe, goat head, wheel, and hand motifs) to equivalent Aegean linear forms. He argues for structural and graphic exchange across Western Anatolia (e.g., Wilusa/Troy, Arzawa) and the Aegean basin during the Middle and Late Bronze Age [39], as well as Cyprus [40]. Comparative epigrapher Emilia Masson created detailed sign matrices evaluating the interaction between BAC writing and neighbor scripts in Cilicia and Syria. Masson’s tables analyze shared geometric simplifications between Luwian sign variants used in Late Bronze Age Syria/Cilicia (e.g., Karkemish, Ugarit) and Cypriot linear signaries, highlighting trade contact in the Eastern Mediterranean [41]. In their landmark re-evaluation of the Anatolian Hieroglyphic syllabary (which established modern sound values in the 1970s), Hawkins and Morpurgo Davies included systematic sign inventories (the Laroche/Hawkins system). These tables trace how complex stone-carved Luwian logosyllabic signs (like those on royal monuments) transformed into cursive, linear variants when painted or incised on lead strips, clay, and wood [42]. In their landmark re-evaluation of the Anatolian Hieroglyphic syllabary (which established modern sound values in the 1970s), Hawkins and Morpurgo Davies included systematic sign inventories (the Laroche/Hawkins system). These tables trace how complex stone-carved Luwian logosyllabic signs (like those on royal monuments) transformed into cursive, linear variants when painted or incised on lead strips, clay, and wood [42].

Conclusion

In conclusion, this study offers a unified paleographic and epigraphic evaluation of the major linear syllabic scripts spanning the Bronze Age Aegean and the Indus Valley. By systematically enquiring sign topologies, it is demonstrated that despite linguistic divergence and significant geographic displacement, these writing systems share a pronounced graphic continuity and a common scribal tradition. Furthermore, contextualizing the Byblos syllabary and the Indus Valley script within this broader framework illuminates key structural parallels across distant Mediterranean traditions. Ultimately, these findings reveal that while distinct regional trade networks, administrative demands, and material media drove localized adaptations, the fundamental evolutionary trajectory of Bronze Age linear scripts was deeply interconnected.

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