International Journal of Social Science and Humanities
www.humanitiesjournals.com
Online ISSN: 2664-8628
Received: 28-04-2026, Accepted: 29-05-2026, Published: 13-06-2026
Volume 8, Issue 2, 2026, Page No. 186-192

Notes on two of the conventionally undeciphered Aegean scripts

Evangelos Papakitsos
University of the Witwatersrand, School of Physics, Johannesburg, South Africa
DOI: https://doi.org/10.66856/ijssh.2026.8.2.8095

Abstract
The present study is focused on the nature of two Aegean scripts, that is Cretan Hieroglyphics, used in Bronze Age (Minoan) Crete, and Cypro-Minoan, used in Bronze Age Cyprus. The paper presents the mainstream views on the nature of these scripts that are considered undeciphered, their decipherment attempts by linguists, and the computational approaches for this purpose. Subsequently, two linguistic theories are discussed for the scripts' nature and the assignment of the corresponding phonetic values, namely, the Cretan Protolinear Script one, regarding Cretan Hieroglyphics, and the Cypriot Protolinear Script one, regarding Cypro-Minoan. These two theories are the most complete, detailed, comprehensive and well-documented theories on the descent of the Aegean scripts, which are also supported by a plethora of anthropological and archaeological evidence. Accordingly, the Cretan Hieroglyphics inscriptions render the Archaic Sumerian language in a religious context, while Cypro-Minoan probably render an Akkadian dialect.

Keywords: Cretan Protolinear, Cypriot Protolinear, Cretan Hieroglyphics, Cypro-Minoan, Aegean scripts, decipherment.

Introduction
Before the classical Greek alphabet emerged, a distinct and closely related family of writing systems dominated Mainland Greece, Crete, and Cyprus during the Bronze and Early Iron Ages [1]. Discovered primarily by Sir Arthur Evans at the turn of the 20th century, these are collectively known as the *Aegean scripts* [2]. This script family traces a fascinating lineage of technological adaptation: as populations shifted and new cultures rose, older scripts were systematically reworked to record completely different languages [3, 4].

The Aegean script family consists of five distinct pre-alphabetic writing systems, which are predominantly syllabic in nature (i.e., syllabaries), meaning that each standard character represents a consonant-vowel sequence (e.g., *ta*, *ki*, *ro*) rather than an individual letter [5]. Conventionally, *Cretan Hieroglyphics* is considered to be the oldest script, *Linear A* to be next and giving birth to *Linear B* and *Cypro-Minoan* scripts, while the *Cypriot Syllabary* is definitely the last one of the family. More specifically [1]:

1. *Cretan Hieroglyphics* is considered to be the earliest known script in the family, attested in the Middle Bronze Age (c. 2100–1700 BCE) and developed by the Minoans on Crete. Despite Evans naming it "Hieroglyphic" due to its highly pictorial look (featuring animals, plants, and body parts), it is completely unrelated to Egyptian hieroglyphs [2]. It was primarily carved into seals or stamped onto small clay administrative labels [6]. It is conventionally regarded undeciphered.
2. *Linear A* is considered to be the second script in the family, attested between c. 1900–1450 BCE. Overlapping with and ultimately replacing *Cretan Hieroglyphics*, *Linear A* marks the transition to a more stylized, abstract, and "linear" format. It was the primary administrative script of the Minoan palaces (such as Knossos and Hagia Triada) and is found on clay tablets, pottery, and religious stone vessels. While we can "read" the phonetic values of many signs by using their *Linear B* descendants, the underlying language remains entirely unknown [2].
3. *Linear B* is considered to be derived from *Linear A*, attested between c. 1450–1200 BCE. It has been fully deciphered since 1952. When the Mycenaean Greeks gained control of Crete and mainland Greece, they adapted *Linear A* to fit their own spoken tongue [3]. *Linear B* consists of roughly 90 syllabic signs (i.e., syllabograms) alongside a wide array of logograms (symbols representing whole concepts like "wine", "wheat" or "chariot") and numerals. It was used strictly for palace accounting and inventories [2].
4. *Cypro-Minoan* is considered to be also derived from *Linear A*, attested between c. 1550–1050 BCE. Maritime trade carried Minoan writing culture across the Mediterranean to Cyprus, where it evolved into the *Cypro-Minoan* script [3]. It is found on small clay tablets, metal ingots, and clay balls. Computational linguistics has heavily debated whether it represents a single unified script or a cluster of several closely related dialects/languages [7]. It is conventionally regarded undeciphered.
5. The *Cypriot Syllabary* (i.e., Cypriot Greek Syllabary) is attested in the Iron Age (c. 1100–300 BCE) and it has been fully deciphered since 1871. Surviving well into the Iron Age and operating concurrently with the early Greek alphabet, this final iteration was derived from Cypro-Minoan [7]. It was used mostly to record the Arcado-Cypriot dialect of Greek, though it was occasionally used for a poorly understood, indigenous language known as *Eteocypriot*.

In addition, the famous Phaistos Disk (c. 1850–1600 BCE), a fired clay disk from Crete stamped with 241 pictorial symbols in a spiral, is often associated with this family. However, because it is an isolated object with entirely unique, stamped icons, mainstream archeologists classify it as a distinct un-deciphered anomaly, separate from the standard Aegean lineage [1].

The present study enquires the attempts to decipher the Cretan Hieroglyphics and Cypro-Minoan, the two out of three Aegean scripts that are conventionally considered undeciphered. The third undeciphered script, which is *Linear A*, deserves an exclusive presentation, due to the magnitude of the related works. The predominant linguistic theory on the methodology followed herein is that of the Cretan Protolinear Script [8].

Methodology

The decipherments of the two readable scripts (i.e., the Cypriot Syllabary and *Linear B*) serve as foundational pillars for modern historical linguistics. Initially, the Cypriot Syllabary was deciphered in 1871 by the English Assyriologist George Smith. His breakthrough relied on a bilingual inscription, discovered at Idalium (modern Dali, Cyprus), featuring parallel texts in both the Phoenician abjad (i.e., a consonantal script) and the Cypriot Syllabary. Because the underlying language of the Cypriot Syllabary was Greek, it provided the first undeniable proof that a syllabic writing system could express Indo-European sound structures [1].

Linear B was deciphered in 1952 by the British architect and self-taught linguist Michael Ventris, alongside classicist John Chadwick. For decades, academia assumed *Linear B* recorded the unknown Minoan language. Ventris, through rigorous structural cryptography and grid analysis, discovered that the underlying language was actually an archaic, pre-Homeric form of Greek (conventionally named Mycenaean Greek), instantly pushing the written history of the Greek language back by centuries [9].

The present approach follows the Cretan Protolinear Script theory; it declares that there was an initial script of 120 syllabograms, which *Linear A/B* and Cretan Hieroglyphics (collectively referred herein as "Cretan" scripts, to be distinguished from the two Cypriot ones) evolved from [10]. The repertoire comprises all the syllabograms of *Linear A* and *B*, either common to both scripts or not [11]. In this respect, and unlike the mainstream view, *Linear A* and *B* are sibling scripts and not parent-to-child respectively (see also [12]). In addition, Cretan Hieroglyphics is merely the ornamental and ritual version of the Cretan Protolinear Script [13] [14], Subsequently, the theory dictates the assignment of phonetic values to the syllabograms. After the initial discovery of the Cretan scripts and unlike all other cases of Near Eastern scripts, the phonetic values of the syllabograms had not been immediately associated with the corresponding signs (sketches). Such tendencies still exist in the relevant computational processing (see paragraph below), indicating a lack of comparative linguistics knowledge. Kenanidis [15] [16], firstly observed that the phonetic value (sound) of each sign was the Archaic Sumerian word for the object abstractly depicted by this sign [17], according to the rebus principle [18]. For many of these signs, the pictorial and vocalic identification to their mainly pre-cuneiform Sumerian equivalent is so obvious and seriously beyond doubt [11]. This fundamental observation on the linguistic and pictorial affinity of the Cretan scripts to Archaic Sumerian is still ignored by mainstream archaeology, despite the numerous independent studies in favour [19]- [27]. Therefore, it was discovered that the model language for the creation of the Cretan scripts was Archaic Sumerian (not necessarily though the conveyed languages, as in the case of *Linear B*).

Cretan Hieroglyphics

Just like its hypothesized descendant *Linear A*, the Cretan Hieroglyphic script (c. 2100–1700 BCE) remains completely undeciphered for the mainstream Archaeology/Palaeolinguistics. Because the script is highly pictorial, early investigators hoped it would mirror the decipherment paths of Egyptian hieroglyphs. However, the corpus is tiny, consisting of just over 360 known inscriptions primarily stamped on stone seals or scratched onto clay archival documents [28]. This lack of data, coupled with the absence of a bilingual "Rosetta Stone", has heavily restricted early and modern decipherment efforts.

The very first attempts to decipher the script began before a single shovel hit the dirt at Knossos, by Sir Arthur Evans and his "Illusory" Egyptian Method (1890s–1909). The initial clues (1889–1894) appeared while working as the keeper of the Ashmolean Museum, where Sir Arthur Evans was fascinated by tiny, perforated gemstone charms, sold in the antiquities markets of Athens. Cretan women wore these as *galopetres* ("milk stones"), believing they aided lactation. Evans noticed that these stones were engraved with symbols like eyes, loops, fish, and plants. The attempted method of Evans is described in his 1894 publication [29], when he attempted to decipher the marks by comparing them directly to Egyptian Hieroglyphs and Hittite symbols. He hypothesized that the script was an offshoot of Egyptian writing, attempting to assign ideological meanings to the symbols (e.g., assuming a "leg" sign meant travel or movement) [30]. When Evans finally excavated Knossos in 1900 and discovered clay archives containing the same script, he realized it was a highly localized Cretan development. Mainstream linguistics later proved that the physical similarities to Egyptian characters were completely superficial and accidental [28].

For nearly a century, actual decipherment attempts were paralyzed because scholars were working from Evans's old, flawed drawings. Every researcher had their own arbitrary numbering system for the signs. The most vital "attempt" at decipherment wasn't a translation, but the standardization of the corpus, via the publication of the *Corpus Hieroglyphicarum Inscriptionum Cretae* (CHIC) by Jean-Pierre Olivier and Louis Godart in 1996 [31]. CHIC systematically photographed, cataloged, and assigned a standardized three-digit number (e.g., CH 044) to every single valid Cretan Hieroglyphic sign. It weeded out purely decorative flourishes from actual linguistic signs [32]. CHIC essentially provided the clean data set that modern computational linguists use today. Recent initiatives employ machine learning and coordinate geometry to map how these symbols act as logograms (symbols representing an entire word) alongside their syllabic values, laying the modern groundwork required to eventually crack the script [33], at least for mainstream archaeolinguistics.

Conventional Decipherment Attempts

The decipherment attempts by conventional Linguistics followed two methods: The Internal Cryptographic Method (Mid-20th Century) and the "Archanes Formula" and Structuralism (1980s–1990s). These are presented next.

The Internal Cryptographic Method

Following the formal publication of Evans [30], scholars abandoned the idea that the script was purely pictographic (where one picture equals one concept). They began applying statistical, internal cryptography, focusing on isolating the typology of the script. Linguists like Johannes Sundwall and later Alice Kober counted the unique characters. They determined that the script contained roughly 90 recurring signs [32]. In cryptography, a signary of this size points to exactly one thing: a *syllabary* (where each sign represents a consonant-vowel syllable, like *ma, re, ti*), rather than an alphabet or a purely ideographic system.

The "Archanes Formula" and Structuralism (1980s–1990s)

A breakthrough in understanding the structure, if not the exact spoken language, of the script came with excavations at the cemetery of Archanes in Crete. There, Archaeologists discovered a cluster of prepalatial seals, dating back to c. 2100 BCE. They featured a highly specific, repeating sequence of five specific hieroglyphic signs, dubbed the "Archanes Formula" [34]. Then, the decipherment strategy commenced. In 1980, Paul Yule isolated this formula and attempted to decipher its structural function. Because this sequence appeared exclusively on high-status personal items and seals, scholars realized it didn't represent mundane trade items like "grain" or "oil." Instead, it was highly likely an administrative title, a religious invocation, or an elite family name. As a result, while Yule and subsequent scholars couldn't definitively "pronounce" the Archanes formula, this structural approach proved that the hieroglyphs were being used as true, functional language to designate ownership, status, and authority, rather than just random decorative art [35].

Computerized Decipherment Attempts

Computerized and digital approaches are at the forefront of modern Aegean epigraphy, although they may typically lack a rigorous linguistic base [36]. Because the corpus of Cretan Hieroglyphics is far too small for traditional cryptanalysis (fewer than 400 inscriptions total), scholars have pivoted away from attempting premature translations. Instead, modern computerized efforts focus on Digital Paleography, Computer Vision (CV), and Scriptinformatics to clean the data, analyze 3D structures, map structural syntax, and trace the evolutionary links between scripts [37] [38],. These computerized initiatives are split into three main methodologies:

Computer Vision and Sign Classification

Cretan Hieroglyphic inscriptions are notoriously difficult for computers to process, because they are inherently three-dimensional, i.e., carved into tiny, rounded gemstone seals or scratched onto uneven clay labels. The methodology of decipherment is pioneered by data scientists, working alongside the European Research Council's INSCRIBE (Inventions of Writing and Their Early Evolution) project at the University of Bologna, where researchers are training Deep Residual Networks (a type of convolutional neural network, or CNN) to automate sign identification. Yet, there is a computational hurdle: AI models typically require thousands of examples to accurately "learn" a character. To bypass the severe data shortage of Cretan Hieroglyphics, researchers employ self-supervised pre-training models, based on the reconstruction of Bags of Visual Words [37]. The goal is that, by standardizing how a computer clusters visual representation, the software strips away personal carving flourishes or accidental stone damage, providing a digitally verified, un-biased sign list. This mitigates human error in determining whether a faded mark is a new character or just a poorly carved variant of an existing one [32].

Scriptinformatics and Phylogenetic Trees

Rather than trying to translate the words blindly, computer scientists use evolutionary algorithms to map how Cretan Hieroglyphics gave birth to Linear A and subsequent Mediterranean writing systems. Accordingly, in the CNN-SVM Approach, researchers (like Daggumati and Revesz) have trained Convolutional Neural Networks paired with Support Vector Machines (SVM) to numerically score visual similarities between Cretan Hieroglyphic signs and seven other ancient scripts. The strategy followed is that the images of the characters are denoised, using adaptive thresholding and binarization techniques, before their features are analyzed. The algorithm computes mathematical feature vectors to generate cladograms, essentially creating a "family tree" for writing systems [38]. This helps researchers back-project known sound values from *Linear B* down the tree to see which Cretan Hieroglyphic components share phonetic roots.

High-Resolution 3D Modeling and Digital Typography

The material nature of the script has historically bottlenecked manual decipherment. Advanced digital humanities initiatives have digitized the corpus into specialized interactive formats. In Advanced Imaging, techniques such as Reflectance Transformation Imaging (RTI) and high-resolution 3D scanning allow computer programs to change lighting directions digitally. This exposes micro-grooves and stroke directions made by Bronze Age engravers that are invisible to the naked eye [37]. In terms of digital fonts, the INSCRIBE project developed specialized digital typefaces, such as inSCriBe, to translate physical 3D artifacts into clean, digital geometric lines [39]. This allows computational tools to perform automated string-matching and positional analysis across the entire corpus, tracking which combinations of signs ("words") cluster together most frequently.

Cretan Protolinear Script

As mentioned previously, according to the Cretan Protolinear Script theory, Cretan Hieroglyphics is merely the ornamental and ritual version of the said script. In this respect, the reading of several inscriptions in Archaic Sumerian, like the Arkalochori Axe and its siblings [40], the Malia Stone [41] and numerous seals [14], give meaningful interpretations perfectly fitting in the contemporary cultural context [42]. It should be stressed though that these readings do not prove neither that the involved population nor that their mother tongue was Sumerian. In the former case, the anthropological and genomic studies of the Minoan Cretans show a 15% existence of people somewhere from eastern Anatolia or northern Mesopotamia ("Iranian/Armenian"), but not Sumerian (Central Asia [43]). In the latter case, the Sumerian religion was dominant from the Indus Valley to Anatolia [10]. Sumerian language was the sacred language of this religion that had survived as a liturgical one until the 1 [st] century CE, i.e., 2000 years after the complete disappearance of the Sumerian nation. Most Cretan Hieroglyphics inscriptions are encountered in a religious context, either directly on votive objects [40] and altars [41], or indirectly on the heraldic seals that invoke a patron deity [14].

Therefore, it is normal to render the sacred language, and not a local mother tongue, whichever that might be.

Cypro-Minoan

Unlike its sister scripts (i.e., the classical Cypriot Syllabary and *Linear B*), the Late Bronze Age Cypro-Minoan script (c. 1550–1050 BCE) remains officially undeciphered. Because the surviving corpus is incredibly small (fewer than 250 texts total, mostly consisting of brief inscriptions on clay balls, pottery, and small cylinders), mainstream scholarship widely agrees that a definitive decipherment is currently impossible without a major new bilingual discovery [44]. However, this has not stopped linguists and archaeologists from making a series of rigorous, historical attempts to crack the script over the past century, since the early comparative method (1909–1930s).

The first step toward decipherment wasn't a translation, but an identification of the script's lineage. Sir Arthur Evans (1909), after discovering pre-alphabetic writing systems on Crete, turned his attention to Bronze Age findings from Cyprus. He was the first to recognize structural similarities between the Cretan scripts and the Cypriot markings. He officially coined the term "Cypro-Minoan", arguing that the script was a provincial offspring of Minoan *Linear A* [45].

Another early sound-value matching was that of Sundwall (1915). These earliest explicit attempts to *read* the script relied on a simple comparative bridge. Because George Smith had already deciphered the Iron Age *Cypriot Syllabary* in 1871, early scholars assumed that if a Bronze Age Cypro-Minoan sign looked identical to an Iron Age Cypriot sign, it must have carried the exact same sound value. Johannes Sundwall published a table in 1915, equating 30 Cypro-Minoan signs with their supposed classical counterparts, attempting to read isolated words. This method was ultimately criticized for ignoring centuries of paleographical evolution [46].

The next attempt was that of John Franklin Daniel and Methodological Sobriety (1941). Accordingly, before a script can be translated, its sign list must be standardized. For decades, archaeologists lumped completely random marks, stamps, and multi-sign sentences into the same analytical pot [45]. A breakthrough happened when the American scholar John Franklin Daniel established the first truly scientific framework for decipherment [46]. Daniel isolated true writing from isolated "potmarks" (merely ownership or cargo symbols). He built the first rigorous, clean signary of 73 distinct characters and systematically assigned tentative phonetic values to 26 of them, based on geometric evolutionary paths, linking *Linear A* to the later Cypriot Syllabary [47]. Tragically, Daniel died suddenly in the field before he could apply his matrix to the larger tablet discoveries of the late 1940s and 1950s.

The post-*Linear B* efforts and the Hurrian Hypothesis (1950s–1970s) followed. When Michael Ventris successfully cracked *Linear B* in 1952, using an algebraic grid, it ignited a massive wave of optimism. Scholars immediately attempted to apply Ventris's grid and phonetic values to Cypro-Minoan, assuming the underlying language might also be an archaic form of Greek or a known ancient Near Eastern language [45]. Subsequently, it was the extension of Ventris & Chadwick (1950s). Namely, following their success with *Linear B*, Michael Ventris and John Chadwick turned their attention to the newly excavated clay tablets from Enkomi and Ugarit (Syria), which featured longer Cypro-Minoan texts [44]. They attempted structural analysis, counting sign frequencies and mapping prefixes/suffixes, but concluded that the data set was too small to construct a stable, independent internal grid.

In the 1970s, Emilia Masson proposed the Hurrian Hypothesis (1974). There, the French epigrapher revolutionized the field, by categorizing the script into distinct sub-classes, based on where they were found and how the signs were drawn, namely: CM1 (the general Cypriot corpus), CM2 (dense, specialized tablets found at Enkomi), and CM3 (texts found at the trading hub of Ugarit). Masson attempted a linguistic decipherment, by focusing on the CM3 texts from Ugarit. Because Ugarit was a multi-ethnic diplomatic hub, she hypothesized that Cypro-Minoan was being used to record Hurrian, a known, non-Indo-European language of the ancient Near East [48]. While she successfully isolated specific recurring character combinations that matched Hurrian naming patterns, she later conceded that the attempts yielded only "sporadic readings" rather than a full, systemic decipherment [47].

In the late 20th and early 21st centuries, isolated attempts at full decipherment continued to appear, such as Jan Best and Fred Woudhuizen's attempts to read the script as a Semitic/Luwian hybrid, or various attempts to force-read it as Eteocypriot (the indigenous, unknown pre-Greek language of Cyprus) [49]. However, modern linguistic consensus, led by computational specialists and epigraphers like Silvia Ferrara and Philippa Steele, views all past and current full decipherment claims as highly improbable and premature [45] [50], Current efforts have largely abandoned trying to "translate" the text, shifting focus instead to advanced 3D imaging, digital paleography, and analyzing how the script functioned socially within Late Bronze Age Mediterranean trade networks [51].

Computational decipherment attempts

There are also active, pioneering computational attempts regarding the Cypro-Minoan script. However, it is important to distinguish the specific nature of these attempts: because the overall corpus is so small, fewer than 300 inscribed objects [52], current computational linguistics and AI efforts are not yet "deciphering" (translating) the language itself. Instead, they are focused on solving the architectural and paleographical prerequisites, required for a successful future decipherment. The major computational breakthroughs and approaches applied to Cypro-Minoan include the following approaches.

1. Unsupervised Deep Learning & Sign Reclassification

Historically, scholars divided Cypro-Minoan into three separate sub-scripts (CM1, CM2, and CM3), suspecting they might represent different languages. A massive hurdle to decipherment was determining whether two highly similar characters were completely different signs (graphemes) or just variations written by different authors (allographs). In a landmark 2022 study, researchers used a state-of-the-art, unsupervised convolutional neural network (CNN), built on computer vision and natural language processing concepts, to analyze the script without prior human bias. The deep learning model looked at drawings of the signs and mapped them into a vector space. It integrated sequence data to learn how characters interact with one another. The computational model demonstrated that the physical medium (e.g., clay balls, tablets, metal vessels) heavily distorted how signs looked. When compensating for this "medium bias", the neural network demonstrated that Cypro-Minoan is actually a single, unified script rather than three distinct subgroups [52]. Resolving this question computationally gives paleographers a standardized sign inventory, a critical step before full linguistic decipherment can begin.

Now, let's make a few comments on how the Unsupervised Neural Network grouped signs. The 2022 study [52] bypassed human preconceptions, by feeding sign data into a deep learning pipeline that combined computer vision and natural language processing (NLP). The AI did not know what the signs meant; it only analyzed how they looked and where they appeared. There is a two-pronged pipeline; the network evaluated each character based on two independent vectors:

- Visual Geometry (The "Look"); A Convolutional Neural Network (CNN) analyzed standard digitized drawings of the signs. It broke down strokes, curves, and angles, mapping every sign into a geometric vector space. If two signs looked visually similar, their vectors sat close to each other.
- Contextual Environment (The "Behavior"); The team used a language model approach akin to Word2Vec. The algorithm examined every instance of a sign in the entire corpus, tracking its "neighbors" (which signs frequently came before or after it).

Overcoming the "Medium Bias" was a major research target. The most significant hurdle for human epigraphers has been that Cypro-Minoan was written on vastly different materials. A scribe gently scratching into a soft, wet clay tablet creates a very different line quality than a scribe aggressively carving into a hard-bronze vessel or rolling a cylinder seal. Humans looked at these stylistic discrepancies and divided the script into three separate classifications (CM1, CM2, CM3). The unsupervised model, however, analyzed the overlapping geometric features alongside the contextual neighboring signs. It proved mathematically that the differences between the groups were entirely environmental (the material and document type), not linguistic. When the model clustered the data, signs from CM1 and CM2 that looked slightly different shared nearly identical contextual neighbor scores. The AI successfully proved that they were the exact same characters, written in different handwriting styles.

Cross-Script Target Modeling

Because Cypro-Minoan is conventionally regarded as an evolutionary link between Crete's *Linear A* and the later deciphered Cypriot Greek Syllabary, computational linguists have leveraged known scripts to map the unknown. Recent doctoral and institutional research has focused on training unsupervised models using the Cypriot Greek Syllabary as a known structural target. By configuring algorithms to understand how syllables operate in the deciphered geographical descendant, AI models are being used to reconstruct disputed allographs in Cypro-Minoan and map structural, statistical algorithmic pathways between them [52].

Algorithmic Combinations & Similarity Metrics

Other computational pipelines involve testing Cypro-Minoan's parent script, *Linear A*, using feature-based similarity metrics to see how signs mathematically map to known writing systems, such as the Carian Alphabet and the Cypriot Syllabary. By creating algorithmic models that measure graphic proximity and phonological likelihood across these interconnected script families, computational models aim to bypass the human error of "forcing" phonetic values where they don't belong [53]. Yet, according to the author herein, the simplest a grapheme (sketch) is geometrically, the less it can prove anything, when studied regardless of the contemporary cultural context.

Both topics provide fascinating insights into how modern data science and classical historical linguistics intersect. Here, it was presented how the unsupervised neural network achieved its classification, now followed by how Cypro-Minoan structurally relates to its supposed mother script, *Linear A*, since Cypro-Minoan is conventionally considered a direct offshoot of Crete's *Linear A*. Accordingly, when Minoan traders established dense trade routes with Cyprus, during the Bronze Age, the residents of Cyprus adopted and adapted the Minoan script to record their own local language (often called "Eteocypriot"). Linguistically, they share deep architectural DNA, but they also diverged in a few distinct ways:

- Both scripts share a common syllabic core, i.e., they are primary *syllabaries*, meaning each open sign typically represents a consonant-vowel pair (e.g., *ta*, *ma*, *ri*) rather than a single alphabet letter.
- Both scripts share visual cognates, since, roughly half of the signs in Cypro-Minoan have clear, undeniable visual equivalents in *Linear A*. The core shapes allegedly traveled directly from Crete to Cyprus.
- *Linear A* is highly reliant on ideograms/logograms (i.e., symbols representing whole words like "wine", "wheat", or "person"), while Cypro-Minoan almost entirely lacks logograms and it is written out nearly purely phonetically.
- The primary purpose of *Linear A* is administrative, for economic book-keeping (also found in religious libation formulas), while Cypro-Minoan is highly varied, found on personal items, luxury goods, clay balls, and foundational architecture.
- *Linear A* retained somewhat intricate, pictorial flourishes from its alleged hieroglyphic roots, while Cypro-Minoan is drastically simplified, i.e., stroke counts were reduced to make the characters faster to scratch or stamp.

This structural relationship creates a fascinating paradox for computational linguists. Because we can read the *later* descendant script of Cypro-Minoan (the Cypriot Greek Syllabary), we can reliably guess the phonetic values (the sounds) of many Cypro-Minoan signs, based on their structural lineages. However, even if an AI perfectly maps every Cypro-Minoan sign to its correct sound, the underlying language conventionally remains entirely unknown.

Cypriot Protolinear Script

According to Kenanidis [16], the Cypriot Protolinear Script had been developed alongside the Cretan Protolinear Script by the Sumerian community of Cyprus, following the same principles, hence their pictorial resemblance. The Cypro-Minoan script is what has remained from the evolution of the original script. A detailed study is available [54] that explains the nature of its syllabograms, as well as a decipherment of texts, which seem to render an Akkadian dialect. The historical presence of Akkadians in Cyprus, since the reign of King Sargon the Great in the 23 [rd] century BCE, is well known from the Tablets of Mari [42], while equally well-known is their Sumero-Akkadian bilingualism [55].

Conclusion

Unlike *Linear B* and Cypriot Greek Syllabary, which were successfully cracked because the underlying language turned out to be Greek, neither the language of Cretan Hieroglyphics nor Cypro-Minoan had a confirmed living relative. Computational power is currently regarded as the mainstream hope for finding structural patterns within these text blocks to figure out exactly how their grammar operated. Yet, occasionally there are claims encountered of complete computer translation. These claims usually follow the “garbage in, garbage out” data rule, meaning that the software successfully matches patterns, but the human programmers feed the machine unverified sound values to begin with, rendering the output mathematically consistent but historically fictitious.

Early researchers tried to force-read the phonetic values of *Linear B* backward into Cretan Hieroglyphics. By taking a hieroglyphic sign that looked like a door, matching it to a *Linear A/B* sign that looked like a door, and applying the *Linear B* sound value, they tried to speak the words aloud [56]. This early backward-projection failed because of several reasons. One is that graphic styles shifted radically between 2000 BCE and 1450 BCE; a symbol that looked like an animal head in 2000 BCE might be over-simplified to a geometric cross-shape in *Linear B*. Even so, the linguistic affinity to Sumerian would not had been recognized, since Sumerologists and Aegeanists represent two different worlds of Archaeology that do not normally “mix”.

Unlike previous attempts, the Cretan and Cyprus Protolinear Scripts theories considered the interpretation of these scripts not merely linguistically, but in their broader contemporary cultural context. This approach is essential for the accurate recognition of the nature of each sign and its rendered phonetic value. Accordingly, inscriptions in Cretan Hieroglyphics convey meaningful interpretations of religious context in Archaic Sumerian, while Cypro-Minoan inscriptions may well render an Akkadian dialect. In both cases, linguists specialized and knowledgeable enough in the ancient Mesopotamian languages and cultures are more suitable than anyone else to proceed in further studies.

Acknowledgements

The author express his thankfulness to Professors Elias Sideras-Haddad and Bruce Mellado, of the University of the Witwatersrand, Johannesburg, South Africa, for facilitating the research herein.

References

1. Davis B. Introduction to the Aegean Pre-Alphabetic Scripts. Kubaba,2010:1:38-61.
2. Steele P. Other pre-alphabetic scripts of Crete and Cyprus. In: Galanakis Y, Christophilopoulou A, Grime J, editors. Codebreakers and Groundbreakers. Cambridge, 2017. p. 43-51.
3. Meissner T. Understanding Relations Between Scripts: The Aegean Writing Systems. Oxford: Oxbow Books, 2017.
4. Steele PM. Exploring Writing Systems and Practices in the Bronze Age Aegean. Vol. 7. Oxford: Oxbow Books, 2024.
5. Kenanidis IK, Papakitsos EC. Seven Linear B Syllabograms of Conventionally Unknown Phonetic Value. International Linguistics Research,2018:1(2):22-30.
6. Donnelly CM. Review of Cretan Hieroglyphic by Civitillo et al. Bryn Mawr Classical Review,2026. Available from: https://bmcr.brynmawr.edu/2026/2026.01.17/
7. Corazza M. Computational methods applied to undeciphered scripts from the Aegean and Cyprus: Linear A and Cypro-Minoan. Doctoral thesis. University of Bologna, 2023.
8. Papakitsos E. Designing the automation of data retrieval for processing the corpora of the Cretan Protolinear scripts. International Journal of Computational Engineering Research,2026:16(5):29-34.
9. Lupack S. History of Research of Aegean Bronze Age Scripts. In: Weilhartner J, editor. Cambridge Companion to Aegean Bronze Age Writing. Cambridge University Press, 2026.
10. Papakitsos EC. Inquiring into the Origin of the Minoan Civilization via Information Systems Modelling in Humanities. GPH - International Journal of Social Science & Humanities Research,2020:3(5):40-58.
11. Papakitsos EC. The Linear-A Syllabary in the Context of Cretan Protolinear Theory. Bulletin of the Georgian National Academy of Sciences,2021:15(2):154-162.
12. Finkelberg M. Bronze Age Writing: Contacts Between East and West. In: Cline EH, Harris-Cline D, editors. The Aegean and the Orient in the Second Millennium. Liège, 1998. p. 265-272.
13. Olivier J-P. The Relationship between Inscriptions on Hieroglyphic Seals and those Written on Archival Documents. In: Aegean Seals, Sealing and Administration. Aegaeum,1990:5:11-24.
14. Papakitsos EC, Kenanidis IK. Cretan Hieroglyphics: The Ornamental and Ritual Version of the Cretan Protolinear Script. Anistoriton Journal,2016:15:Essays.
15. Kenanidis I. Great-hearted Eteocretans [in Greek]. Athens, Greece: National Library of Greece, 1992.
16. Kenanidis I. cwepeker.doc [in Greek]. In: Historical and Linguistic Studies. Kavala, Greece: Lazidou, 2013.
17. Papakitsos EC. Standardizing the Cretan Protolinear Syllabary. Migration & Diffusion,2019:1-11.
18. Fischer SR. A History of Writing. London: Reaktion Books, 2004.
19. Willetts RF. The Civilization of Ancient Crete. Berkley CA: University of California Press, 1977.
20. Olivier J-P. Cretan Writing in the Second Millennium B.C. World Archaeology,1986:17(3):377-389.
21. Castleden R. Minoans: Life in Bronze Age Crete. London: Routledge, 2002.
22. Glarner H. Sumerische Schriftzeichen in der Linear A. Kadmos,2002:41(s1):121-122.
23. Woudhuizen FC. The Language(s) of Linear A: An Updated Review Article. DO-SO-MO: Fascicula Mycenologica Polona,2005:6:95-121.
24. Szałek BZ. Eteocretan, Linear A, Etruscan, Lemnian, Carianan, Eteocypriot and related problems in the light of heuristics and cryptology. Szczecin, 2008.

25. Davis B. Cypro-Minoan in Philistia? Kubaba,2011:2:40-74.
26. Morpurgo Davies A, Olivier J-P. Syllabic scripts and languages in the second and first millennia BC. Available from: http://www.ling-phil.ox.ac.uk/files/people/AMD/AMD-Olivier,_Syllabic_scripts_and_languages_in_2nd_millennium_BC_(Parallel_Lives,_2012).pdf, 2012.
27. Szałek BZ. Tartessian, Etruscan, Linear A, Sumerian and related problems in the light of heuristics and cryptology. Szczecin, 2015.
28. Mnamon. Cretan Hieroglyphic. Italy: Scuola Normale Superiore, 2025.
29. Evans AJ. Primitive Pictographs and a Prae-Phoenician Script from Crete. The Journal of Hellenic Studies,1894:14:270-372.
30. Evans AJ. Scripta Minoa: The Written Documents of Minoan Crete. Vol. I. Clarendon Press, 1909.
31. Olivier JP, Godart L. Corpus Hieroglyphicarum Inscriptionum Cretae (CHIC). École Française d'Athènes, 1996.
32. Ferrara S, Montecchi B, Valério M. Rationalizing the Cretan Hieroglyphic signlist. Kadmos,2021:60(1-2):5-32.
33. Ferrara S, Montecchi B, Valério M. In Search of Lost Signs: A New Approach to the Issue of Writing and Non-Writing on Cretan Hieroglyphic Seals. Oxford Journal of Archaeology,2023:42(2):107-130.
34. Decorte RP-JE. The First 'European' Writing: Redefining the Archanes Script. Oxford Journal of Archaeology,2018:37(4):341-372.
35. Jasink AM. Cretan Hieroglyphic Seals: A New Classification of Symbols and Ornamental/filling Motifs. Fabrizio Serra, 2009.
36. Mavridaki A, Zacharis N, Papakitsos E. Software Engineering for the Undeciphered Aegean Scripts: Conditions, Prerequisites, Perspectives. International Journal of Engineering, Management and Humanities,2025:6(4):395-403.
37. Lastilla L. Digital palaeography: Computer vision methods applied to the study of ancient undeciphered writing systems. Sapienza University of Rome, 2023.
38. Daggumati S, Revesz PZ. Convolutional Neural Networks Analysis Reveals Three Possible Sources of Bronze Age Writings between Greece and India. Information,2023:14(4):227.
39. Civitillo M, Ferrara S, Meissner T, editors. Cretan Hieroglyphic. Cambridge University Press, 2024.
40. Kenanidis IK. A 17th c. BC Minoan Votive Double Axe (Labrys): The Arkalochori Axe and its siblings. Anistoriton Journal,2016-2017:15:In Situ.
41. Kenanidis IK, Papakitsos EC. An Interpretation of the Malia Stone Inscription in Terms of the Cretan Protolinear Script. Terra Sebus: Acta Musei Sabesiensis,2017:9:43-56.
42. Papakitsos EC. An Application of Systems Science in Humanities: Investigating the Origins of the Minoan Civilization. Sumerianz Journal of Social Science,2019:2(4):33-44.
43. Kenanidis I, Papakitsos EC. Yet another suggestion about the origins of the Sumerian language. International Journal of Linguistics,2013:5(5):30-44.
44. Steele PM. A Linguistic History of Ancient Cyprus. Cambridge University Press, 2013.
45. Palaima TG. Cypro-Minoan Scripts: Problems of Historical Context. In: Problems in Decipherment. BCILL 49,1989. p. 121-188.
46. Daniel JF. Prolegomena to the Cypro-Minoan Script. American Journal of Archaeology,1941:45(2):249-282.
47. Faucounau J. The Cypro-Minoan Scripts: A Reappraisal Fifty Years after John F. Daniel's Paper. Archaeologia Cypria,1994:3:93-106.
48. Masson E. Cyprominoica: Répertoires, Documents de Ras Shamra, Essais d'Interprétation. Studies in Mediterranean Archaeology,1974:31:257-258.
49. Best J, Woudhuizen F. Ancient Scripts from Crete and Cyprus. E.J. Brill, 1988.
50. Ferrara S. Cypro-Minoan Inscriptions. Vol. 1: Analysis. Oxford University Press, 2012.
51. Steele PM. Writing and Society in Ancient Cyprus. Cambridge University Press, 2018.
52. Corazza M, Tamburini F, Valério M, Ferrara S. Unsupervised deep learning supports reclassification of Bronze age Cypriot writing system. PLOS ONE,2022:17(7):e0269544.
53. Nepal A, Perono Cacciafoco F. Minoan Cryptanalysis: Computational Approaches to Deciphering Linear A and Assessing Its Connections with Language Families from the Mediterranean and the Black Sea Areas. Information,2024:15(2):73.
54. Kenanidis I. Cypro-Minoan writing deciphered. Researchgate,2021. DOI: https://doi.org/10.13140/RG.2.2.21743.36000
55. Kenanidis IK, Papakitsos EC. A Comparative Linguistic Study about the Sumerian Influence on the Creation of the Aegean Scripts. Scholars Journal of Arts, Humanities and Social Sciences,2015:3(1E):332-346.
56. Karnava A. The Cretan Hieroglyphic Script of the Second Millennium BC: Description, Analysis, Function and Decipherment Perspectives. Doctoral thesis. Bruxelles: Université libre de Bruxelles, 1999.