



Original Article

Transformation of Scribe Designs in Late Proto-Elamite Tablets: A Study of Scribe Pattern Motifs and Changes in Sealing Practices

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Abstract

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This study examines the so-called “scribe pattern” markers identified in 62 late Proto-Elamite administrative documents housed in the Louvre Museum and the National Museum of Iran. Recent research indicates that Proto-Elamite administrative systems underwent significant developments in the methods used to authenticate and individualize documents. Archaeological evidence suggests that, in the early phases, animal and symbolic motifs predominated in seal designs; however, with the advancement of writing, these were gradually replaced by simpler linear signs. Notably, the emergence of new types of seals inspired by these linear signs characterizes the later stages of this period. These changes reflect a complex phase of interaction between ancient traditions and administrative innovations. It appears that Proto-Elamite society was actively experimenting and seeking optimal solutions for recording and verifying information. Despite recent advances in scholarship, major challenges remain in fully understanding this system, especially regarding the precise status of these markers within the administrative hierarchy. This research not only opens a new window onto the study of early administrative systems but can also inspire comparative studies of the evolution of writing in ancient civilizations. The discovery and analysis of additional examples in the future will undoubtedly clarify many of the current uncertainties.

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Introduction

According to Pittman's research (1997), approximately 15.7% of Proto-Elamite clay tablets bear seal impressions, the vast majority (96%) of which were stamped with "classic" style cylinder seals. These seals were decorated with naturalistic motifs of animals or humanoid figures (Pittman, 1997: 139; Roach, 2008: 352-364). Two hypotheses have been raised regarding the function of these seals: a validating signature—where the seal was impressed after the text was written, presumably serving as a mark of authentication for the tablet's contents (Matthews, 2013: 344); and an administrative letterhead—where the seal was applied prior to writing and may indicate the identity of the issuing institution (Pittman, 1997: 137). In contrast, Hawkins investigated the individual, household, and institutional signs on 35 Proto-Elamite tablets, noting that only 4 had seal impressions, each with a different seal. This suggests that there may not have been a direct relationship between the individual/household/institutional sign recorded on the tablet and its seal (Hawkins, 2015: 4). Recent studies indicate that the decline in seal use towards the end of the Proto-Elamite period was primarily driven by the growing phoneticism and the advancing anthropological sequence in this system. As Matthews (2013) points out, although seals were effective in visually representing concepts, they lacked the capacity to precisely express the phonetic forms of personal names or specialized terms (Matthews, 2013: 349). Conversely, Dahl argues that the increasing complexity of Proto-Elamite tablets, such as the development of anthropological sign sequences, did not necessarily lead to the gradual abandonment of seals. According to Dahl, these patterns essentially performed the same function as sealing, acting as a scribe's signature (Dahl, 2012; Dahl, 2013). Similarly, Pandey (2020) refers to these markers as "scribe patterns," which in some late Proto-Elamite tablets were used instead of seals. However, evidence from later periods, such as examples from TUV at Tall-e Malyan, suggests that after some time and the use of scribe signatures, the seal once again regained its previous role (Deset, 2021). Accordingly, Dahl has proposed a three-stage sequence for the development of seals and signatures during the Proto-Elamite

period. The first stage featured the so-called "classic Susa seals" or traditional seals, characterized by the use of cylinder seals decorated with animal motifs. In the second stage, within the late Proto-Elamite tablets, linear patterns—serving as linear signatures—emerged and gradually replaced the use of cylinder seals. The third stage saw the advent of "imitative seals," which signaled a return to seal use; however, these seals were now based on linear patterns inspired by the earlier signatures—essentially, seals that imitated the linear signatures (Dahl, 2012).

Scribes' Signatures in Proto-Elamite Tablets;

A systematic examination of the scribal signatures on Proto-Elamite administrative tablets from the Susa corpus—encompassing 62 artifacts currently held in the Louvre and the National Museum of Iran, as published via the Cuneiform Digital Library Initiative (CDLI)—provides critical insight into the professional structure and social organization of Proto literate administration in southwestern Iran. Among these 62 tablets explicitly bearing scribal marks of authorship, a total of 36 distinct signature types have been identified, reflecting both the individuality and the operation of record-keeping practices during the Proto-Elamite period.

Building upon initial observations summarized by Dahl (2012) for a portion of these tablets, a more extensive quantitative analysis reveals a nuanced distribution in the frequency of signature recurrence. Approximately 31% of identified signatures (19 out of 62) recur with notable regularity, each appearing between 4 and 8 times, suggesting either the presence of professional, perhaps institutionally-affiliated scribes, or scribes engaged in specialized administrative roles commanding a recurring presence within the archival corpus. In contrast, about 8% of the signatures (6 types) are attested only 2 or 3 times, possibly representing itinerant or less central participants in the administrative apparatus, or those with a more circumscribed function. The most striking pattern, however, is the predominance of single-occurrence signatures:

roughly 51% (30 types) are attested on only one tablet each. This high degree of non-recurrence may indicate a large pool of part-time or non-professional writers operating alongside regular scribes, or reflect episodic participation in administrative documentation by various members of the community—possibly as a function of the distributed or decentralized nature of Proto-Elamite administration.

Furthermore, the analysis is complicated by the fact that in approximately 10% (6 cases) of the tablets, the signature field is either damaged or illegible, precluding precise identification. Such cases remind us of the fragmentary preservation of the archaeological record

and the limits it imposes on reconstructions of scribal activity. Taken together, this pattern of signature distribution is not only striking for its diversity but also rich in interpretive potential. A complete listing of signature types, along with the specific registration numbers of the associated tablets, is provided in Figure 1 and Table 1. This dataset forms an empirical foundation for exploring further questions relating to scribal mobility, professional hierarchy, and the role of writing in early state formation processes across the Iranian plateau.

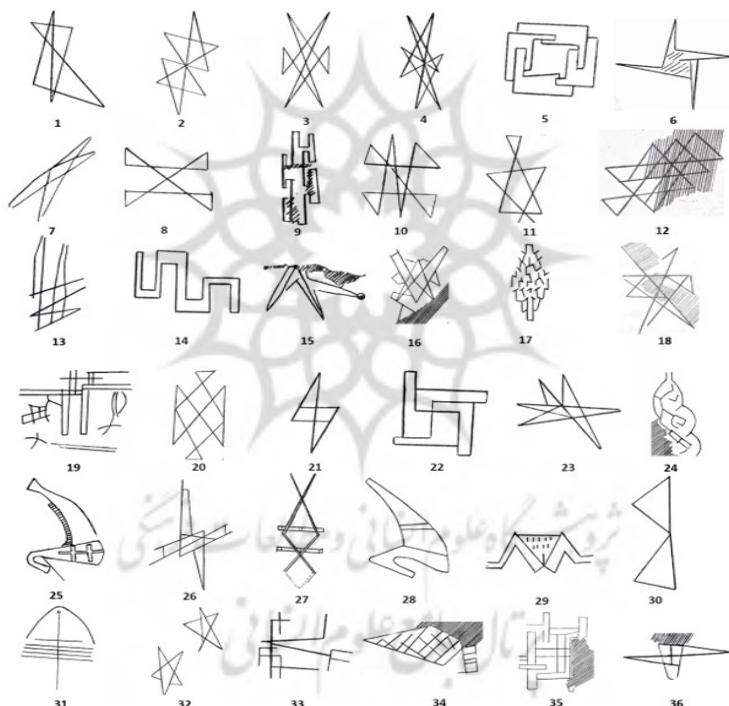


Figure 1.
Scribes' Signatures in Proto-Elamite Tablets.

Figure1.
Scribes' Signatures in Proto-Elamite Tablets Publication.

Number of Scribal designs	Repetitiveness
1 (design 4 in Dahl, 2012)	8:MDP26,004/MDP26,125/MDP06,263/MDP06,387/ MDP17,005/MDP17,162/MDP17,326/MDP26s,5016
2 (design 1 in Dahl, 2012)	6:MDP17,36/MDP17,81+347/MDP17,131/MDP17,156/MDP17,286/ MDP17,331
3 (design 2a in Dahl, 2012)	5:MDP06,4994/MDP17,324/MDP26s,384/MDP26s,4761/ 01148 NMI
4 (design 3 in Dahl, 2012)	2:MDP17,412/MDP26s,4784
5 (design 13 in Dahl, 2012)	2:MDP17,309/MDP17,330
6	2:MDP06,359/MDP26,314
7	1:MDP06,226
8 (design 6a in Dahl, 2012)	1:MDP06,290
9	1:MDP06,391
10 (design 6b in Dahl, 2012)	1:MDP06,4996
11 (design 7 in Dahl, 2012)	1:MDP17,005
12 (design 9 in Dahl, 2012)	1:MDP17,30
13 (design 6c in Dahl, 2012)	1:MDP17,72
14 (design 12 in Dahl, 2012)	1:MDP17,87
15	1:MDP17,116
16	1:MDP17,123
17 (design 10 in Dahl, 2012)	1:MDP17,153
18 (design 2b in Dahl, 2012)	1:MDP17,314+376
19	1:MDP17,328
20 (design 8 in Dahl, 2012)	1:MDP17,428
21 (design 5 in Dahl, 2012)	1:MDP17,430
22 (design 14 in Dahl, 2012)	1:MDP17,443
23	1:MDP17,452
24	1:MDP26s,371
25	1:MDP26,050
26	1:MDP26,96
27	1:MDP26,314
28	1:MDP26,436
29	1:MDP26,480
30	1:MDP31,009
31	1:MDP31,032
32	1:MDP31,35
33	1:TCL,32,11
34	1:Sb 09458
35	1:RA,050,20208
36	1:NMI 01154
37	Unrecognizable:MDP17,189+336/MDP17,333/MDP17,365/ MDP17,414/MDP17,157/MDP26s,4757

Scribe Signature;

This analysis is based on the examination of eight Proto-Elamite tablets from the Susa corpus, of which three are broken and thus could not be identified with certainty. In the remaining tablets, the presence of Signature (No. 1) appears consistently in documents related to the distribution of rations, as indicated by the usage of signs (M288) and (M297). The frequency of this signature and its consistent association with specific content support the hypothesis that it likely belonged to a scribe or official responsible for ration distribution storerooms within the Susa administrative system. The next most frequent signature, Signature (No. 2), occurs on six tablets. Although many of these texts are damaged and difficult to verify, in those that are identifiable, this signature is associated with sign (M036), which pertains to cereals and legumes. This

pattern suggests that Signature (No. 2) may have belonged to a scribe or official managing grain and legume storage facilities. Signature (No. 3) is documented five times on tablets; however, for some cases—such as (MDP 17, 324)—only the scribe's signature drawing exists in the CDLI, and others, like (MDP 26s,384), are too damaged to discern the content. Nonetheless, the remaining three tablets with Signature (No. 3) all display the title sign (M157), possibly indicating a specialized function of this signature within a particular institution or extended household.

Functional Distinctions of Signatures on Proto-Elamite Tablets

On one of the Proto-Elamite tablets from the Susa site, both a seal impression and a scribe's signature have been identified. This finding clearly illustrates that, during the transitional period, the administrative system was evolving

from the use of traditional seals toward individualized signatures. As Matthews (2013) has suggested, while signatures gradually replaced seals, there was a notable period of overlap in which both practices were employed simultaneously. In this particular tablet, the seal—typically impressed on the main surface—serves as an indicator of formal and institutional validation of the document, whereas the signature, sketched with specific linear marks on the tablet's reverse, represents the personal identity of the scribe or the official responsible for the record.

This interesting combination demonstrates that the transformation of administrative practices was not abrupt; rather, there was a phase when traditional seals and the emerging signatures coexisted. It appears that seals were retained for more important and official documents, while signatures were newly incorporated to register individual responsibility. This noteworthy development reflects the increasing sophistication and specialization of administrative recording methods during the Proto-Elamite period (see Figure 2).



Figure 2.

Proto-Elamite tablet showing both a seal impression and a scribe's signature, illustrating the transitional overlap of institutional validation (seal) and emerging personal identification (signature) in administrative practice.

Dual Signatures on Documents:

Dual signatures have been identified on four Proto-Elamite tablets from the Susa site (MDP 26,314; MDP 17,005; MDP 17,428; MDP 31,35). The signature on the obverse of the tablet likely belonged to the immediate recorder or person directly responsible for the entry, whereas the signature on the reverse probably functioned as an archival marker or as a sign of final verification and control. The presence of two distinct signatures, each on a different side of the

tablet, suggests a more advanced level of administrative hierarchy and oversight, reflecting a division of roles and responsibilities within the recording process. This dual-signature practice may have provided an additional layer of accountability, with one individual documenting the transaction and another confirming or archiving it, thus ensuring both procedural integrity and administrative control. Such an arrangement is indicative of a complex and multi-tiered bureaucratic structure in the late Proto-Elamite administrative system (see Figure 3).

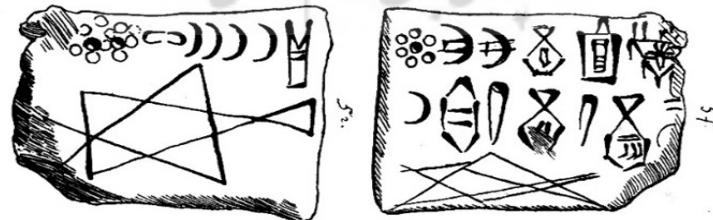


Figure 3.

Dual-signature Proto-Elamite tablets from Susa: distinct signatures on obverse and reverse indicate division of recording and archival roles, reflecting enhanced administrative oversight and a multi-tiered bureaucratic system.

Unilateral Signatures on Tablets:

A study of eighteen Proto-Elamite tablets reveals that the system of unilateral signatures operated in two distinct forms. The first and most prevalent form, represented by fourteen examples (see Figure 3: MDP 06,263; MDP 06,387; MDP 06,4996; MDP 17,30; MDP 17,286; MDP 17,308; MDP 17,314+376; MDP 17,331; MDP 17,430; MDP 17,452; 26s,4757; 26s,4789; 26s,5016; TCL 32,11), features tablets where the reverse side is left blank and the signature is concentrated solely on one side. This pattern likely reflects a simpler administrative hierarchy for record-keeping and offers three key practical advantages: (1) optimizing the available space by reserving the reverse side of the tablet for potential future annotations or additions; (2) facilitating easier handling and quicker access to the document, since the relevant information is consolidated on a single side; and (3) reducing approval time for entries deemed

less significant or routine. Archaeological evidence, particularly the spatial distribution of these tablets—which are found mainly in peripheral workshops—and comparison with dual-signature tablets further confirm that this system was deliberately employed to expedite the registration process for lower-priority or everyday administrative records. In the second form, some unilateral signature tablets display a signature on the obverse, while the reverse features additional marks or signs (see Figure 4: MDP 26,125; MDP 06,359; MDP 17,365; RA050,20208). As indicated above, these supplementary notations were most likely added at a later stage to provide updated or auxiliary information. Altogether, the practice of unilateral signing demonstrates intentional administrative streamlining, reflecting both operational pragmatism and a flexible approach to managing documentation in Proto-Elamite administration.



Figure 4.

Examples of unilateral signatures on Proto-Elamite tablets: Figure 3 shows signatures limited to one side with blank reverses for simpler records, while Figure 4 presents cases where additional notations were added to the reverse, reflecting flexible administrative strategies.

Reverse-Side Signatures on Tablets:

A distinct pattern of documentation is observed in a subset of Proto-Elamite tablets, where content-related signs are inscribed on the obverse, while the scribe's signature appears alone on the reverse, without accompanying numerical or pictorial signs. This registration system likely reflects an advanced form of administrative control designed to fulfill three principal objectives: (1) safeguarding the authenticity of the document by placing the signature on the less accessible reverse side, thus limiting unauthorized tampering or falsification; (2) facilitating expedited inspection and review by clearly separating the content (on the obverse) from the official validation

or endorsement (on the reverse); and (3) establishing a well-defined work hierarchy, in which the primary scribe recorded the substantive information, while a supervisor or overseer provided final approval by signing on the back of the tablet.

This dual-sided system exemplifies the sophisticated adaptation of writing technology to meet both security and administrative requirements in Proto-Elamite society. By distinguishing between the recording and approval functions spatially on the tablet, administrators improved organizational transparency and accountability while accommodating growing institutional complexity.

Archaeological data confirm this pattern on sixteen tablets from the Susa site (MDP 26,050; MDP 26,436; NMIBK 01148; NMIBK 01154; MDP 06,226; MDP 06,290; MDP 17,87; MDP 17,116; MDP 17,162; MDP 17,324; MDP 17,326; MDP 17,328; MDP 17,330; MDP

17,333; MDP 26s,371) (see Figure 5). The continued use of this practice highlights the deliberate and intelligent integration of evolving writing strategies into the administrative framework of early Elamite communities.

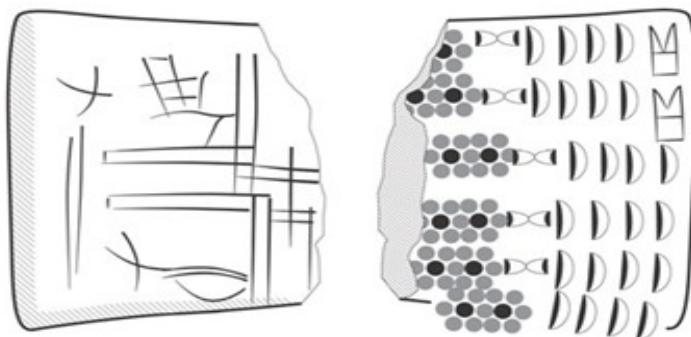


Figure 5.

Two distinct forms of reverse-side signatures on Proto-Elamite tablets: large, central signatures mark high-importance documents; small, marginal signatures denote routine records—reflecting administrative hierarchy and validation practices.

Signature on the Reverse of Tablets Accompanied by Numerical and Figurative Signs:

An examination of twenty Proto-Elamite tablets reveals the presence of signatures on the reverse, often in association with numerical and/or figurative signs. Close observation of these examples demonstrates that reverse-side signatures manifest in two clearly distinct forms: (1) in three cases, the signatures are centrally placed and considerably larger in size (MDP 17,157; MDP 17,414; MDP 31,009); and (2) in seventeen cases, the signatures are located along the margins and are noticeably smaller (MDP 26,004; MDP 26,096; MDP 06,290; MDP 06,385; MDP 06,391; MDP 06,4994; MDP 17,036; MDP 17,72; MDP 17,81+347; MDP 17,123; MDP 17,131; MDP 17,153; MDP 17,156; MDP 17,189+336; MDP 17,443; MDP 26s,384; MDP 26s,4761). These marked physical distinctions—readily visible to the naked eye and confirmed by basic measurement—indicate that the position and characteristics of the signature were not arbitrary. Instead, they reflect purposeful administrative choices, serving as concrete indicators of both the significance of the document and the status of the signatory within

the Proto-Elamite bureaucratic hierarchy. It is plausible that tablets displaying large, centrally placed signatures on the reverse were intended to represent final endorsements or authorizations for documents of higher importance or greater official weight. In contrast, those with smaller, marginal signatures may have pertained to routine or less critical records. This spatial differentiation not only underscores the sophistication of administrative practices in late Proto-Elamite society but also hints at an emerging sense of institutional protocol, in which the act and manner of signing itself communicated information regarding the document's function and legitimacy. The systematic use of central versus marginal signatures, documented in Figures 6, thus offers valuable insight into organizational stratification, record validation, and the internal logic governing Proto-Elamite archival traditions.

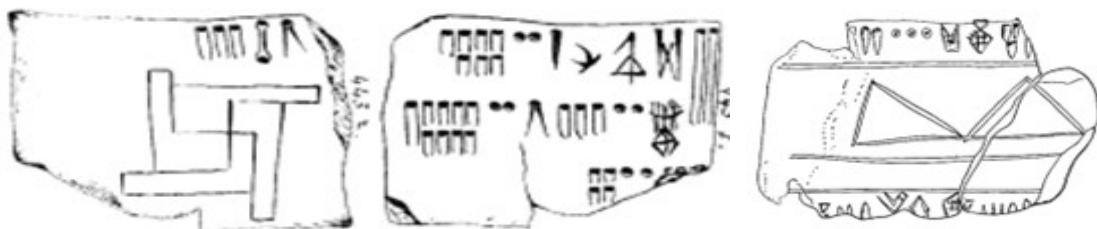


Figure 6.
Reverse-side scribal signatures on Proto-Elamite tablets from Susa.

Unilateral Signatures on Content-Free Clay Tablets (Without Signs):

Two examples of content-free Proto-Elamite tablets bearing only a single unilateral signature—without any accompanying inscription or numerical signs—have been published from the Susa site on the CDLI platform. The analysis suggests that such signature-only tablets likely fulfilled one of three practical purposes. First, they may have functioned as identity documents, akin to modern identification cards, issued to verify the identity of the owner or responsible party. Second, these tablets might have

served as training pieces for novice scribes, providing practice in inscribing personal signatures or marks as part of their initiation into administrative procedures. Third, they could have acted as temporary receipts, accompanying items or goods in transit and serving as provisional acknowledgment of dispatch or custody until a more formal record was issued. The minimalist nature of these tablets, featuring nothing beyond the signature, points to their specialized administrative utility and highlights the pragmatic and flexible approach within the Proto-Elamite bureaucratic tradition (Figure 7).



Figure 7.
Proto-Elamite content-free tablets bearing only single signatures

In one exceptional case among the content-free Proto-Elamite tablets bearing only a signature, there is a remarkable example featuring the depiction of a crowned bull and a series of crosses. This unique artifact, which falls within the category of tablets lacking conventional written content, likely served a ritual or symbolic function rather than a purely administrative one. Animals, particularly the bull, held significant roles in Proto-Elamite and Elamite culture, often being employed as powerful communicative symbols. As Pittman (1997) notes, such animal imagery

was intentionally used to convey messages and express complex ideas within the visual language of the period. The bull, in particular, is among the most frequently represented animals on Proto-Elamite cylinder seals, where its depiction signified strength, authority, or divine sanction. Recent scholarship has expanded on the social significance of these motifs: high-ranking members of Proto-Elamite society—perhaps even those associated with specific institutions—were commonly represented by lions or bulls (Dahl, 2014:1), suggesting a strong link between animal iconography

and elite status. Furthermore, crosses have been interpreted in Marishi's nomenclature as institutional symbols, and it is likely that they serve a similar function here. Taken together, these observations suggest that this tablet most likely belonged to a person of elevated rank within an institution. The presence of the crowned bull and crosses thus points to an intertwining of iconography, authority, and institutional identity, highlighting the dynamic interplay between emergent administrative practices and the enduring influence of ritual and symbolism in early Elamite society (Figure 8). Significantly, this motif was not only employed graphically within administrative and artistic contexts, but was also incorporated as one of the standardized signs in the Proto-Elamite script, specifically catalogued as M073~d. This phenomenon—where a visual motif concurrently functions as both an emblematic image and a formal grapheme—merits particular attention, as it illustrates the permeability of boundaries between representational art and the emerging

writing system during this formative period. The adoption of such motifs into the signary suggests a conscious integration of culturally resonant symbols into administrative literacy, thereby amplifying both their communicative and legitimating power. In practical terms, this integration may have enabled scribes and administrators to harness widely recognized iconographic traditions, embedding additional authority and layers of meaning within written records and administrative procedures. Moreover, the dual status of the crowned bull motif underscores the formative processes through which proto-bureaucratic society negotiated its visual and textual vocabularies, using symbols that simultaneously conveyed religious, political, and institutional identities. The example of sign M073~d thus stands as evidence for an early Elamite strategy of sign development that privileged multifunctional and deeply rooted visual forms, laying the groundwork for the later symbolic and script traditions of the region. (Figure 8).

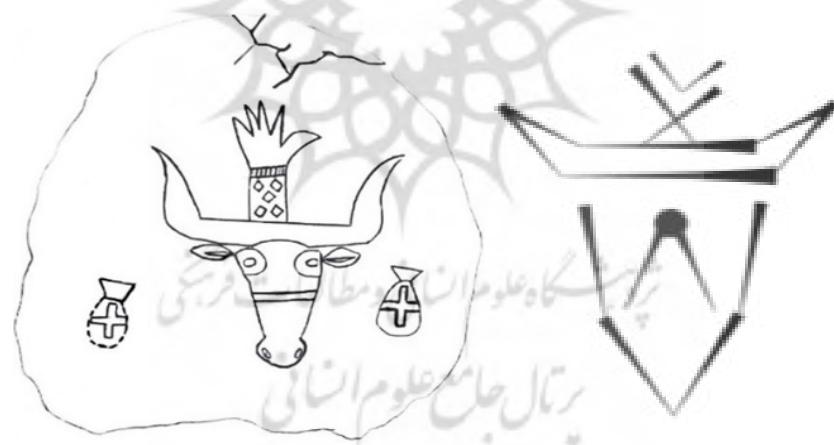


Figure 8.
The crowned bull and crosses motif from Proto-Elamite Susa, which served both as an iconographic image and as sign M073~d in the Proto-Elamite script, reflecting the integration of visual symbolism into early writing practices.

Conclusion

Given the lack of systematic studies on the analysis of scribe signatures on Proto-Elamite tablets, this research—drawing on museum collections (notably the Louvre and the National Museum of Iran) and digital archives (such as CDLI)—aims to establish a methodological framework for future inquiry in several

key areas: (1) reconstructing the hierarchy of the Proto-Elamite bureaucracy, (2) analyzing the evolution of script and handwriting across periods, and (3) better understanding mechanisms of document control in the ancient economy. It is hoped that this study will lay the groundwork for more extensive future investigations.

Data analysis reveals that the system of seals and signatures in early Elamite administration underwent a notable evolution: initially, traditional animal-motif seals were predominant; over time, as writing advanced, simpler linear patterns emerged as scribe signatures. Interestingly, a later phase saw the reappearance of seals imitating these linear signature designs—the so-called “imitative seals” observed at sites like Tal-e Malyan. This trajectory indicates that, while writing evolved, seals were not entirely abandoned but rather transformed in form and function. Such developments suggest a period of experimentation within administrative systems, during which both old traditions and new practices coexisted as strategies for recording and validating information were tested and refined.

The study also demonstrates that scribe patterns on late Proto-Elamite documents were multidimensional in function: these signatures were neither entirely personal (like modern signatures) nor completely institutional (like official seals), but likely represented a combination of both. They functioned as individual identifiers—a particular scribe within a temple at Susa, for example—while also reflecting official responsibility, signaling that a record had been verified by an authorized figure such as a storehouse manager or accountant. Most Proto-

Elamite tablets have been unearthed in large, unstratified excavations at Susa; had they been recovered under more controlled conditions, our understanding might be richer. Despite this limitation, the identification of 62 distinct, documentable scribe patterns, along with their structural similarities to contemporary administrative systems, points to a shared regional tradition in the use of these administrative symbols. However, the exact nature of these markers—especially their relationship to the Proto-Elamite writing system—remains unresolved and requires further investigation. The current study is constrained by a limited data set (only 62 documented examples) and a lack of complementary evidence, making definitive interpretation challenging. Fundamental questions remain: to what extent were these markers phonetic or pictorial, and what was their full administrative range and place within the hierarchy of early Elamite administration? Addressing these questions will require interdisciplinary research, combining historical linguistics, documentary archaeology, and visual analysis. Such approaches will not only deepen our understanding of the earliest administrative systems in the ancient Near East, but also offer new models for studying the evolution of writing systems more broadly.

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Data Availability

The data underlying the results presented in this paper are not publicly available at this time but may be obtained from the corresponding author upon reasonable request.

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Conflict of Interest

In adherence to ethical publication standards, the authors affirm that there are no conflicts of interest, either personal or financial, that could have influenced the content or conclusions presented in this research.

Authors' Participation

This research is derived from the first author's doctoral dissertation. The primary data collection, encompassing all observational and analytical components, was conducted by the first author under the direct supervision and mentorship of the second and third authors.

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