

Five Cases of 'Dubious Writing' in Indus Inscriptions

Parallels with Vinča Symbols and Cretan Hieroglyphic Seals

The Emblematic and Magical Nature of Indus Symbols



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NOTE: Much additional evidence on this question (including my 2004 Harvard Roundtable lecture) can now be downloaded from <http://www.safarmer.com/downloads>)

Five Cases of ‘Dubious Writing’ in Indus Inscriptions: Parallels with Vinča Symbols and Cretan Hieroglyphic Seals

The Emblematic and Magical Nature of Indus Symbols

Mais si toute écriture est bien composée des signes, tout signe (ou tout ensemble de signes) ne constitue pas nécessairement la manifestation d’une écriture. [While every script is composed of signs, not every sign (or every group of signs) is necessarily the manifestation of a script.]

— Jean-Pierre Olivier et Louis Godart, *Corpus Hieroglyphicarum Inscriptionum Cretae* (1996)

The assumption that Indus or Harappan inscriptions encoded speech has not been seriously challenged since the first Indus seal was discovered in the 1870s. Over the last two years I have attempted to apply a series of rigorous tests to that assumption. My aim hasn’t been the traditional one of trying to establish the supposed language (or languages) underlying Indus inscriptions, but of testing whether they were in fact linguistic in nature. Did Indus symbols really belong to the same class of signs found in Mesopotamian, Egyptian, Chinese, or Maya inscriptions? Could you use them to record speech, compose a book, or — perhaps the ultimate test of a writing system — write a book about another book? Is it really possible, as has been repeatedly claimed since the 1920s, that Indus manuscript traditions may have once existed on perishable materials?

My interest in these question arose when I began systematic tests of a cross-cultural model of the evolution of manuscript traditions a few years ago (Farmer, Henderson, & Witzel, 2002). When I turned to India, I was surprised to encounter the ‘lost text’ thesis, since Indus archaeological remains exhibit none of the expected signs of manuscript production.

When premodern civilizations produced manuscripts over many centuries, ‘markers’ of that activity began to accumulate in the archaeological record, even when no perishable texts survived. It is not difficult to compile a long list of such markers from many old- and new-world manuscript civilizations. The fact that not one of these markers shows up in Harappan remains undermines claims that Indus symbols were used to write long texts.

This finding raises a deeper problem. On Mahadevan’s data, the average Indus inscription is barely 4.6 signs long; the longest on a single face has 17 signs; two have 14; a tiny percentage reach 10; hundreds contain just one or two symbols. If no Indus manuscripts ever existed, the brevity of Harappan inscriptions alone would throw their linguistic character into doubt.

In the last two years, I have turned up evidence from many directions that Indus symbols were not capable of encoding extended speech or long narratives. That does not mean that they were meaningless or insignificant. On the contrary, new evidence confirms traditional views that the symbols were central to Indus society. It also suggests that the Harappans may have created the most complex nonlinguistic sign system in the ancient world, which if anything enhances the inscriptions’ historical importance.

There is a great deal of ambiguity in the ways that writing maps to speech. Often the same signs in ancient scripts served multiple functions, or several symbols the same ones. Typically, a great deal of phonetic, grammatical, and semantic data were also omitted when speech was translated into graphic form. It is this ambiguity that permits the ‘decipherment’ of virtually any ancient system of symbols, linguistic or not, into any language — a situation raised to absurd heights in the case of the Indus ‘script.’ Conversely, due to the speech-to-text mapping problem, any proof that an ancient system of signs did *not* encode speech must necessarily depend on many arguments, each taking into account every plausible counterargument drawing on that ambiguity. In this talk I will limit myself to illustrating five obvious examples of ‘dubious writing’ that help make the broader case. Along the way, I’ll point to parallels between Indus signs and a number of nonlinguistic symbol systems in other ancient societies, which provide us with hints of the ‘multivocal’ ways in which Indus symbols probably functioned. I’ll also discuss several statistical tests, including one recently developed in discussions with Richard Sproat of AT&T Shannon Labs, that provide the closest thing we have to a ‘smoking gun’ that demonstrates that Indus signs were not linguistic in nature.

‘Lost’ Text Claims and Markers of Manuscript Production

The thesis was first advanced in the late 1920s by G.R. Hunter and Sir John Marshall that the embarrassing lack of long Indus texts, when compared to the abundant textual finds of Mesopotamia and Egypt, could be explained by the fact that the Harappans “must” have written on “birch bark, palm leaves, parchment, wood, or cotton cloth, any of which would naturally have perished in the course of the ages” (Marshall 1931: I, 40). Among recent academic researchers, A. Parpola has especially championed this idea, suggesting that the level of literate production in the Indus Valley compared favorably to that of the Aztecs or Mesopotamians (1994: 54). Even more extreme claims have been made by Hindu nationalists and their Western supporters.

A short list of some simple ‘markers’ of the production of manuscript traditions is listed below (more complex markers also exist that are tied to the long-term integration of those traditions).¹ Evidence of these markers in societies that wrote extensively on perishable materials is available from a wide range of civilizations in S. Asia, Mesopotamia, Anatolia, the Aegean, Egypt, China, and Mesoamerica. This evidence is discussed at length in the paper summarized in this talk:

- Inscriptions of significant length on pottery, ceramics, and potsherds (ostraca);
- Inscriptions of extended length on other durable materials (stelae, cliffs, rocks, architecture, statues, weapons, cave walls, etc.);
- Suggestions in the art or in pictographic scripts of the existence of scribes, writing, and/or writing paraphernalia;
- Archaeological finds of writing instruments (pens, styli, ink jars, ink, writing tablets, etc.);
- Evidence of rapid linguistic and paleographic changes in early scripts, reflecting ‘scribal pressures’ to make the copying of long texts more efficient;
- A general tendency of conquering peoples to adopt the literate technologies of the societies they conquer, unless a more efficient system is already available.

NB: the disappearance at the end of the second millennium BCE of Aegean scripts, which did *not* give rise to the use of manuscript traditions, is not a valid counterargument against the final point. I’ll suggest an explanation later that efficiently explains the rapid disappearance of Indus symbols near the start of the second millennium BCE.

¹In the case of the Indus Valley, some of these complex markers include intellectual developments we would expect to find, but do not, in early strata of Vedic texts — if those texts were in fact related to Indus ‘manuscript traditions,’ as many Hindu nationalists and their Western supporters claim. I develop this argument elsewhere.

Case #1: ‘Dubious Writing’ à la M. Pope

In 1968 Maurice Pope challenged the view held since since the 1890s that Cretan hieroglyphic seals (as opposed to account tablets carrying some similar signs) encoded speech. Pope’s view has been championed ever since, with minor qualifications, by Jean-Pierre Olivier (e.g., 1996, 2000), coeditor of the corpus of Cretan hieroglyphics and main corpus of Linear A inscriptions. Pope’s main argument relied on statistical analyses of early scripts worked out by Alan Mackay (1965). But the origins of his doubts lay in suspicious symmetries, odd sign repetitions, and visual anomalies that suggested to Pope that the seals contained ‘dubious writing’ at best. A few Indus parallels are illustrated in the next pages. (Further details are presented in the talk.)



C-23a



On the right: The most common Indus sign (over 10% of all sign cases) shows up no less than 3 times in this 6-sign inscription (arrows). Because of its high frequency, it is often claimed as a ‘grammatical marker,’ which is difficult to reconcile with its use in this and many other inscriptions. The ‘duck in pond’ only shows up on this one seal.



Marshall, Mohenjo-Daro, Vol. 3., Pl. 93

Suggestive hints of mythic or ritual narratives are seen in a number of inscriptions like C-23a and M-288a. Compare C-23a carefully with the linear mistranscription in Mahadevan 1977: 148. Many problems arise from the reduction of Indus symbols to mere ‘fonts’ that obscure their iconic meanings.



M-288a



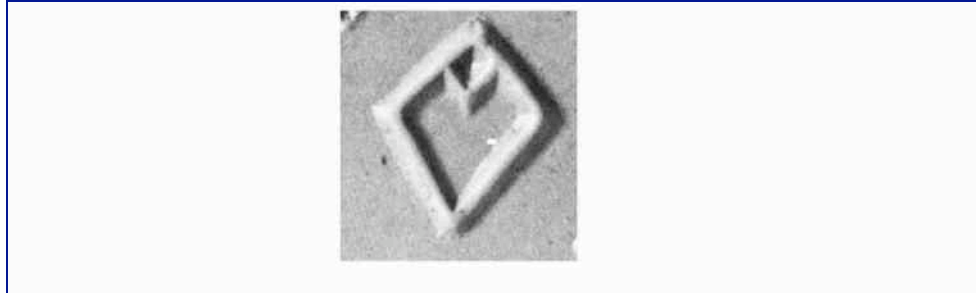
C-13 (flipped horiz.)

Below: ‘Symbols in Bloom’— a common motif in Indus inscriptions.



One of the most common quasi-narrative scenes in Indus inscriptions involves the three figures seen on the far left of this (modern) seal impression. Evidence from a large body of inscriptions suggests that the three figures may represent a real or mythological (or both) human sacrifice before a sacred tree. That interpretation is not critical to our present purposes, however.

The Most Common Initial Symbol in Indus Inscriptions



Part of the original iconic sense of this important sign may be suggested by a number of interesting variants and closely related symbols:



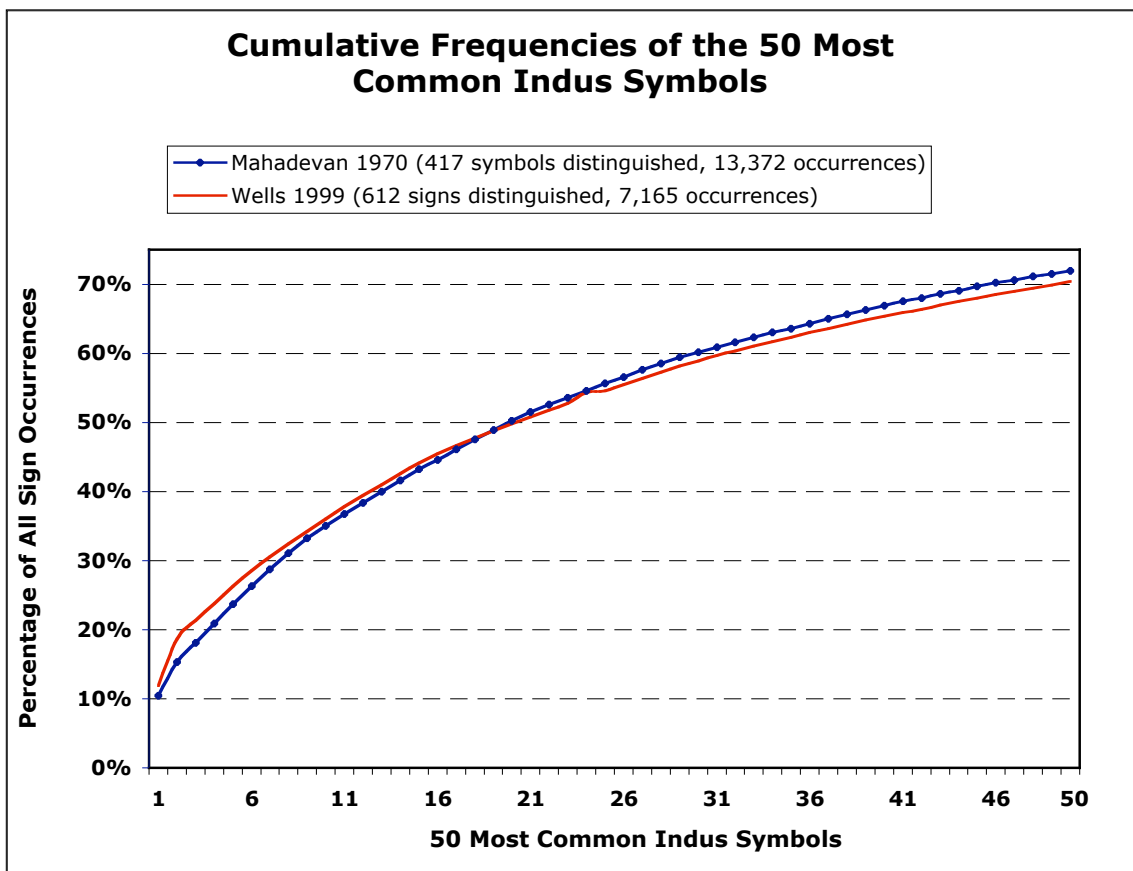
The earliest known precursor of Indus signs, dated by Meadow & Kenoyer to c. 3300 BCE.

Source: harappa.com

Case #2: Statistical Anomalies in Indus Sign Frequencies

One of the most revealing of many statistical anomalies in Indus inscriptions results in an interesting paradox. Looking at the full corpus of Indus inscriptions, we find that the inscriptions are predominately composed of a small number of very high-frequency signs. No matter whose definition of symbols we follow (leaving aside Rao's eccentric claims), we find that 3-4 signs represent over 20% of all Indus sign occurrences, and 15 signs over 40% of the entire Indus corpus. The chart below displays these trends using raw data from Mahadevan (1977) and Wells (1999).

If Indus inscriptions *did* encode speech, these frequencies would lead you to conclude that the inscriptions had a large syllabic content, as usually claimed. The paradox arises when we correlate these general symbol frequencies with the strange ways that signs are distributed in single inscriptions (see the following pages).



Despite major disagreements in their counts of symbols, Mahadevan's concordance (1977) and Wells' catalog (1999) agree remarkably well on the distribution of high-frequency Indus signs. Their differences arise instead in how they distinguish the large number of low-frequency symbols and sign 'singletons' at the other end of the frequency spectrum (discussed below, in Cases #4 and #5).

Case #2 Continued: Paradoxical Sign Frequencies in Long Inscriptions

The paradox is highlighted when we look at the longest Indus inscriptions. Given the predominance in the whole corpus of high-frequency signs, we would expect frequent symbol repetitions in long inscriptions — if the inscriptions really encoded speech. Instead, we find a much lower rate of sign repetition than that seen in any known logosyllabic (part whole-word, part syllabic) script used to encode speech.

This tendency is illustrated in the longest Indus inscription on a single surface, M-314a. It is important to note that most signs in the inscription are very high frequency: using either Mahadevan's or Wells' data, we find 10-11 of the signs seen below are among the most common 18 signs in the Indus corpus. Despite their high frequency, none is used more than once in the inscription. Hints in the inscription suggest that it may have represented a cosmology or cosmogony of sorts (see a few visual hints of this on the following page). But whether or not this reading is accepted is not critical to our present discussion.



Sources: Marshall 1931: V. 3, Pl. CXII, #400. *Corpus of Indus Seals and Inscriptions (CISI)* M-314 a. For the size of the inscription, see Marshall Vol. II, p. 404, #400.

M-314a. Actual size of the longest known Indus inscription on one surface = 1.0 x .95 inches!

A modern seal impression of M-314. Using the data in Mahadevan 1977, we find that 10-11 signs in the inscription (depending on how we class one sign) are among the 18 most common symbols in the Indus corpus; all six symbols in the top row are in this class. All of the signs in the two lower tiers can be tied, based on evidence seen here and in other inscriptions, to agricultural themes; all those in the top row can be linked to possible cosmological forces. For suggestions of similar hierarchical ordering in Mesopotamian emblematic inscriptions, see page 22. The only apparent unique sign in the seal impression (middle row right) is a variant of another well-known sign (an ard or primitive plow, surrounded in this case by four sets of double marks — a common set of Indus sign modifiers).

Supporting Pictorial Suggestions that M-314 May Have Been a Cosmological Inscription (Not 'Read' Right to Left)¹

The sun/wheel or power sign illustrated here shows up no less than 4 times (out of 10 signs) in the famous Dholavira 'signboard' (apparently hung on that city's walls).



One of the multivocal senses of this frequently linked pair of signs (the 'multivocality' of Indus symbols is discussed later) is suggested in ligatured forms of the two signs in an important group of inscriptions (double arrows on the left).



In linguistic views of the inscriptions, the sign looking a bit like a ditto mark is often claimed as a 'diacritic' or 'vowel sign,' etc. It is the second most common sign.



M-272 A (flipped horizontally, as it would appear as an impression)

NB: Indus Valley spindle whorls (which in other ancient civilizations often carried cosmological symbols) often have the same wheel-like design. This design did *not* represent a 'spoked wheel,' as sometimes claimed.



Common SW N. American petroglyph for 'rain.' Similar pictographs show up in a dozen other civilizations. (After Patterson 1992.)

¹The fact that Indus craftsmen carved inscriptions in one direction or another does not imply that they were supposed to be 'read' that way, as typically argued; for related comments see Meadow and Kenoyer 2000, n. 3. We know that Mesopotamian emblem inscriptions (which were nonlinguistic; see page 22 for an example) were often organized in a hierarchical fashion that roughly reflected symbols' degrees of cosmological power. Evidence discussed in the paper from which this talk is abstracted suggests that similar principles may be at work in the exquisitely tiny (and revealing) Indus amulet/seal M-314.

Further Evidence of the Low Incidence of Sign Repetition



The problem of nonrepeating symbols in M-314 is not an isolated case.

Take one class of very late seals (inscribed seals without iconography) that often contains long inscriptions (by Indus standards). 76 inscriptions of this type from Harappa are illustrated in Vols. I and II of the *Corpus of Indus Seals and Inscriptions* (H-129 to H-162 and H-639 to H-682). Only *one* of those 76 consecutive inscriptions repeats even the highest frequency sign — and that case (see below) certainly does not look linguistic.

A small consecutive sample of those 76 seals, starting with the first, is shown on this page. There are many interesting features in this class of seals that I cannot discuss today.

Open question at present: Did the producers of late inscriptions always understand the original meanings of the symbols? Or in some cases were they repeating or joining traditional sequences of signs whose meanings had been forgotten? (Many interesting parallels exist in esoteric traditions in other civilizations.)

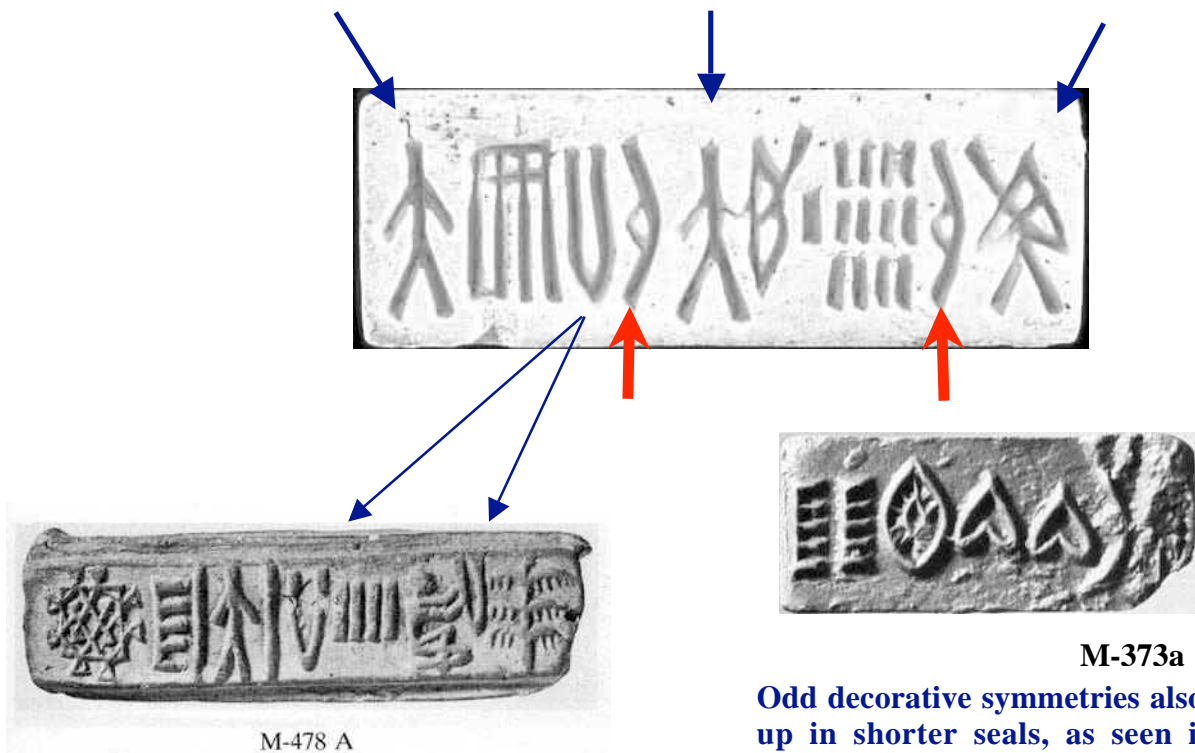
↑ Of the 76 consecutive inscriptions in this series (only 10 shown), this is the *only one* with a repeating sign. Whether or not this particular sign is a time marker remains unclear (see also next page).

Symbol Repetition in Longer Inscriptions

It is important to recall that extensive symbol repetition (e.g., the sort seen in “Duck in Pond,” illustrated on page 4) sometimes shows up even in very short Indus inscriptions. The fact that many long inscriptions of the sort shown in the last few pages *avoid* all sign repetition — coupled with the fact that many shorter inscriptions contain odd duplications — adds to the evidence that signs were something other than linguistic.

When in longer inscriptions we do find symbol duplication, it is often of a peculiar type in which we find odd symmetries and, at times, strong suggestions of pictorial narratives. These tendencies are both illustrated in one “long” inscription discovered in the late 1990s in Harappa (for the original photo, see harappa.com). Below, the sign has been flipped horizontally to mimic the way it would appear if it were a seal impression. Note the balance of three anthropomorphic figures in the middle and two ends of the inscription (arrows at top). Symmetrical placement is also suggested by the signs marked by the lower arrows (a crescent moon marking time? a shield? perhaps both?).

Added note: The three signs on the far left of this inscription often appear to be associated in other contexts with sacrificial rituals (the U-shaped figure is commonly represented as an offering vessel, as seen in M-478 A; the symbol to its left is visually similar to ritual huts seen in other inscriptions.) What *none* of this appears to be is ‘writing’ in the linguistic sense. Presumably, its symbolic sense could be ‘read out’ in any of the languages spoken in the Indus Valley — which may very well have served the purposes of a giant multilinguistic civilization.



Odd decorative symmetries also show up in shorter seals, as seen in this nicely balanced example from Mohenjo-daro.

Case #2: Conclusions and Counterarguments

The implication of this evidence is that any syllabic or phonetic encoding in Indus inscriptions — if any existed there at all — was extremely low. On the other hand, all these data make *immediate* sense if we assume that these symbols encoded information *other* than speech.

Potential counterargument #1: Maybe this was a largely whole-word (logographic) system like Chinese, in which semantic and phonetic elements were joined in single decomposable signs. Sign repetition here too was often relatively low, as we see in this Shang dynasty example (how much repetition existed in early Chinese texts depended widely on the text).

Quick responses: (1) there aren't nearly enough Indus signs for such a system (Shang oracle bones already used 5,000); (2) Chinese-style glyphs work fine for languages with simple morphologies, but are impossible for affixing S. Asian languages that have complex inflectional structures including tenses, declensions, and moods, etc. If all these complexities were omitted, the ambiguities in the system would be extreme.



Potential counterargument #2: maybe Indus scribes avoided sign repetition for aesthetic reasons: when repeating syllables cropped up in speech, Indus ‘scribes’ may have followed a procedure adopted by the Maya: (1) choosing alternate symbols encoding the same sound or (2) radically varying sign orthography.

Quick Responses: (1) It is very unlikely that many alternate phonetic signs could be found among the small number of high-frequency signs predominantly used in most Indus inscriptions; this is especially true since these signs often appear in sign groups that are clearly linked pictographically; the idea that many Indus symbols encoded the same sounds also conflicts with the idea that Indus signs were ‘invented’ or ‘perfected’ at one time, as claimed by a number of researchers to explain the lack of major evolutionary change in the system (cf. Pope, Edzard, Parpola, Fairservis, Possehl, etc.). (2) Not enough orthographic variability existed in the Indus system (as opposed to Maya) to make the second alternative plausible.

Potential counterargument #3: The anomalies may reflect the fact that the inscriptions aren't representative of the ‘Indus language’ (Kak 1988; Possehl citing the Egyptologist John Baines, 1996).

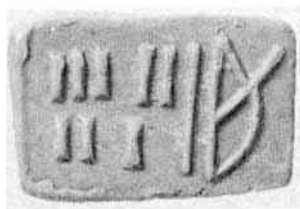
Quick responses: (1) If the inscriptions were really predominantly syllabic, as regularly claimed, the genre of the text would not affect symbol frequencies radically; this is especially true if (as often said) the inscriptions supposedly mainly contained common names, like seals in Mesopotamia. (2) This counterargument is rendered moot by evidence from comparative studies that suggest there *were* no longer or more ‘representative’ inscriptions (see *supra*). (3) We have inscriptions on many different materials, only 60% or so of which are seals; this suggests that our present corpus is in fact made up not of one but of a variety of different types of texts — if we insist that these are ‘texts.’

Case #3: Anomalous Uses of Apparent Numerical Signs

Numerical signs are typically the easiest and first parts of scripts to be deciphered. This was the case with Sumerian, Linear B, and the Maya script. Much is also known about numbers in Linear A (including how fractions work), proto-Elamite, and other largely undeciphered scripts.

The case is radically different in the case of the Indus Valley. As is well-known, many anomalies exist in the different classes of vertical strokes typically assumed (based on comparisons with Middle Eastern and other early scripts) to be numerical signs. Some of these anomalies were seen by Gadd in the 1920s (Marshall 1931, Vol. I, 412 ff.) and by Ross (1938). Drawing on the large corpus of inscriptions currently available, we are in a much better position today to appreciate these anomalies. Very quickly:































1. The distribution of supposed Indus number signs is strangely uneven. The system contains a large number of apparent 2's and 3's, in several morphological types. After that, the numbers of signs drop fast. There are only about 1/4 as many 5's as 4's, and only about 1/2 as many 6's as 5's. 7's are fairly common, but symbols made up of 8, 9, and 10 strokes are extremely rare. Above that, you find only 12's and occasional 24's. *Pace* Robinson (2002: 285-6), the claim that there is “considerable” evidence for a special symbol for 10 (one rare sign looks something like the Egyptian 10) is unsustainable — since that sign appears in only 6 out of 2,905 inscriptions in Mahadevan 1977, and there is no way of telling if it was intended to be a number. (See the illustration on the bottom of the chart on the next page.)
2. Certain apparent numerical signs are regularly found in conjunction *only* with specific non-numerical signs, and never with others — in a way that again seems peculiar for an abstract number system.
3. Frequently apparent numbers are grouped with other numbers in idiosyncratic ways — with no intervening signs separating them — or are found all by themselves on inscriptions. One interesting example is shown below:



One of many anomalies in supposed number signs is illustrated in K-59a (a modern impression of a seal). In the inscription, three signs usually assumed to stand for the numerical modifiers 5, 3, and 1 all show up in front of the ‘Bow’ sign — or, worse, *after* it, if we accept the old view that inscriptions were ‘read’ right to left.

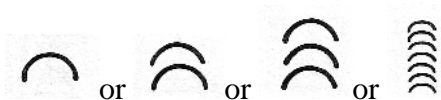
There are many other anomalies of this type, but this is enough to illustrate quickly the kinds of problems that exist. A chart containing a quick overview of a few of these difficulties is shown on the next page.

Examples of a Few Apparent Numerical Signs Using Data from Mahadevan's Concordance

Apparent number sign	Number of signs (out of 13,372)	Number of signs for each subtype	Most frequent signs found to the left of the apparent number (subscript numbers signify how many cases)
Tall 3 	495	314	 ₁₂₄  ₄₄  ₁₂
Short 3 		151	 ₂₀  ₁₈  ₂₀  ₂₀  ₁₆
Two Row 3 		30	 ₂₇
Tall 4 	134	64	 ₅₈
Short 4 		70	 ₂₁  ₂₄
Tall 5 	66	22	 ₅  ₄  ₂
Short 5 		38	 ₅  ₃  ₁₁  ₁₀
Two Row 5 		6	 ₁  ₁  ₁

Not illustrated in this chart: apparent numerical signs supposedly standing for 6-10, 12, and 24.

One symbol supposedly standing for 10 according to Robinson 2002 (also Parpola 1994, and Fairservis before him) is shown below:



NB: these signs only show up in a total of six inscriptions out of 2,905 in Mahadevan's concordance — and in context none of these looks all that numerical.

Numbers or Numerology? ('The Three,' 'The Seven,' etc.)

The usual way anomalies like this are handled is to claim that while in some cases (e.g., in counts of sacrifices or sacrificial vessels) simple numerical modifiers are used in the inscriptions — and there is no reason to doubt this — in other cases apparent numbers were used for their rebus (sound) values, as in the simple English example **“I yearn 4 you!”**

How do you handle these anomalies when the evidence suggests that Indus inscriptions *didn't* encode speech? A surprisingly simple answer is suggested by cross-cultural studies of ancient esoteric traditions. Many visual hints exist in Indus inscriptions (see the next page) that numbers often played purely symbolic roles. In these cases, the stroked lines did not function as numerical modifiers of other symbols ('three fish' or 'seven Water Carriers,' etc.) but as numerological symbols — as 'The Three,' 'The Seven,' 'The Twelve,' and so on — referring to divine, celestial, or mythological forces.

In Mesopotamia, numbers were regularly used this way to symbolize the gods. Ea, for example, was often symbolized by 40, and Enlil by 50. 'The Seven' in Mesopotamia — most commonly represented by seven dots (a pictorial example is shown on page 20) — could alternately stand for 'The Seven Gods,' or Pleiades, or 'The Seven Sages,' and so on.

Similar practices were common in Vedic traditions. Thus in the Rgveda we find references to the 'Three Times Eleven' (gods) or the 'Seven Times Seven' (Maruts) — and so on for many other cases. Many parallels to these practices exist in other premodern civilizations.

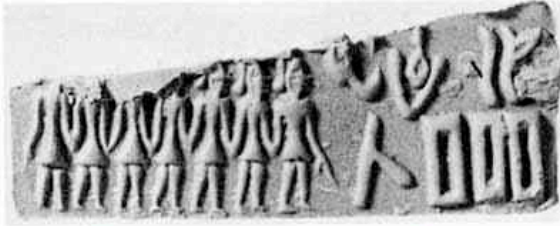
Hints are shown on the next page of similar tendencies in Indus inscriptions.

Quick notes on other interpretations of proposed or apparent Indus numbers

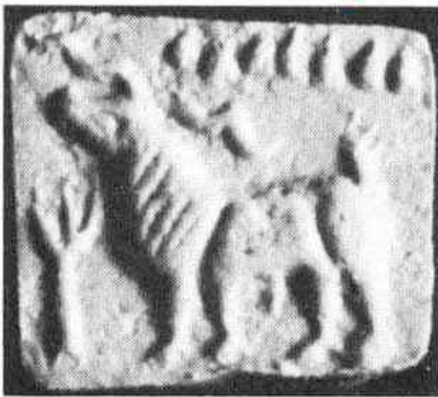
1. There are good reasons to be skeptical about the idea (Bonta 1996) that Indus fish signs were linked to a numbering or metrological system. One reason this suggestion is implausible lies in the fact that high-frequency fish signs show up in all Indus media in roughly the same percentages we would expect if they were distributed randomly. (Expected and actual frequencies can be calculated using the raw data in Table IV of Mahadevan 1977, "Distribution of Signs by Object Types.") These media include copper plates, which were apparently used in rituals or as talismans, and on which we would not expect to find evidence of elaborate calculations. Cross-cultural studies of Middle Eastern, Aegean, Chinese, and Mesoamerican seals also put this thesis immediately into doubt (next point).

2. There are also good reasons to be skeptical about claims that crop up periodically that Indus seals were used for complex accounting purposes (supposedly à la proto-Elamite or Linear A or B tablets, etc.). One reason for rejecting this idea concerns the mass of evidence that has emerged in recent decades concerning administrative uses of seals in other civilizations (see, e.g., Palaima, ed., 1990; Perna, ed., 2002). Seals had important administrative functions throughout the ancient world, but their use in calculations was not one of them. Indeed, findings of many apparent numbers on seals (as opposed to tablets, etc.) was apparently unique in antiquity to the Indus Valley. Leaving aside simple uses in counts of sacrifices or sacrificial vessels, which appear commonly in Indus inscriptions, the simplest explanation for apparent 'numbers' in Indus inscriptions is that they were numerological symbols, as argued above.

A Few Hints That 'The Seven' and other Apparent Numerals Served (in Some Contexts) as Numerological Symbols



H-97 a



B-10 a



M-1186 A



B-12 a

What are the supposed referents here of 'The Seven' and 'The Three'?

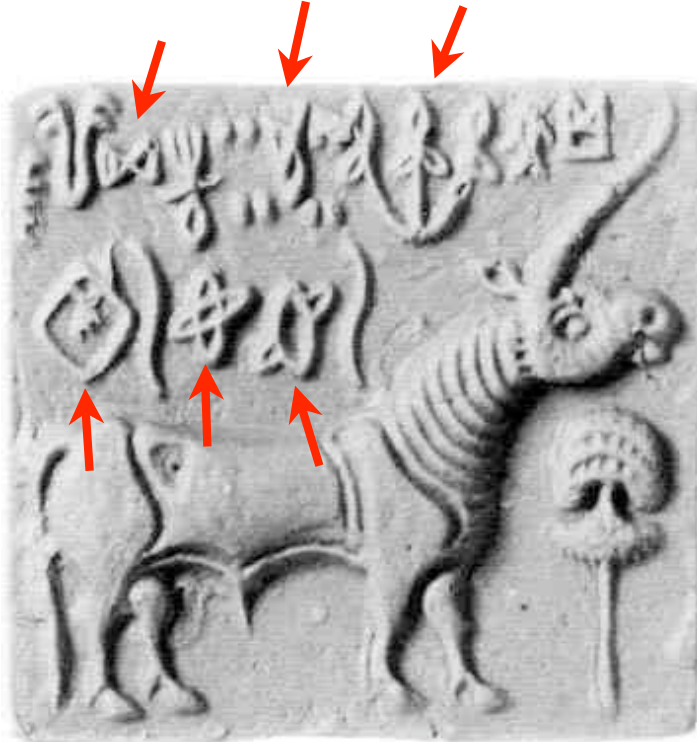
27 of 70 times that this form of 'Seven' appears in Mahadevan's concordance, it does so in conjunction with the symbol in the middle (representing a hearth with a fire?). There are many interesting interpretive possibilities here that are too involved to discuss in this talk.



K-49 a

Case #4: Anomalously High Number of Sign ‘Singletons’ and Other Very Low-Frequency Signs

At the opposite end of the spectrum from the high-frequency signs that predominate in Indus inscriptions, we find an enormous number of ‘singletons’ and very low-frequency signs. Out of 13,372 signs in Mahadevan’s concordance, over 50% show up 5 times or less — and 27% are found once and never again. In Wells’ catalog, no less than 75% of the 7,165 signs he lists show up 5 times or less, and 50% only once. If we factor out the many duplicate inscriptions made in single molds, we get even higher numbers of very low-frequency signs and ‘singletons.’



K-15 a

On Wells’ definitions of signs, the six symbols marked by arrows in this inscription show up only once anywhere in the Indus corpus. (The sign at the top left and two on the lower right aren’t noted in the catalog.) Mahadevan’s concordance groups two of these ‘singletons’ with signs found in other inscriptions — which I think is correct — but their frequencies are still extremely low. (Mahadevan also oddly lists the two signs in the lower right as variants of each other — although neither appears in any other inscription.)



H-255 A bis

This sign shows up 38 times in the *Corpus of Indus Seals and Inscriptions* (H-252 - H-277 and H-859 - H-870). This is accordingly listed as a high-frequency sign by Wells 1999 (the 42nd most common). All 38 inscriptions, however, were made in a single mold. As a result, we could just as easily count the sign as another ‘singleton.’ Again, Mahadevan lists the sign as variant of another symbol; but once we factor out the duplicates made in a single mold, the total frequency is still extremely low.

Case #5: A Prediction Concerning Statistical Findings in Vol. III of the *Corpus of Indus Seals and Inscriptions*

‘Once a singleton, always a singleton?’ — Richard Sproat

One test of whether the inscriptions are linguistic has developed out of discussions with Richard Sproat of AT&T Shannon Labs, who studies the relationship between speech and writing (see, e.g., Sproat 1992, 2000). The test revolves around the large number of Indus ‘singletons’ and other rare signs.

If the signs were linguistic, as the number of known inscriptions grew you would expect the corpus to ‘saturate’ as apparent singletons began showing up a second and third and fourth time. On the other hand, if some Indus symbols were created ‘on the fly’ and never used again, the ratio of singletons over the total number of known signs (n_1/N) (or the number of very rare signs compared to N , if these signs were placed on a few objects before being dropped) would increase with each new wave of discoveries. As we look at the last 130 years of Indus research, we find the ratio n_1/N has in fact grown steadily larger as the corpus has increased — exactly the reverse of what we’d expect from any genuine writing system.

An ideal opportunity to test these ideas further will come soon, when the long-delayed third volume of the *Corpus of Indus Seals and Inscriptions* is finally released. The volume reportedly reproduces early photos of many inscriptions (like “Duck in Pond”) that have been lost or stolen and were not shown in the first two volumes. (A shockingly high percentage of the most interesting pieces has disappeared.) Some of these are cataloged in the concordances, but not all have been published before in pictorial form. The volume will also contain high-resolution images of many newly found inscriptions, including 500 or so from the last two decades of excavations at Harappa.

One easily tested prediction I would like to make is that the anomalously high ratio n_1/N , and the even higher ratio of all low-frequency Indus signs, will *not* drop with this new crop of inscriptions, so long as definitions of symbols are held constant. That is, we will find few apparent ‘singletons’ or other rare signs reappearing in the new body of inscriptions, and we can expect new singletons to show up.² Assuming this prediction holds, one might try to ‘save’ old claims about the linguistic nature of the inscriptions by arguing that the Indus ‘script’ was a Chinese-type system that required a huge number of signs, some of which we still haven’t seen. But this claim would clash with one critical piece of evidence discussed earlier: the fact that the vast majority of Indus inscriptions are made up of a very small number of high-frequency signs. Moreover, as noted earlier, it is difficult to imagine how any ancient language thought to have been spoken in S. Asia could have possibly been encoded in a Chinese-style system.

A defender of traditional claims might also argue that ‘singletons’ were personal symbols — perhaps a little like Chinese taboo names minus their phonetic elements. But this solution could not account for inscriptions containing more than one ‘singleton,’ whose meaning could not possibly have been understood over a wide geographical area. The pictographic sense of most singletons is very obscure, moreover, making it unlikely that any human reader, at least, could guess their (assumed) sound values through visual-auditory punning.

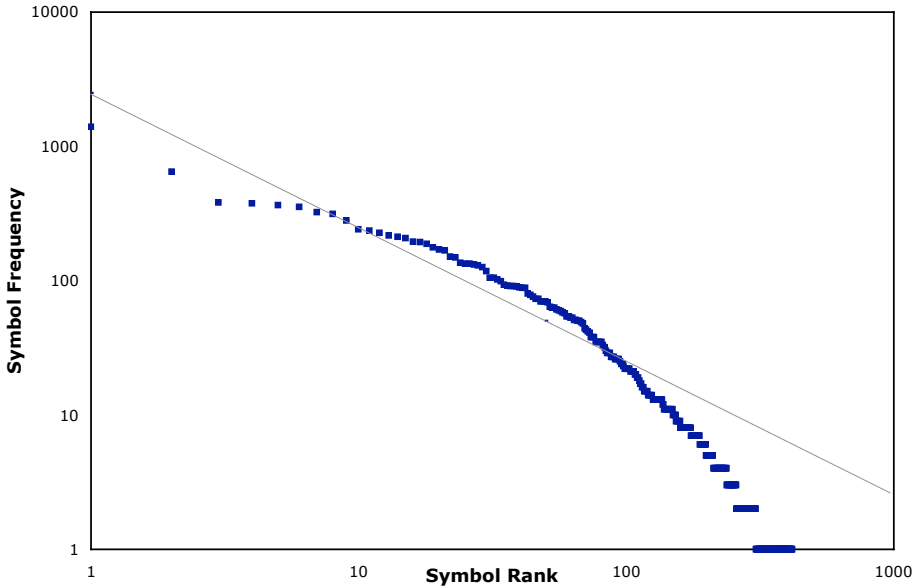
As always, it is possible to imagine elaborate *ad hoc* arguments to ‘save’ linguistic assumptions about Indus symbols. But the most likely explanation of the large number of singletons and very low-frequency signs is the obvious one: Indus inscriptions didn’t encode speech.

I propose we label the upcoming test ‘Sproat’s smoking gun.’

² What is critical to this prediction is that no drop occurs in the ratio n_1/N or in the number of very rare signs. How many new singletons we can expect depends on the typology of the new inscriptions and on how many are duplicates. There are 112 singletons among the 2905 inscriptions in Mahadevan’s 1977 concordance, which omits many short duplicates Vats left out of his 1940 Harappan excavation report. Extrapolating from these numbers, you might expect an average of one new singleton for every 25 or so new inscriptions. But the numbers can be predicted to be far lower if, as expected, many of the new inscriptions are duplicates of the large numbers of ‘tiny steatite tablets’ unique to Harappa or are so-called graffiti, few of which contain novel signs. Again, the critical point in the prediction is that the percentage of ‘singletons’ and very rare signs will not diminish, even as the number of known inscriptions continues to increase.

Zipf's Law in Indus Inscriptions

Zipf's Law and Indus Symbols
(Data from Mahadevan 1977)

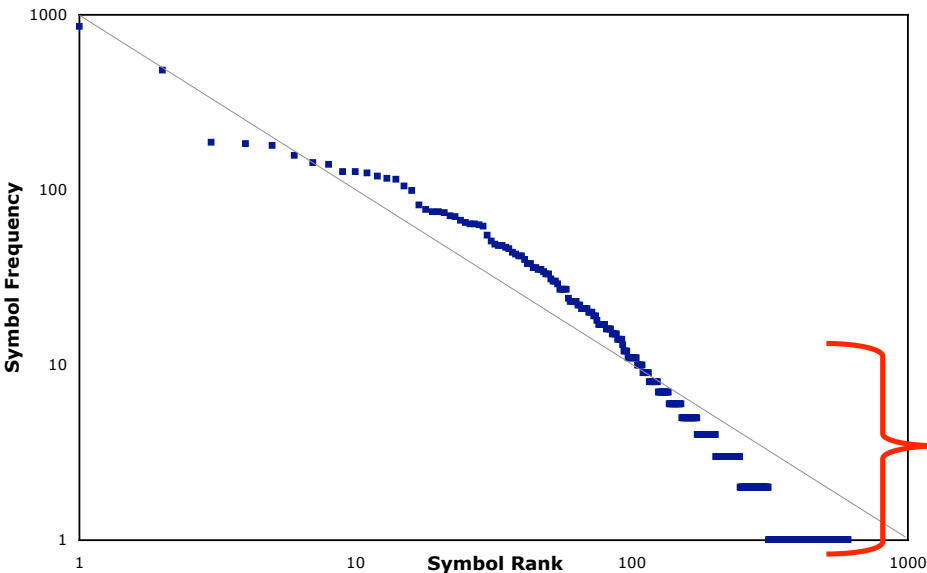


Zipf's law relates the frequency f of words to their rank r in a textual corpus; Zipfian distributions are often used in statistical studies of sign frequencies. An ideal Zipfian distribution shows up as a straight line when the data relating frequencies and rank are displayed in a double-log graph — reflecting the classical form of the law, in which $f \cdot r = k$ (k is a constant unique to a given textual corpus).

Deciding on the relevance (or irrelevance) of Zipf's law to the Indus system takes considerable discussion. But the data are worth displaying to illustrate the effect of low-frequency signs on the righthand 'tail' of the distribution.

Above: Zipf's law and Indus signs based on the 13,372 signs in Mahadevan 's 1977 concordance. The series of flattened lines on the lower right reflects the high percentage of low-frequency signs in the Indus system (27% of all signs in Mahadevan's concordance only show up once). The straight line reflects the expected value of $f \cdot r = k$, when $k = 2,500$. **Below:** the same distribution using the 7,165 signs in Wells' 1999 catalog. The deviation from Zipf's law in the low-frequency range is more prominent in Wells due to the large percentage of low-frequency signs in his catalog (50% only show up once, and he misses a number of singletons). The reference line in this case reflects the expected value of $f \cdot r = k$, when $k = 1,000$.

Zipf's Law and Indus Symbols
(Data from Wells 1999)



One prediction of this paper is that the number of very low-frequency signs and 'singletons' (reflected in the lengths of the horizontal lines in the right-hand 'tail' of the distribution) will not decrease over time — the reverse of what we would expect from a genuine writing system.

If Indus Inscriptions Weren't Linguistic, What Were They?

To get a few ideas, it is useful to investigate the wide range of nonlinguistic symbol systems developed in other premodern civilizations.

It is important to recognize that there were many different *types* of systems like these, and they did not all have the same functions. The majority were not 'picture writing,' although that form did exist.

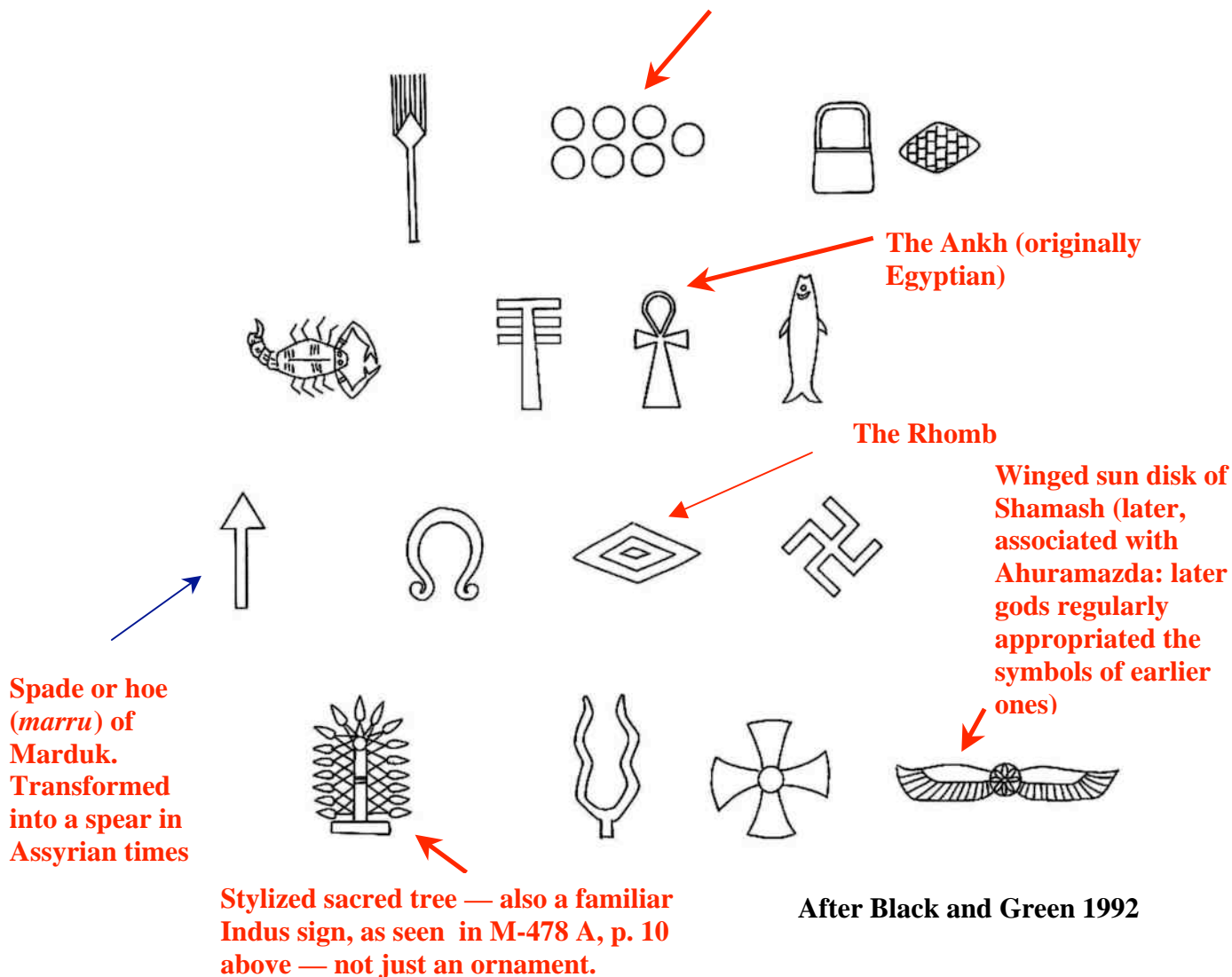
Some major types included mnemonic systems, systems of heraldic or emblematic signs, clan marks, accounting tokens, and so on.

- Petroglyphs (many different types on every continent)
- Narrative 'picture writing'
- Pre-Shang glyphs or supposed glyphs (see, e.g., Li et al. 2003)
- Early Balkan sign systems (Winn 1973, 1981)
- Schmandt-Besserat's tokens
- Mesopotamian and Egyptian ritual and deity symbols
- Constellation and horoscopal signs
- Systems of alchemical and astrological signs
- Cretan hieroglyphic seals (Pope 1968, Olivier 1996, Poursat 2000, etc.)
- N. American prelinguistic sign systems (many types)
 - Poverty Point 'cooking balls'??
 - Wampum color coding systems (mnemonic, counting)
 - Andes quipu (mnemonic, counting)
- Mystical signs from the middle ages (Kabbalah, etc.)
- Medieval heraldic signs
- Easter Island rongorongo
- Symbols and attributes of saints and bodhisattvas, etc.
- Magical runes
- Many others

Much evidence suggests that the Indus symbol system was an extreme case of a common class of ancient emblematic and magical signs. A few parallels relevant to the Indus Valley situation are explored in the next few pages.

Some Common Mesopotamian Emblematic and Magical Symbols

Not 'Seven' but 'The Seven' = The Seven Gods, Pleiades, Seven Sages, etc.



One suggestion of studies of Mesopotamian emblematic signs is that the meanings of key Indus symbols probably changed over time. Some symbols may also have been collected in later inscriptions out of a sense of tradition, without a full understanding of their original meanings (= the cartouche principle).

Added notes: (1) Despite their familiarity, we still aren't sure of the meanings of all of the Mesopotamian signs shown above. Even the sense of the 'Rhomb' — one of the most ubiquitous Middle Eastern signs — is uncertain, although it is assumed to be a fertility sign. (It was closely associated with Inana/Ishtar.) Cf. the initial 'seed' sign or 'seed + rain' signs, etc., in Indus inscriptions.

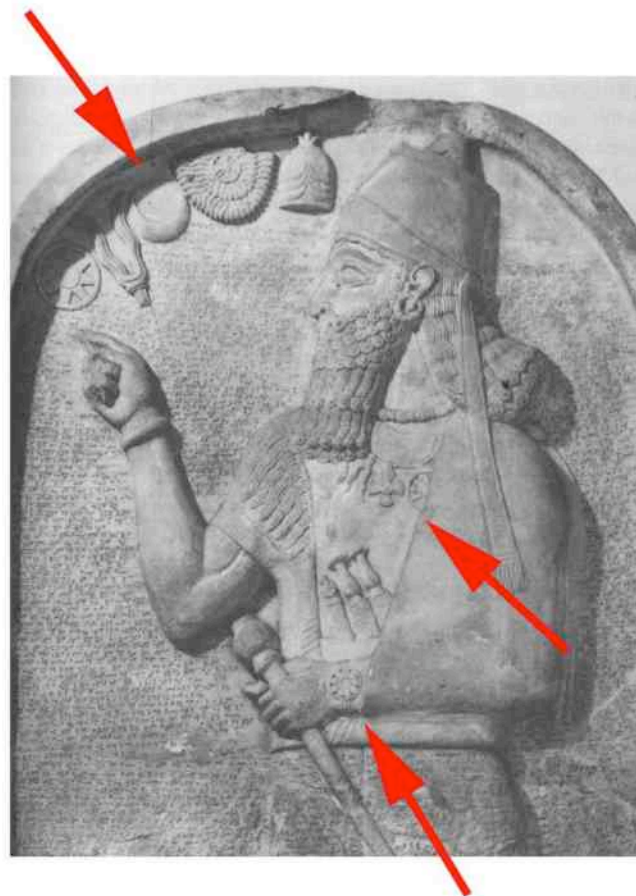
(2) Note the partial homonymic links between the word spade or hoe (*marru*) and the name of the god it symbolizes (*Marduk*), who may have originated as an agricultural god. Punning of some sort was probably involved at times in the choice of divine emblems in the Indus Valley. NB, however: this is *not* the same phenomenon as the systematic use of homonyms or near homonyms in rebus writing.

A Few Mesopotamian Emblematic and Magical Symbols in Context

Assurnasirpal II (9th century BCE) pointing to his patron gods. Their signs can also be found as magical talismans on his necklace and bracelet. Note that one deity is represented by two different signs. Going right to left:

Anur here = horned crown
 Ama = winged sun disk (alternately represented by a cross on his necklace)

Adad = forked lightning
 Istar = eight-pointed star



Compare the seal from Palestine (below left, Keel and Schroer 1985-94) with an example from the Indus Valley (below right). The symbol in the top middle of the Indus example is an apparent mortar and pestle, which shows up often with plants and apparent farm instruments on Indus inscriptions. See above, M-314 a, page 7.

One variant of
 'the Romb'



One Further Mesopotamian Example

The *kudurru* or land-grant stone of Melishihu, Babylonia in the Kassite period (1202-1188 BCE). Louvre sb 22.

Mesopotamian land-grants were protected by the magical signs or emblems of as many gods possible. Often, as here, they were ordered in a loosely hierarchical fashion. Cf. for possible similar organization in one Indus seal, M-314, on pages 7-8 above.

Top part of top register [1]: common emblems, left to right, of three celestial gods: Sīn (moon), Šamaš (sun, justice, truth), Ištar (Venus, fertility, etc.).

Just below [2] are the triad Anu and Enlil (the two horned caps — also sometimes emblems of other gods, as suggested on the previous page) and Ea (represented by both the ram-headed column and the goat fish). The sense of the inverted Omega sign to the right of the goatfish — which has formal similarities to the most common Indus sign — is a matter of ongoing debate.

Other common emblems on lower levels include [3] the pointed hoe of Marduk and [4] the serpent-dragon who guards the underworld. On the serpent's head [5] we see the scribe's stylus, emblem of Marduk's son Nabû.

A few of a number of other identifiable emblems in the second through fifth registers include [6] the griffin-headed or eagle-headed staff of Zababa, [7] the lamp of Nusku, [8] the plow of Ningirsu, and [9] the scorpion of the storm god Išhara (Adad).

The sense of few of these emblems would be known if Mesopotamian scribes had not occasionally inscribed the names of the gods next to them — a luxury we don't have in the scriptless Indus Valley, where we must infer the meanings of signs from context.



The ‘Multivocality’ of Fish Symbols in Mesopotamia (and Probably the Indus Valley)

The question of referents in premodern symbols is tricky — as hinted in the examples on the previous pages — since typically symbols had referents on several levels of reality. When people ask “What did Indus signs represent?” any simple answer given (“They were constellation signs,” or “heraldic marks,” or “ritual symbols,” etc.) would be misleading. As suggested by the Mesopotamian examples, an inscription with a series of emblems identified closely with the wearer might, for example, serve simultaneously as a symbol of power or position, as a talisman invoking personal deities, as an administrative ‘signature,’ or various other functions.

The same goes for individual symbols. Take fish signs, whose appearance in river-based civilizations where they ate a lot of fish is hardly surprising. Based on what we know of fish symbols in Mesopotamia, in Indus society we could expect them to suggest simultaneously:

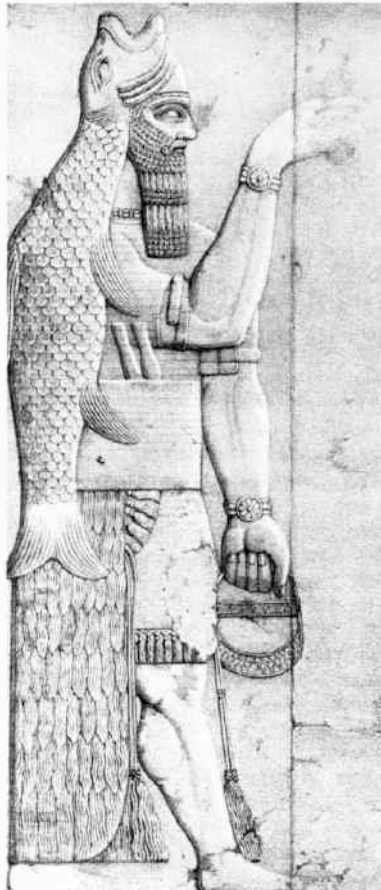
- Actual fish or fish offered in sacrifices**
- The profession or clan of fishermen**
- Cosmogonic myths involving fish or fish deities**
- Priests of fish deities (possibly dressed as fish!)**
- Stars, planets, constellations, or stellar clusters identified with fish gods**
- Months or festivals associated with fish, or linked birth dates; and so on**

Victor Turner (1967) referred to phenomena like this preliterate cultures as the ‘multivocality’ of symbols. Vedicists have the same tendencies in mind when they speak of *bandhus* (relations, correlations), Sinologists of ‘correlative thinking,’ and Western medievalists of ‘systems of correspondences.’ General tendencies to generate such correspondences can be traced to well-understood principles in neurobiology (Farmer, Henderson, and Witzel 2002).

Fish, associated with the Assyrian god Ea (the Sumerian Enki), were linked to a profession or clan, an order of priests (complete with fish suits — see right), real fish, fish sacrifices, fish mythologies, fish stars, and a month in the calendar (the twelfth Assyrian month, Adar, belonged to ‘The Star of the Fish of Ea’).

Not only was there a fish constellation (the later Greek Pisces), but during leap years, the Babylonians provided a double dose of fish months in the form of a ‘Second Adar’ that came every 6 years, known as the ‘Fishes of Ea.’

Given the importance of fish in Indus signs, there is reason to expect similar multivocality in the sense of Indus fish symbols.



**Priest in a Fish Suit,
Assyrian, 9th century
(after Black & Green 1992)**

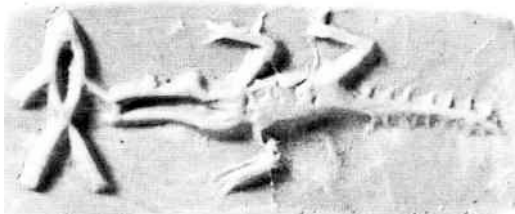
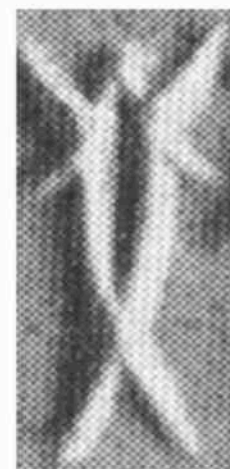
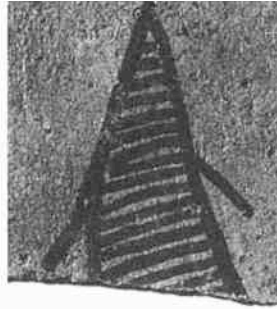


**Ea (Enki) with fish
(Akkadian)**

‘Fishermen in the service of the larger temples were charged to deliver stated quantities of fish of different species....’ (Buren 1948)

Fishy Business

There are interesting morphological similarities between the wide range of fish seen on Indus pottery and on Indus inscriptions. Extreme caution is in order when pointing to supposed 'ligatures' involving Indus fish signs.



Fish signs in Indus inscriptions most probably signified the obvious. Whether the primary referents were to actual or mythological fish is debatable. (Most probably, in line with the multivocality of symbols, *both* were intended.)

So-Called ‘Cretan Hieroglyphic’ Seals

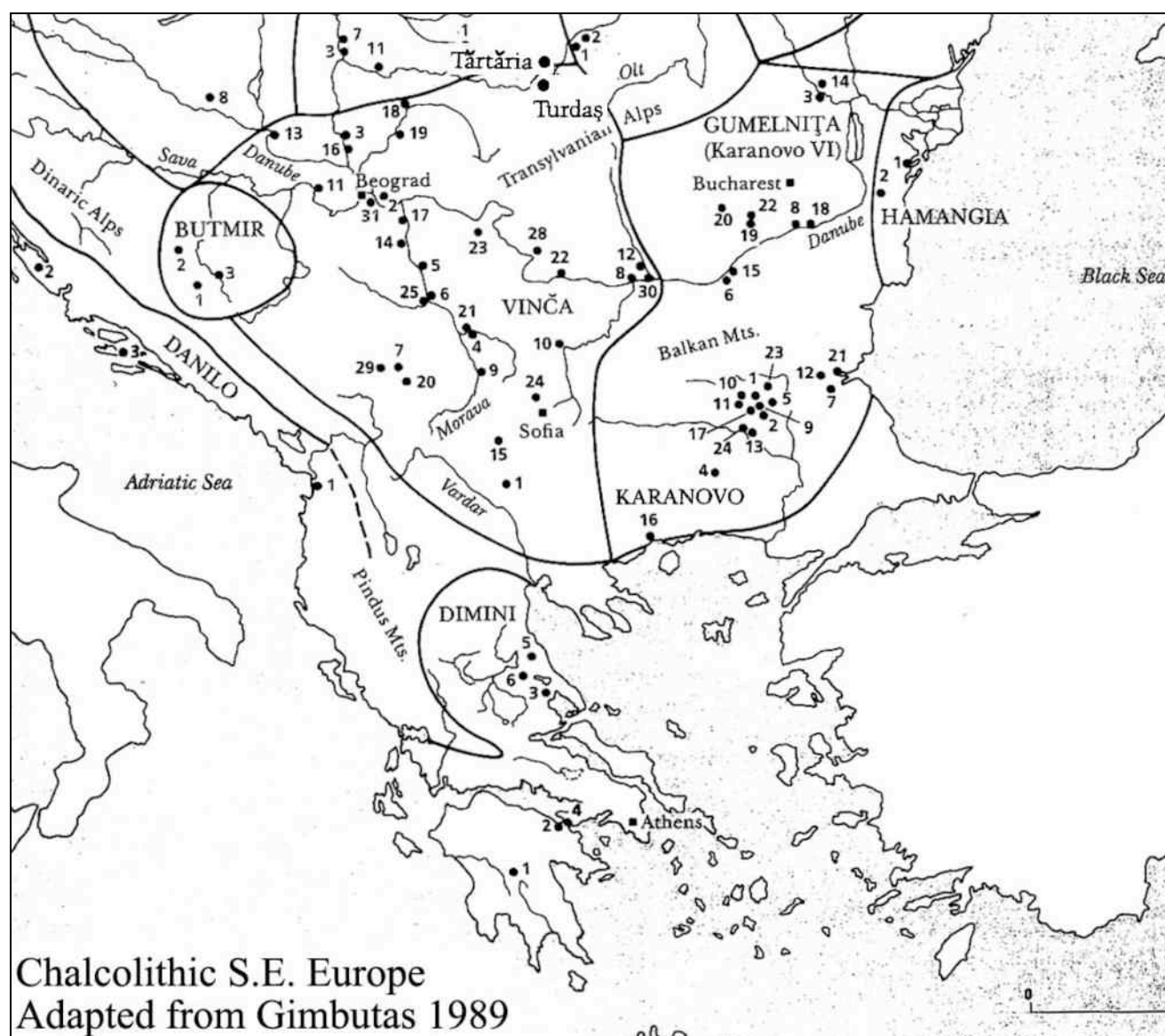
A sample of this corpus of Cretan seals, which had been assumed to contain writing since Arthur Evans’ day, is shown below. Pope (1968) first pointed to statistical arguments (developed in Mackay 1965) and odd symbol repetitions that suggested that the seals contained ‘dubious writing.’ This position has been further developed by the editors of the *Corpus Hieroglyphicarum Inscriptionum Cretae* (Olivier et al., 1996). Some phoneticism may be found in the seals, but much of the apparent ‘writing’ also appears to be decorative or talismanic. For a suggestive interpretation of how the seals were used administratively, see Poursat 2000.



Vin a Cultural Complex and Related Cultures in Southeast Europe

Dates for the Vinča symbols are unusually controversial, as are the relations between the Tordos-Vinča complex and Mesopotamian and Aegean civilizations. Winn (1973, 1981) dates the symbols to the 5th and 4th millennia, contradicting earlier researchers like Vlassas who saw Mesopotamian influences on the symbol system. Haarmann (1996), following Gimbutas, tends to push the dates in some cases far back into the 7th millennium BCE.

For similar regional tendencies to push the dates back on early 'writing' to improbable dates, see the recent paper by Li et al. in *Antiquity* (2003), which suggests early precursors of Chinese writing in the 7th millennium. Extreme tendencies like this are, of course, familiar to S. Asian researchers.



Some Vin a Symbols

Most reliable studies: Winn (1973, 1981). An extreme interpretation of the signs as supposed 'writing' is found in Harald Haarmann's many works (e.g., 1996).



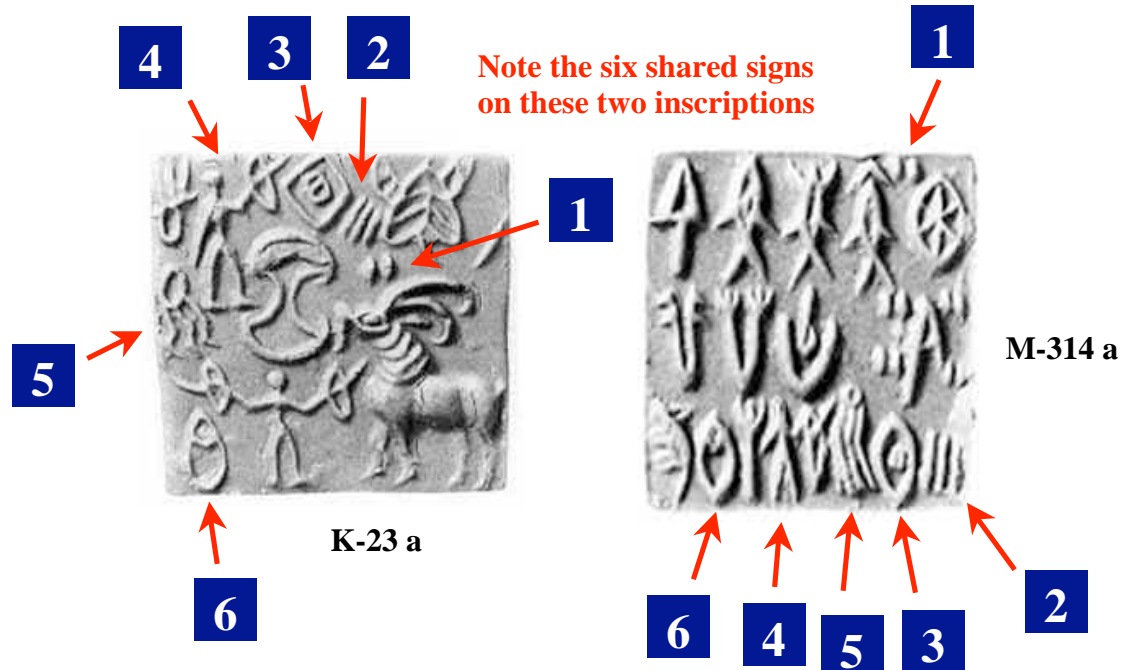
Some Formal Similarities between Vinča Signs and Indus Symbols

The Indus symbol system was considerably more complex and standardized than the older Vinča symbol system. Nevertheless, based on the careful analyses by Winn (1973, 1981) of Vinča signs and widely known facts about Indus signs, some interesting parallels can be drawn between the two systems:

- 1. In both systems, a small and relatively stable core group of signs was used for long periods over a wide geographical region.**
- 2. Outside this stable core of signs, a large number of symbols appeared in both systems only once or a handful of times, never to reappear.**
- 3. Neither system showed signs of the expected rapid evolution typical of early linguistic scripts — arising from ‘scribal pressures’ to make the copying of texts more efficient.**
- 4. Many inscriptions in both systems can be tied closely to ritual activities. (This does not preclude their having additional social, political, and administrative functions, tapping their ‘multivocal’ meanings.)**
- 5. Both systems included complex symbol compounds or ligatures. (Religious and magical symbols are often compounded, just as are semantic and phonetic signs: many examples can be cited from Vedic and other early religious traditions. This issue is dealt with in detail in the long paper out of which this talk is abstracted.)**
- 6. Both systems rapidly disappeared in periods of broad social and cultural change. (Rapid disappearance like this is not typical of fully developed writing systems, but is expected of nonlinguistic symbols closely tied to specific religious and political elites.)**

The result: many traditional puzzles about Indus society can be quickly and parsimoniously explained once we recognize that this was an emblematic and not a linguistic symbol system.

Indus Signs are Known by the Company They Keep



So long as Indus signs were viewed as part of a largely syllabic ‘script,’ it was natural for the concordances to focus on contiguous sign pairs in the hope of guessing sound combinations.

Once we recognize that these signs were emblematic in nature, it makes sense to study broader family relationships between signs — not just between contiguous pairs. This follows since while signs of deities or semi-divine powers (think of Indra and the Maruts, Marduk and Nabû, or the Christian Holy Family) may come in iconographic clusters, their exact order is often fairly flexible.

These two seals that we looked at earlier — one from Chanhujodaro (**K-23 a**) and one from Mohenjodaro (**M-314 a**) — have six high-frequency signs in common. The signs show up in slightly different sequences in the two seals. It is easy to show from analyses of closely related signs in other pictographically related seals that all six signs are linked in some fashion to farming.

Even **SIGN #4** above (the anthropomorph holding a single bow and arrow) can be tied directly to agricultural motifs. On these two inscriptions and many others we consistently find him near other signs that suggest sprouts, seeds, plants, and even (**SIGN #5** above) what appears in some variants to be an anthropomorphized set of furrows or plowed land. The same or a similar anthropomorph with a bow and arrow is also found on other inscriptions (e.g., on copper plates) with horns of divinity and dressed a bit like the ‘Jolly Green Giant’ — suggesting his probable role as an agricultural deity. Rai Bahadur Daya Ram Sahni, the excavator of the copper plate shown on the right (**M-588 B**), refers to the figure as being “reminiscent of a Babylonian deity...clothed in a costume suggestive of leaves” (in Marshall 1931: I. 222). This makes perfect sense, when we consider the farm symbols that usually surround him.

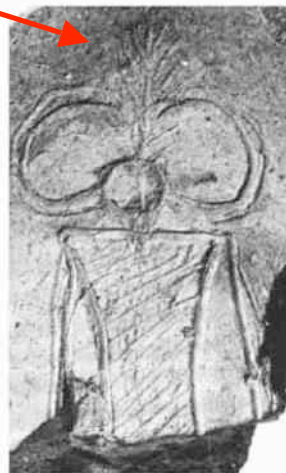


Similar claims can be made concerning **SIGN #2** above (“The Three”), whose precise referent isn’t yet known, and other signs suggestive of agricultural themes seen on one or the other of these seals. A few examples include the winged pipal leaf at the top right of **K-23 a** and the mortar and pestle and apparent ard or plow in the middle line of **M-314 a**. Much more can be said about these signs from careful study of the pictographic signs that accompany them in other inscriptions.

Shamanism and Indus Symbols

Why were Indus symbols abandoned so suddenly at the beginning of the 2nd millennium BCE, despite the fact that Indus cities remained largely intact? The answer to this question may be surprisingly simple, tied to the fact that the symbols were not 'writing,' but were apparently tied to a specific religious-political ideology.

Shamanic 'tree antennae' to the Indus symbol world?



Arizona petroglyph of horned shamans connected by 'power lines' (Patterson 1992)

Walter Fairservis and Indus Symbols

In the last 20 years of his life, Walter Fairservis joined the ranks of a long line of distinguished researchers who concluded their careers in odd attempts to decipher the 'Indus script.' Fairservis' instincts as an archaeologist were too acute to lead him to mistake the Harappans for a truly literate people: he was nearly alone in rejecting fantasies of Indus 'scribes' producing books on perishable materials. By the end of his life he embraced the peculiar compromise that the Harappans possessed a full syllabary but restricted it almost exclusively to making short inscriptions on seals.

Interestingly, in a stray paragraph in an early survey of ancient India, Fairservis came close to being the first to break with linguistic views of the signs. The remarkable passage cited below from one of the great archaeologists of the twentieth century has been forgotten, and it is a pleasure to quote it in full. It was apparently written in the late 1960s, but did not make it to print until several years later:

Seal writing is not necessarily writing derived from the oral language. It has its own meanings and in effect need not have verb, adjective, or adverb. Rather it may be simply a kind of label specifying the individual or his god, house, or belongings, much as a heraldic device uses iconographic elements limited in number in countless ways to name the individual or an institution. Except for the numbers, which suggest bookkeeping and thus more mundane motivations one cannot help but feel that the Harappan script is of this character. It appears to be a script a full step above the potters' marks of pre-Harappan times but below the complexity of early hieroglyphic Egyptian or Sumerian which was already ideographic. The script has little preamble except possibly in the potters' marks. Throughout its known history it shows little or no change and disappears with the Harappans and their seals. Though it is writing in one sense, it does not appear to have been much more meaningful to the Indus people than the repeated motifs that appear on their pottery. However, tomorrow's shoveling may reveal a room full of tablets and change this so limited interpretation (1971: 282).

Leaving aside Fairservis' remarks on bookkeeping and his odd comments on how the Harappans viewed their symbols, there is much prescient in this passage. Peculiarly, however, the passage is surrounded by others that claim that Indus inscriptions were syllabic in nature, suggesting that the passage was written shortly before Fairservis reverted to older linguistic models. As suggested in a paragraph eventually placed right before this one, what changed his mind were not finds of rooms filled with tablets — none were forthcoming — but the spectacular public announcement of a breakthrough by the Finns, who in 1969 announced they had harnessed the infant field of computer science to *prove* that the "language" of the inscriptions was proto-Dravidian. The fact that the Soviet team made similar claims nearly simultaneously apparently reinforced Fairservis' about face — sending him on his twenty-year odd quest to 'decipher' what his own archaeological instincts suggested and much evidence today can confirm wasn't a script in the first place.

The story of Indus inscriptions over the past 130 years provides a cautionary tale of how early failures to test historical assumptions can lead research down dead ends for many decades. The initial Director General of the Archaeological Survey of India, Alexander Cunningham, published the first Indus seal in the mid 1870s; within two years, on the basis of one mutilated inscription, he declared the 'script' on the seal to be an early form of Brahmi. Five years later, the first of many forgeries that play a role in the Indus story was foisted on the public by the famed Sinologist Terrien de Lacouperie, who plugged for a Chinese or Indo-Chinese tribal origins for the new-found 'script.'³

The result was that by 1882 the long Indus 'decipherment' comedy was already in full swing. It is interesting to speculate how the field would have evolved if from the start anyone had asked one obvious question: "Are these *really* linguistic signs? And, if so, how can we tell?" It may be my own quixotic thinking, but I'm convinced that had this question been posed even once, our understanding today of much of ancient history would be radically different.

³ On Cunningham's seal and this first forgery, see the PDF file (1.3 megs) at <http://www.safarmer.com/firstforgery.pdf>.

A Few Conclusions

1. Paradoxically, studies of Indus signs become more important, and the signs in a sense ‘decipherable,’ once we recognize that they did *not* encode speech. We know a great deal about ancient literate societies, but much less of societies in which the use of writing may have been rejected for other types of symbolic systems. Study of the Indus civilization provides us with an opportunity to study what was apparently the most complex civilization of this type in depth.
2. Our best chance for deciphering the original meanings of Indus signs comes from comparison of their abstract forms with their much rarer anthropomorphic variants. This makes future excavations aimed at uncovering new inscriptions even more important than in the past.
3. Once Indus symbols are recognized as something much more than linguistic signs, studies of temporal and geographical variations in their use provide powerful tools for studying Indus society — since these variations can apparently be closely correlated with political and religious developments. Much more can be done in providing the improved dating needed for such studies by calling on paleographical methods used to date manuscript traditions, guided by the more accurate dating of Indus seals that has emerged from recent excavations at Harappa (Kenoyer and Meadow 1996; Meadow and Kenoyer 2000).
4. Judging from modern examples and research in the linguistic history of S. Asia (Witzel 1999), the Indus Valley was probably intensely multilingual throughout its history. This may have provided the Indus emblem system with an advantage over ordinary writing as a means of providing the civilization with social cohesion. The fact that the majority of inscriptions rely on a surprisingly small core of symbols suggests that the meaning of Indus signs could have potentially been known by all or most of the population, resulting in a pervasive ‘quasi-literacy’ far beyond that achieved in Mesopotamia or Egypt.
5. The possibility should be noted that the extreme rarity of Mesopotamian artifacts in the Indus Valley (see, e.g., Possehl 2002), including a total lack of cuneiform inscriptions, may have been the consequence of an explicit cultural policy on the part of Indus elites. It is interesting to compare this situation with the apparent resistance by Brahmins to the introduction of writing in NW India in the Persian period (i.e., following the mid 6th century BCE). Similar resistance to literacy as a threat to oral traditions is also known elsewhere (e.g., by the Celts in Britain).
6. The fact that the linguistic nature of Indus signs has gone unchallenged since the 1870s provides a good example of the role played by ‘path dependence’ in historical research (Farmer, Henderson, & Witzel 2002), and is itself a worthy object of study.
7. At a bare minimum, no one should be allowed to continue to claim without evidence that Indus signs encoded speech. If evidence exists that Indus signs were part of a true writing system, it is time after 130 years to demand evidence for that claim — and to require that the powerful evidence against it be addressed point by point.

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