Deciphering the Indus Script

R.A.E. CONINGHAM

INTRODUCTION

The three greatest obstacles facing any prospective decipherer of the Indus script are the absence of bilingual examples, the lack of knowledge of language which is depicted, and the shortness of individual extant examples—the longest being only 26 signs long. The known corpus consists of some 3,700 legible inscriptions distributed over an enormous area of southern Asia, from the Ganga-Yamuna Doab in the east to the Euphrates in the west, and from the Oxus in the north to Arabian Sea in the south, with an understandably higher concentration within the north-west of the Indian subcontinent—the heartland of the Indus Civilization itself (Fig. 1). The inscriptions between 170 and 220 consist of simple signs and between 170 and 200 composite signs and are found on a wide variety of raw materials ranging between steatite, marble, calcite, limestone, silver, copper, faience, terracotta, ceramic, shell, bone and ivory. Moreover, whilst some of the raw materials were inscribed with the Indus signs, others were stamped, or even cast, providing a bewildering variety. For example, there are examples of signs being both inscribed on ceramics before they were fired, as well as later being scratched on after firing. This variety is also found within the corpus of objects bearing the inscriptions. These objects range from inscribed seals, tablets, tools, vessels, bangles, ladles and other objects to sealings and mouldings. Perhaps the most remarkable recent addition to the corpus was the discovery of the Dholavira 'signboard', consisting of nine signs, each measuring 37 cm high and 27 cm wide (Bisht 1991). In addition to the signs many examples are provided with a single standing animal, whilst a smaller number appear to depict scenes of a more narrative nature. Some of the single animals are clearly recognizable as elephants, rhinoceros or bulls, whilst others are hybrid or composite. Apparently in general use for only 500 years, the complexity of the Indus script, combined with the three aforementioned obstacles, has bedeviled attempts at decipherment since its first discovery at the site of Harappa by Cunningham in 1872. Rather than describing each of these attempts, as has already been done elsewhere (Possehl 1996), the intention of this paper is, firstly, to identify common ground between such attempts, secondly, to discuss the controversial debate concerning the script's language, and, finally, to propose a common route forward.

THE COMMON GROUND

In 1994 Asoka Parpola, chief editor of the encyclopaedic *Corpus of Indus Seals and Inscriptions* (Joshi and Parpola 1987; Shah and Parpola 1991), published a book titled *Deciphering the Indus Script* (Parpola 1994). The result of over a quarter of a century's

Fig. 1. Distribution map of Indus seals and inscriptions (after Parpola 1994:10).

research by a team of Finnish Vedic scholars, Assyriologists and computer scientists, it has been widely recognized by many reviewers as a major step towards the understanding of this previously undeciphered script (Coe 1995; Edens 1995; Mahadevan 1997). Although there is still debate as to the success of Parpola's 24 attempted readings, the book is extremely useful as it clearly defines a number of widely shared conclusions concerning basic typological features of the Indus script such as the direction of writing and recognition of numerals. One of the most generally accepted common points is that the script was written from right to left, although clearly stamps and moulds were written in reverse (Alekseev 1976; Gadd 1931; Hunter 1934; Lal 1966; Mahadevan 1977; Parpola 1994; Ross 1938; Zvelebil 1970). Evidence for such agreement is taken from the common cramping of signs at the left side of seals (Gadd 1931), the clear overlapping of signs on ceramic vessels inscribed prior to firing (Lal 1966) and the comparison between single-line and two-line sequences of identical inscriptions (Mahadevan 1977). It is apparent that the vast majority of examples are written from right to left, but it should be noted that almost 7 per cent are written from left to right (ibid.), a factor often interpreted a scribal error. It is generally agreed that numerical value signs are indicated by strokes, short in earlier examples and long in later ones (Fairservis 1992; Kinnier Wilson 1974; Mahadevan 1988; Mitchener 1978; Newberry 1980; Ross 1938; Wadell 1925) (Fig. 2), and as such strokes often occur with groups of semi-circles it has also been assumed that the latter represent 'tens' (Mahadevan 1988: 14; Parpola 1994: 82-3) (Fig. 3). Mahadevan has further suggested that whilst the largest identified numbers using this system are 35 and 76, it is possible that higher value signs have not yet been identified (Mahadevan 1988: 14). Whilst many would accept such value hypotheses, the underlying numerical system is still in debate. In the 1940s Ross suggested the presence of two numerical systems, one with a base ten and another with a base eight (Ross 1938:16), but Fairservis (1992) suggested a base eight (Fairservis 1992: 61) and Mahadevan a decimal base
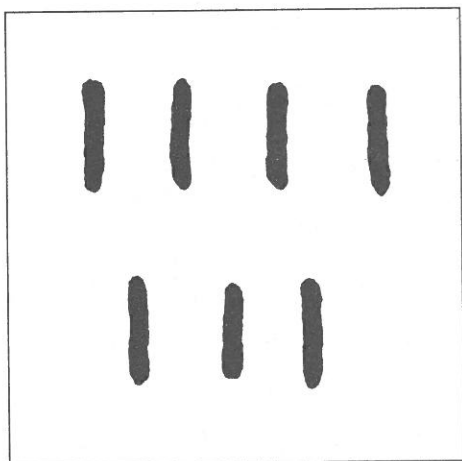

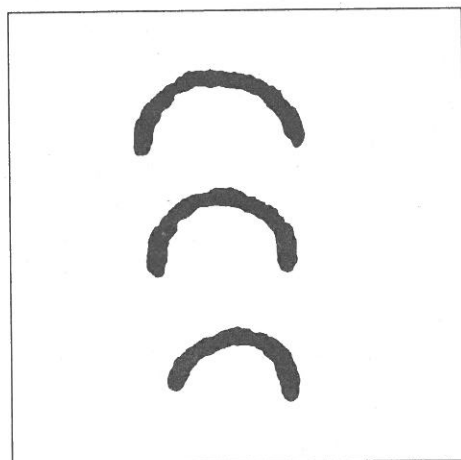Fig. 2. Indus numerical value sign representing 7.

Fig. 3. Indus numerical value sign representing 30.

(Mahadevan 1988:14). Rather than any one suggestion being correct, it is quite possible that all are correct as Harappan weights indicate a mixed system, based upon binary, octonary and decimal bases (Marshall 1931).

Although some scholars have suggested that the Indus script was picto-phonographic (Heras 1953) or alphabetic (Rao 1982), Zvelebil has suggested that there is also broad support for the identification of the script as logo-syllabic possessing word-signs and phonetic syllables (Mahadevan 1988: 8; Parpola 1994:102; Zvelebil 1970: 195). One of the clearest explanations of such a suggestion is provided by Mahadevan (1988) (Table 1). He starts by identifying the four major types of ancient scripts, logo-graphic, logo-syllabic, syllabic and alphabetic (ibid. 5). The first used word-signs, the second used both word signs and phonetic syllables, the third either open syllables or open and closed syllables and the fourth single-sound signs. As such scripts are generally distinguished by the total number of signs used, he concludes that the Indus script's approximate 425 signs are logo-syllabic as logo-graphic used thousands of signs, logo-syllabic used between 900 and 400, closed and open syllabic between 200 and 100, open syllabic between 100 and 40 and alphabetic below 40 (ibid.). Even within this common ground there are a number of disagreements, for example, there is much debate as to the meaning of the signs, in that some may be phonographic and some pictograms may only be understood through the use of homophones—words pronounced the same but with different meanings (ibid. 14). Thus Parpola interprets the Indus fish sign (Fig. 4) through the use of the homophone that in Dravidian and *Proto-Dravidian languages the word fish, or *min, also means star or planet (Parpola 1994: 180), a link already made by Heras (1953). Such debate may also be characterized by the different interpretations ascribed by different decipherers to the Indus sign (Fig. 5), number 342 of Mahadevan's concordance (Mahadevan 1977). This sign is the most commonly occurring within the Indus

TABLE 1: THE NUMBER AND TYPE OF SIGNS WITHIN ANCIENT SCRIPTS (after Mahadevan 1988: 5)

| No.	Type of Scripts	Type of Signs	Total number of Signs	Examples
I	logo-graphic	word-signs	thousands	Chinese
II	logo-syllabic	word signs and phonetic syllables	900-400	Sumerian Egyptian Hittite
III	syllabic	(a) closed and open syllables	200-100	Elamite Cuneiform
		(b) open syllables	100-40	Linear B Old Persian
IV	alphabetic	single sound signs	< 40	Semitic Ugaritic Greek Latin
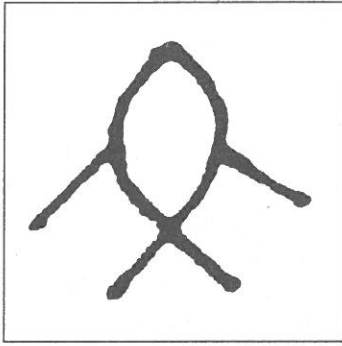
Fig. 4. Indus 'fish' sign.
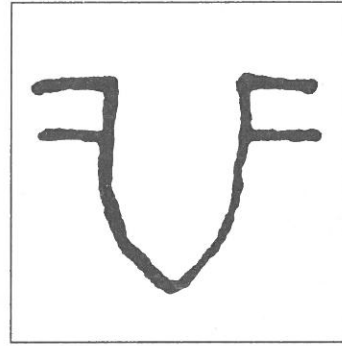
Fig. 5. Indus 'vessel' sign.

script and has been found in more than 1,000 examples and is thus a crucial element for our understanding of the script. Hrozny interpreted it as a sign for a vessel dedicated to a god or gods (Hrozny 1953: 175) and Lal agreed that it was probably derived from a portrayal of a vessel (Lal 1974: 176). Newberry, however, interpreted it as representing the western cardinal direction (Newberry 1980: 4-7), Kak as the sound 'sa' (Kak 1988: 138) and Fairservis as a third person singular honorific (Fairservis 1992: 173). Knorozov, following Heras (1953: 67), has interpreted the sign as a genitive and locative suffix (Knorozov 1976: 60), and Parpola interpreted this sign in 1969 as a ship (Parpola 1969: 21) and in 1994 as 'a title of respect commonly added to proper names, whether human or divine' (Parpola 1994: 97). He also suggested that such a hypothesis did not necessarily exclude the sign from representing a possessive marker (ibid.) and stated that it was probably derived from either the iconic meanings of 'bird', 'eagle', or 'to fly' (ibid.: 104) or a cow's head (ibid.)—for further interpretations see the excellent commentary by B.B. Lal (1979).

THE LINGUISTIC DEBATE

Whilst many of the above points are generally agreed, there is an underlying issue which has had powerful repercussions in terms of almost all studies of the Harappan or Indus Civilization—its language! Almost all the attempts at decipherment may be characterized into two main groups. Those who favour a Dravidian language (Heras 1953; Zide and Zvelebil 1976; Mahadevan 1988; Fairservis 1992; Parpola 1994) and those who favour an Indo-European one (Mitchiner 1978; Krishna Rao 1982, Rao 1982; Kak 1988; Priyanka and Manatunga 1988), notwithstanding earlier attempts to ascribe the script to a Sumerian language (Waddell 1925). It is also interesting to note that the selection of either of these two language families has been debated since the 1930s with Langdon attributing an Indo-Aryan language (1931) and Marshall a Dravidian one (1931) in the same volume. Respective decipherers have marshalled linguistic and archaeological evidence to support such claims with varying success. The linguistic evidence relies heavily upon two elements of data, firstly, the present distribution of these two language families in southern Asia, and secondly, a number of the typological characteristics of

the Indus script. It is clear from most linguistic maps of southern Asia that the northern part of the subcontinent is dominated by a very broad sweep of Indo-European languages (Parpola 1994: 135) (Fig. 6) and that Dravidian languages are concentrated in the peninsular proper with the exception of Brahui in Baluchistan (ibid.: 136) (Fig. 7). That this overall distribution is a direct result of the influx of Indo-European languages forcing Dravidian languages into the peninsula and that Brahui represents a residual element of a once subcontinental-wide distribution of such Dravidian languages is accepted by most scholars (Heras 1953; Parpola 1994; Possehl 1996). Indeed, many scholars would also accept Stein's (1931) and Marshall's (1924) premise that they actually represented a fossil group of the Harappan Civilization itself, as Parpola states, 'The conclusion that the Brahui ... represent remnants of the language spoken by the descendants of the Early Harappan populations of Baluchistan is supported by the evidence' (Parpola 1994: 166-7). It has also been argued by a number of scholars that the Indus script has typological features, which are found in Dravidian languages but not within Indo-European ones (Parpola 1994; Zide and Zvelebil 1976; Mahadevan 1988; Fairservis 1992), thus strengthening the case for a Dravidian reading of the Indus script.

Such theories are, however, based upon two assumptions, firstly, the post-Urban Harappan arrival of Indo-Aryan languages, and secondly, the arrival of those languages in South Asia via the media of a diffusion of a new population. Evidence for the former assumption has clearly been seriously challenged by research conducted by Elfenbein, suggesting that far from representing a fossil remnant of a wider, Chalcolithic spread of Dravidian languages Brahui is most likely to be relatively late, first millennium AD language spread from western India (Elfenbein 1987). Furthermore, there have been a number of recent suggestions that there was a Neolithic, as opposed to a Chalcolithic, diffusion of Indo-European languages (Renfrew 1987). Renfrew's core hypothesis accepts the point made by most linguists and archaeologists that such an arrival of new languages brought by new people must be visible in the archaeological record, but argues that the most obvious discontinuity in the cultural record is the Neolithic rather than the Chalcolithic (Fig. 8). He thus argues that a Neolithic demic diffusion brought Indo-Aryan languages to South Asia (ibid.: 189-97), thus perhaps explaining the presence of apparent 'Vedic' elements within the Harappan Civilization such as the Kalibangan hearths, yogic postures and lingas (Allchin and Allchin 1982: 303). Most advocates of the Dravidian language hypothesis evaluate the possibility of an earlier presence of Indo-European languages within South Asia, but summarily dismiss the question of Austro-Asiatic and Sino-Tibetan language families (Parpola 1994: 137-42). However, both Bellwood and Higham have argued for a Neolithic demic diffusion from China into eastern and northern India as reflected in contemporary linguistic patterns (Bellwood 1995; Higham 1995). Parpola has dismissed the suitability of Austro-Asiatic as a candidate for the language of the Indus script as he states that it probably extended no further than the Ganga-Yamuna Doab (Parpola 1994: 140). He also postulates a link between the northern, or Kashmir-Swat, Neolithic with Sino-Tibetan languages (ibid.:142), suggesting that this language group was spoken across the entire northern edge of the Harappan Civilization from
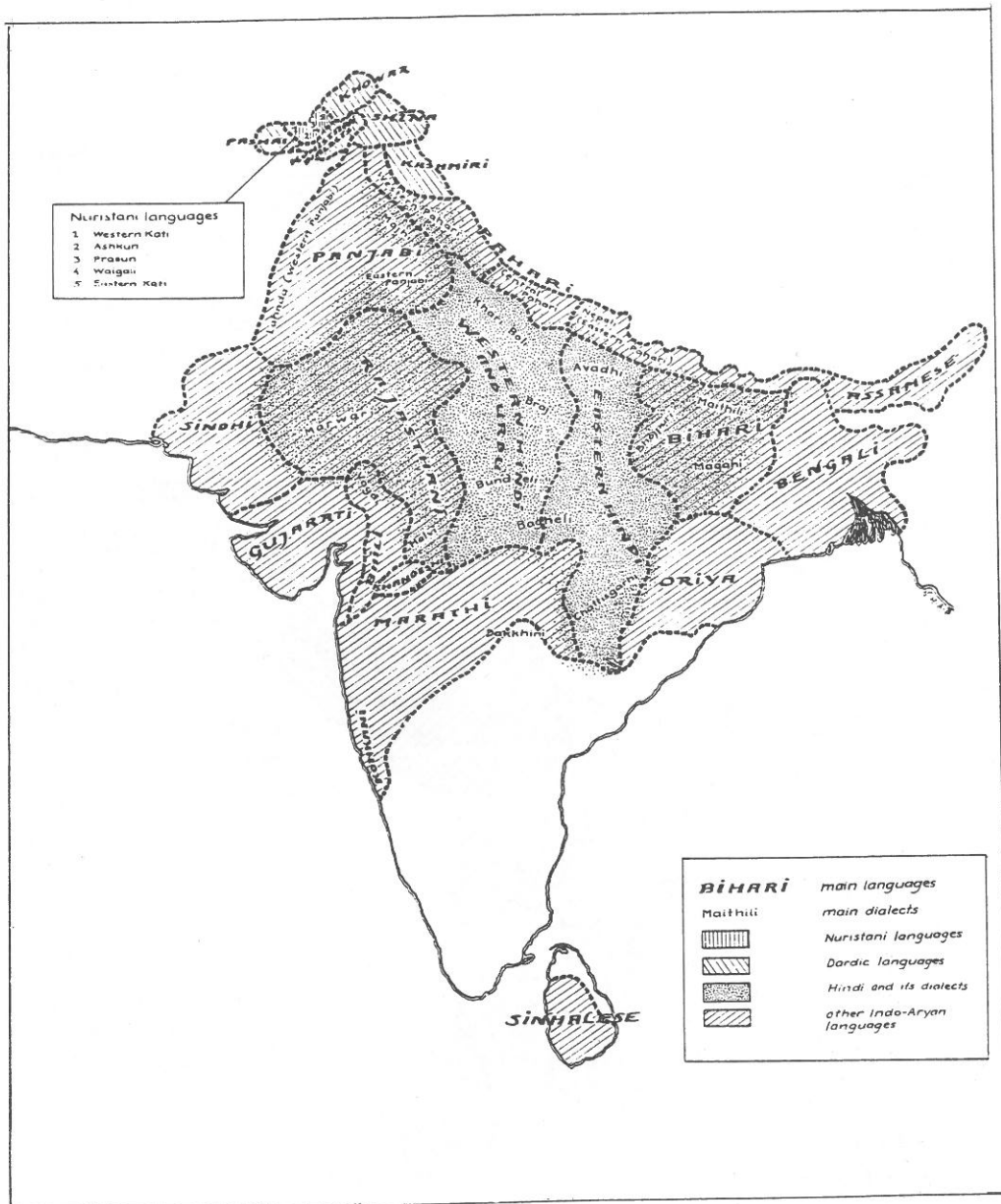
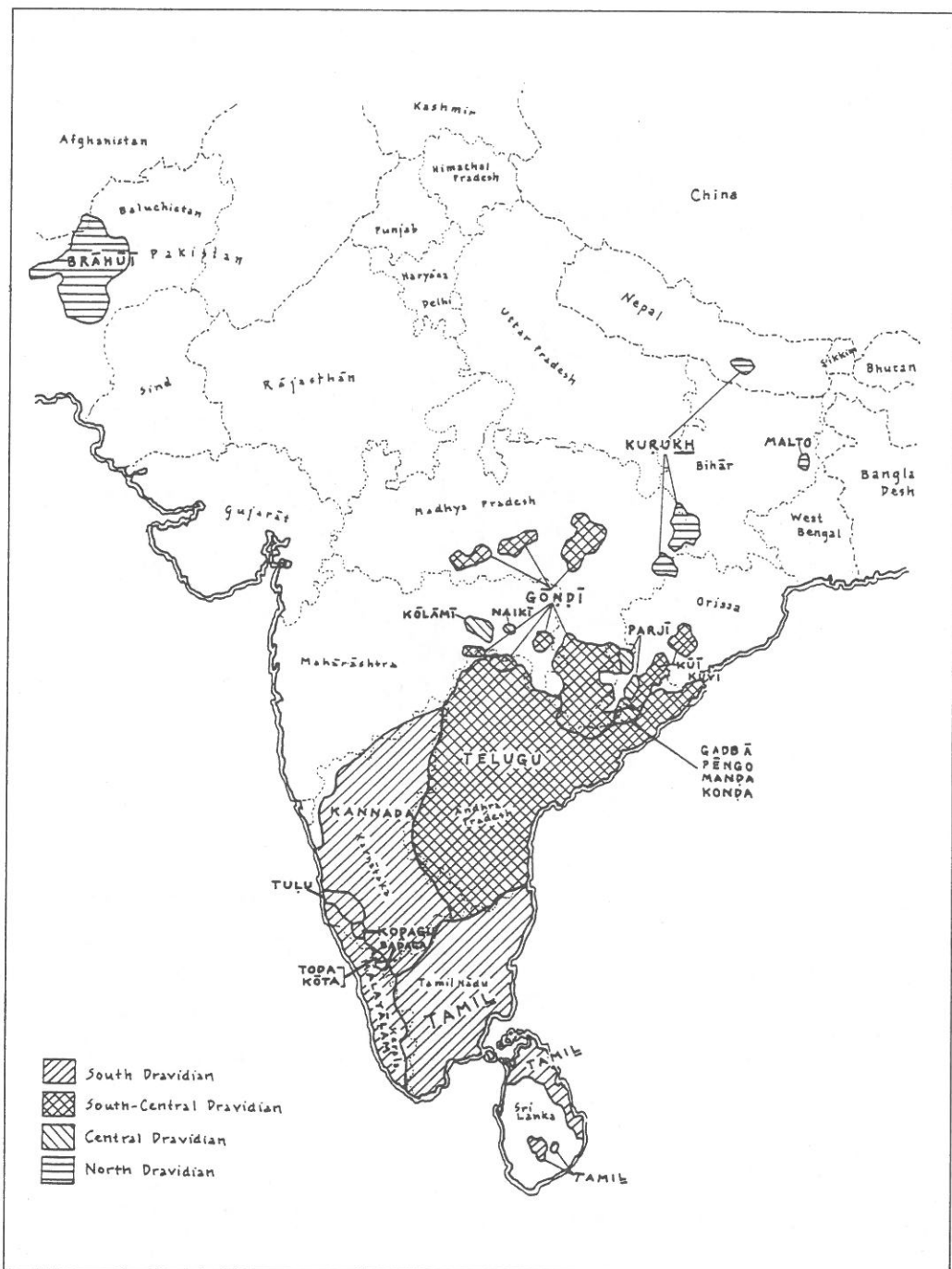Fig. 6. Distribution map of Indo-European languages within South Asia (after Parpola 1994: 135).

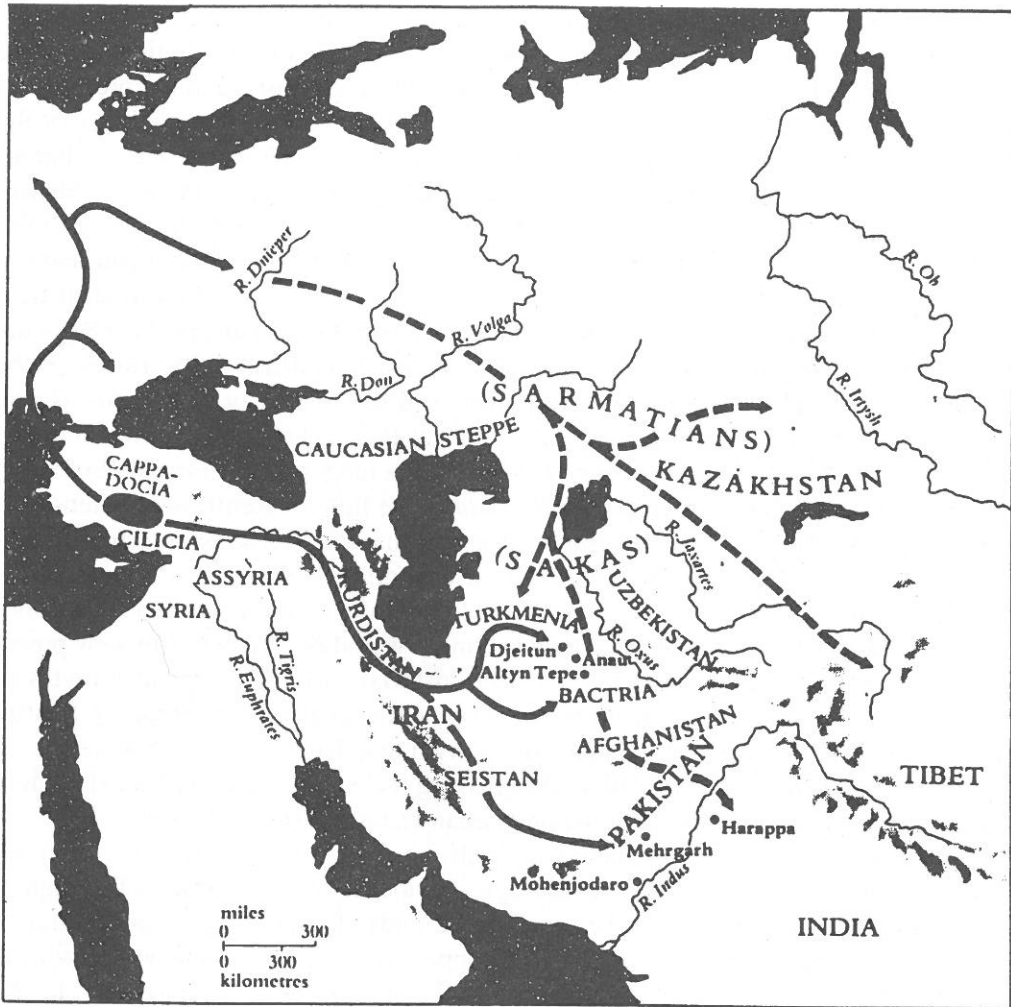Fig. 7. Distribution map of Dravidian languages within South Asia (after Parpola 1994: 136).

Fig. 8. Map showing the Chalcolithic diffusion of Indo-European languages (broken line) and the alternative Neolithic diffusion (bold) (after Renfrew 1987: 206).

Kashmir in the east to Swat in the west. Acknowledging contact between this group and the Harappan world, it is dismissed as a possibility in favour of a small pocket of Dravidian speakers who may have moved into the Indus system in mediaeval times!

The Dravidian hypothesis is also based upon the widely accepted concept of an arrival of one, or more, populations speaking new languages in South Asia from outside, an arrival which occurs during the late Post-Urban Harappan. Indeed, most scholars would cite support for such a mechanism based upon the evidence of a collection of sacred hymns known as the *Rigveda*, finds of objects with 'foreign-traits' and the presence of speakers of Indo-European languages in South Asia. Opinions on the reliability of the *Rigveda* as a documentary source are divided between those who view it as a 'literary record' (ibid.: 133; Witzel 1995) and those who believe it to be largely mythical (Shaffer 1984; Leach 1990; Chakrabarti 1995). Parpola clearly falls in the former category fully accepting the validity of its topographical descriptions (Parpola 1994: 5) and using it almost as a reliable historical document 'Important clues to an archaeological identification of the Rigvedic invasion are provided by the references to the enemies of the Rigvedic Aryans' (ibid.: 149). In doing so such scholars appear to confirm the warnings of the ancient historian, Moses Finley 'We no longer read the *Aeneid* or *King Lear* as true stories ... we certainly do not try to write medieval French history from the "Song of Roland" or medieval German history from the Nibelungenlied.' (Finley 1968: 36). Moreover, it is possible to interpret the *Rigveda* in the light of Renfrew's System Collapse model (Renfrew 1984). This model proposes that the central administration collapses, traditional elites disappear, centralized economies collapse, settlement shifts, population drops and a lower level of socio-political integration is reached (ibid.: 366-89). It also proposes that a romantic Dark Age myth would be developed by new power groups to legitimate themselves, and that later historians would accept such myths as truthful and this would in turn impede the development of Dark Age archaeology. Shaffer has already suggested that such a legitimative myth may have been responsible for the creation of the *Rigveda* (Shaffer 1984), thus making it clear that Renfrew's model might fit rather well with the aftermath of the post-urban Harappan transformation!

The second key assumption shared by both those favoring a Dravidian or Indo-European linguistic model is that archaeological evidence of the presence of foreign or rather newly arrived peoples may be found in the finds of objects with 'foreign-traits'. The similarities between an antennae-hilted copper sword from Bactria in Afghanistan and a similar example from Uttar Pradesh in India are thought to 'suggest that "Indian Dasas" may have introduced some artefact types found in the Copper Hoards of the upper Ganges Valley' (Parpola 1994: 154), a point supported by Allchin (1980). Similarly, Falk has suggested that it is possible to draw further analogies between certain objects within the 'Copper Hoard Culture' and objects described within the *Rigveda* (Falk 1994) and Mallory identified the Gandhara Grave complex and Painted Grey Ware as further Indo-European indicators (Mallory 1989) (Fig. 9). The Megalithic sites of Peninsular India are also interpreted as the result of a further diffusion of people 'All this evidence suggests the introduction of the Megalithic culture into India by horse-riding and warring
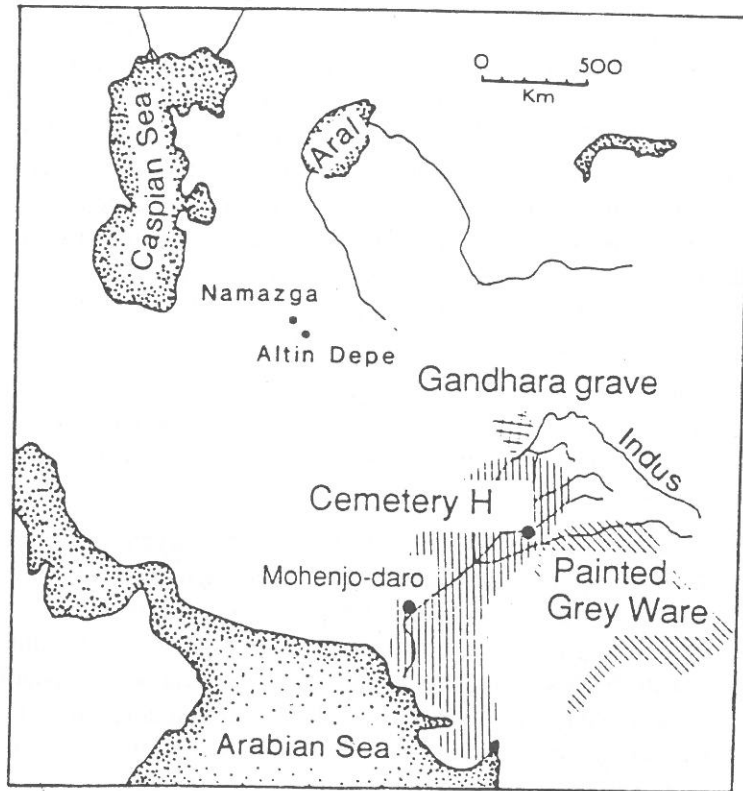
Fig. 9. Map showing archaeological culture-complexes identified as Indo-European speakers by Mallory (Mallory 1989: 592).

nomads, probably speaking an Aryan language' (Parpola 1994: 172)—a view also shared by others (Allchin 1980). These interpretations suggest the simple equation that 'material culture = people = language' and are rather reminiscent of some of Childe's culture historical frameworks (Childe 1956). Processual and post-processual developments in archaeological theory have surely enabled us to abandon such crude equations and to acknowledge that the dynamics of material culture, ethnicity and language are far more complex? Indeed, even Parpola concedes that 'the correspondence between language and culture is not always one to one' (Parpola 1994: 137). Objects do not necessarily need to be carried by a single group from one location to another, objects are traded and if one imagines a down the line exchange one can observe an object travelling hundreds of miles whilst its human carriers themselves only travel tens of miles. As a number of scholars have demonstrated the continuity between the Harappan and the Early Historic periods (Coningham 1995; Shaffer 1993), an alternative interpretation of these objects would be therefore that a transformation of Harappan systems of socio-political integration led to the introduction of new systems of integration. In such a scenario it seems likely that the arrival of these new systems would be accompanied by the arrival of new prestige objects and concepts. The population would thus remain by and large

stationary whilst objects of prestige, being the currency of competition, would change.

Having established the possibility that objects can travel without necessarily the long-distance movement of people, it will now be demonstrated that the same is possible for language change. Although Renfrew identified six models for linguistic change (demographic-subsistence, elite dominance, systems collapse, constrained population displacement, sedentary-mobile boundary shift; and donor-recipient population system) they all include the permanent movement of large numbers of people (Renfrew 1987: 121-37). Sherratt, however, has proposed a model in which linguistic replacement occurs through a prolonged trade contact (Sherratt 1988: 458-63; Sherratt and Sherratt 1988) (Fig. 10). This model suggests that trade and exchange could have:

created new demands for inter-regional communication, especially between elites. These would have provided circumstances for the formation of pigins and creoles, which because of their association with prestige activities could have slowly gained much wider currency in pre-literate communities. (Sherratt: 458-63)

As discussed earlier (Coningham et al. 1996) the complex dynamics of linguistic change are illustrated by Barth who demonstrated that one language, inferior in terms of numbers and prestige, can absorb speakers of a more populous and prestigious one because of the different nature of socio-political organization (Barth 1972). The number of Baluchi speakers is increasing to the detriment of Pushtu speakers because it is easier for a disgraced Pathan to be incorporated into the inegalitarian client-patron relationship of a neighbouring Baluch tribe than into a more egalitarian Pathan tribe. A similar argument is put forward by Ehret who states that 'A language ceased to be spoken when the sense of separate ethnicity with which it was bound up had ceased to be relevant or functional.' (Ehret 1988: 570). Furthermore he has suggested that such changes can be set off by 'merely local disparities' (ibid.) and that 'language and ethnic shift can take place without radical change in the material particulars of life and with an amount of change in the human gene pool so small as to be for all practical purposes undetectable' (ibid.: 571). One should also take serious note of Robb's model for the mechanisms of such disperals within Eurasia (Robb 1991). Taking the premise that often 'random, directionless processes can add up to directed results' (ibid.: 287), Robb created a computerized simulation model for the random diffusion of language. Assuming that individual communities 'grow, dwindle, fuse, merge or go extinct for reasons as varied as intermarriage, disease, demographic change, ecological shift, internecine conflict, economic stress, external political pressure, opportunism, or the assimilation of refugees, immigrants or captives' (ibid.), Robb demonstrated that random microchange within territories often led to recolonization, both social and linguistic, by immediate neighbours. Starting with 64 language groups evenly distributed within the overall test area—Eurasia (Fig. 11), in each territory was generated a random number with each turn (ibid.: 288). If the generated number fell below a pre-set level the territory was assumed to have undergone linguistic change through a colonization by one of its neighbours, which was randomly selected. The turn ended when a new number had been calculated for each square within the test area and a new linguistic map generated. Within 30 turns 16 language groups had become

extinct (Fig. 12), a number which rose to 36 within 60 turns (Fig. 13), culminating in the successfully colonization of the entire test area by two language families by the 1550 turn (ibid.: 289) (Fig. 14). It is important therefore to note that firstly, a general pattern can be created through minute random changes and secondly, that areas can be re-colonized by the same language family (ibid.: 288). In summary, it is therefore suggested that attempts to understand the meaning of the Indus script should concentrate on the study of the archaeological context of the Indus script itself, rather than trying to assume what the language of the script was and then set out to decipher it. Clearly from Robb's model the language of the Indus script could have been Indo-Aryan, Dravidian, Sino-Tibetan or even a language since lost!

DISCUSSION AND CONCLUSION

Now, of course, the question is how can we possibly approach the question of the decipherment of an unknown script of an unknown language? The answer is easier than might first appear; to decipher can also mean 'to make out the meaning of', and this surely we can do at a certain level without knowing the script or the language. We may approach this problem with reference, not to the Harappan script itself, but to the use of graffito in the Early Harappan period through Quivron's exemplary study of inscribed and painted marks at Mehrgarh and Naushario (Quivron 1997) (Fig. 15). A number of scholars have studied the similarities and differences between such marks present within the Early Harappan and signs within the later Indus script, and have suggested that there may have been some degree of continuity (Lal 1974; Durrani 1984). However, Parpola suggests such continuity is unclear stating that 'nowhere do we find clear evidence of a gradual progress toward real writing in the Early Harappan period' (Parpola 1994: 53), a view also shared by Possehl (Possehl 1996: 57). Quivron studied a corpus of 1265 marks from vessels recovered from excavations at Mehrgarh and Naushario which provide a sequence from 3600 to 2500 BC (Quivron 1997: 45). All the marks were made before firing, presumably when the vessel was drying, and most were made on the underside of the base. The key corpus is provided by a failed open kiln, dating to Mehrgarh period VI (*c.* 2700 BC), which contained a large number of abandoned vessels, many of which were inscribed with different signs (ibid.: 53). A further large collection of vessels, one hundred, was recovered from storage room CXVIII belonging to Mehrgarh period VII, of which 33 were incised with a total of 16 different signs (ibid.). Quivron assumed that as there was no apparent link between sign and vessel type within room CXVIII, the purpose of the inscribed signs was during the manufacturing cycle (ibid.: 55). Furthermore he noted that the frequencies of such signs increases and peaks at *c.* 2700 BC and then decreases, and these marks are then mainly post-firing graffito, and makes the comment that this may be indicative of the increasing centralization of ceramic production during the mature Harappan period (ibid.: 61). In an end note Quivron also suggests that the 'marks were perhaps used to avoid confusion of ownership during firing in cases where the vessels were fired in communal kilns' (ibid.); this surely is the key point of this study. Clearly, it would make greater economic sense for individual potters to spread the risk of a failed

THE 'NEOLITHIC' PATTERN

speech communities

A B C D E

'Down the line' trade

Bilingualism

Typical artifact distribution e.g. stone axes.

origin

THE 'BRONZE AGE' PATTERN

A B C D E

Directional trade

trade language

Typical artifact distribution e.g. bronze swords.

origin

Fig 10. Diagrams showing contrasting models for the diffusion of language (Sherratt and Sherratt 1988: 592).

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . aaaaa . . . . . . . . . . . . . 6666666 . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . @@@@D66666 . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . aaa . . ' ' 'ggggJJ@@@DDDDDDD``ooo . . . . 44[[.
. . . . . . . . . . . . . . . . . ccccccccc . . . . . aaaa ' ' ' 'ggggJJJJ@@)))###`` `ooo44444[[.
. . . . . . . . . . . . &&&&&&cccc999998888 ' ' ' ' 'ggfgJJJ@@))))###`` `oooo444[[[[.
. . . . . . . . . . . &&&&&~~~~~~~~99998888***ttttfgJJJJ)))))###`` `ooo44[[[1.
. . . . . . . z . . . &&=======~~~9998888****ttttffffff@@@@@@##mmm;;;11111111.
. . . . . . . zz . . . = . = . ===pppp////mmmm****ttttjffff@@@@@@vvmmmmm;;;;111 . . . .
. . . . . . zzzz . zzz00000ppppp////mmmm%%%*jjjjjf555555vvvvvmmmm;;;;;7777 . . .
. . . . . . . !!zz0000++++ppp////mm%%%%%%%jjjj0555555vvvvvxxxx77777777 . . .
. . . . . . !!!!000+++++++ . . . .rr// . .mm . .%%1111jj0000000xxxxxxxx<<<<<<< . . . .
. . . . . . !!!! . . . ^^ . rrrrrrrrrrw . .11111111.[[[[[0000??????<<<<< . . .XXX . . . .
. . . . . . . !! ^^^^^ . . . . . . . .33wwwwwwwwqqssssss . [[""""??????.<. . . .xx . . . . .
. . . . . .$$$^^^^^eeeeeeee333333wwwwqqqqssssss[[[.["""""""""22 . . . .xx . . . . .
. . . .$$$$ . . . . . . eeeeee3333--- . qqqqqdddddddYYYY22222222 . . . . . . . . . . . .
. . . .$$$$$$ . . . . . . . .uuuuuuu . ------- . . . .dddddcccccYYY^^^22 . . . . . . . . . .
. . . . .$$]]hhhhhhkkkkkuuuuuu . X--- . . . .cccc . . . . YYY^^^ . . . . . . . . .
. . . . .]]]]]hhhhhkkkkkuXXXXXXX . . . . . . . . . . .ccc . . . . .Y^^^^`. . . . . . .
. . . . . .]]]]]h(((((((kkXXXXiii . . . . . . . . . . .c . . . . . . . .^^ . . . . . . . .
. . . . . . . . . . .((((((((iiiiiiii . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

Fig. 11. Simulated Eurasian language distribution at start of program (after Robb 1991: 288).

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . @@@@@@@ . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ' ' 'f . . . . . . @@@@@@@@@@ . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . ' ' ' . .ffggggg@@@@@@@@@@@@@@oooo . . . .4444.
. . . . . . . . . . . . . . . . zzzzz/// . . . . . ' ' ' ' ' 'fgg%%gg@@j@@@@@@@` ` `ooooo4111444.
. . . . . . . .~zzzzzzz/////////' ' ' ' ' '%gg%%%%%jj@@@@@@oooooo7o44111444.
. . . . . .~~zzzzzzzz~////////' ' ' 'ff%%fggggg%%jjjj@@@oooooo7o11111141.
. . . . . .z . .~zzzz+zzz++8///////'ffff%ffjjj%%jjj@@@@oooo777777111111.
. . . . . .zz . . .~.z.++++++8833////'88fff%%jj%jjj@@@@@@0@ooo777777111 . . .
. . . . . .zzzz.zz~~z++++++883338888' '%ff%%ffjjjj@@@@00@@oo7777771111 . . .
. . . . . .zzzzz~+z+++++888883338888' '%%f%%fffjjjj@@@00@@@7777771111 . . .
. . . . . .$$$zzzzzzzzz+++ . . . ./333 . .88 . .%%f%Yffjjjj@@@000@@@7777777711 . . .
. . . . . .$$zz . . . .zz.++333333%3% . .88%%%%%YY.jjj@@@@000@@777777 . . .<<< . . .
. . . . . . .$$$$^^^ . . . . . .333%3%%%%%%%%%%YYYj.Y@j@@@@x@@@22.7 . . .<< . . . .
. . . . .$$X$$$$^^^^kkkk33k33333%3%%%%%%%%%dddYYY.x@xxYxYY222 . . . . .<< . . . . .
. . . . .$$$X . . . . . . .kkkkXk3333333.%%%%%%%%%dYYYYYYxxxYYY2222 . . . . . .
. . . .$$$$$X . . . . . . .kkXXX/3.333333 . . . . .%%%dYYYYYYYYYYY222 . . . . .
. . .$$$XXXXXXXXXXXkXXXX/// ./333 . . . . . . . .dddd . . . .YYYYYY . . . . . . . . .
. . .$$$XXXXXXXXXXXXXXXX//xx . . . . . . . . . .ddd . . . .YYYYY . . . . . . . . .
. . . . . .$$$XXXXXXXXXXXXXXXX . . . . . . . . . . . . .d . . . . . . .YY . . . . . . . . . .
. . . . . . . . .XXXkkkXXXXXXXXX . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

Fig. 12. Simulated Eurasian language distribution after 60 turns (after Robb 1991: 289).

```
.........................................................................................................
......................................................................@@@@@@@...................
..................................................////@.......@@@@@@@@@@.....................
...............................................///.y@@@YYYY@@@@@@@@@@@@@@@@@@....4444.
.......................zzz///zz......///YYY@@@@@YYYY@@@@@@@@@@@@@@@@@4444444.
......................./z/////zzz////////YYYY@@@@YYYY@@@@@@@@@@@@@@@@@4444444.
.................zz//////zz/////////YYYY@@@@YYY22222@@@@@@@@o@@@@4444444.
..........z....z//////////z/z////////YYYYY@YOY22222@@@@@o@@@o@@@44444444.
...........zz..../././////////////////YYYYYYYYOY22222@o@oooooo44444444....
.........zzzz.zzzz/////////////////////YYYOOO2OO222222ooo@oooo444444444...
.........zzzzz//zz////////////////////YYYO//OOO2222222ooo@@@o4oo4444444....
......888zzzzzz/////.....////..//..//OO///2222222ooooo@@2@4o4444444.....
......88zz....zz.///////////../)//)/))///.2222222200oooo@4444...4444.....
.........8zzzzzz........./////////////O/OOOO222.2222222oo2@oo.4.....44...
.....z88zzzzzzzXXXXX/////////////O/OOOO22222.22222222@2o.....44.....
.....zzzz.........xx////xx/////.//O//OOOO222222222222222o...........
...zzzzzz...........xx//xxx.//////.....OO2222222222222222...........
....zzzzzzzzzXXXXXXXXXXXX./////.......2222....222222...............
....XXzzzzzzzXXXXXXXXXXXXX...........222.....,22222..............
....XXXXzzzXXXXXXXXXXXXX..............2.......22...............
....................XXXXXXXXXXXXXX......................................
.........................................................................................................
```

Fig. 13. Simulated Eurasian language distribution after 340 turns (after Robb 1991: 290).

```
.........................................................................................................
.....................................................2222222...............
...........................................22222.......2222222222...............
...........................................222..2222222222222222222222....2222.
...............................22222222......222222222222222222222222222222222.
..................222222222222222222222222222222222222222222222222222222222.
.............2222222222222222222222222222222222222222222222222222222222.
.........2...2222222222222222222222222222222222222222222222222222222.
.......22....2.2.22222222222222222222222222222222222222222222222....
......2222.222222222222222222222222222222222222222222222222222...
.......2222222222222222222222222222222222222222222222222222222.....
........2222222222222....2222..22...2222222222222222222222222.....
......2222...22.22222222222..22222222.22222222222222222222...222...
.......2222222.........22222222222222222.2222222222222.2..22....
......2222222222222222222222222222222222.22222222222.....22.....
....2222.........2222222222.22222222222222222222222.............
...222222.......2YY22222222222.....2222222222222222222..............
.....22YYYYYYYYYYY222222222222.......2222....222222...............
....22Y22YYYYYYYY2222222222...,.....222.....22222.............
......2Y2222YYYYYY22222222..............2........22................
...............YYYYYYY22222222..;...............................
.........................................................................................................
```

Fig. 14. Simulated Eurasian language distribution after 2000 turns (after Robb 1991: 290).
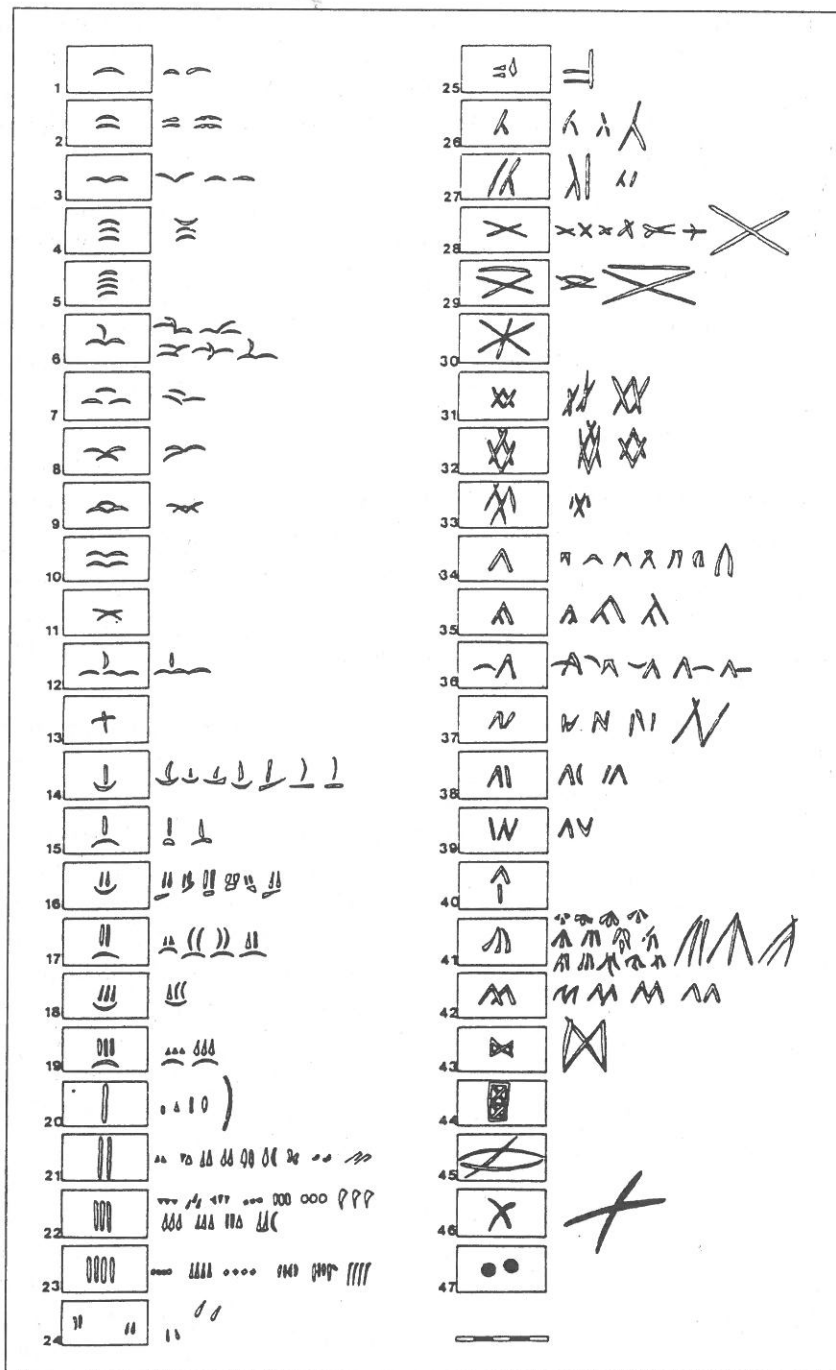
Fig. 15. Master sign list of pot marks from Mehrgarh and Nausharo
(after Quivron 1997: 47).

firing by sharing a firing with others; in doing so they needed a form of identification to differentiate their own goods from that of the other share holders. Although clearly such developments are not in writing, as in the case for graffito-inscribed ceramics from late Iron Age contexts (Coningham et al. 1996; Lal 1960), they represent a demand for recording, as Goody states:

In some non-literate societies rights are indicated by graphic marks of ownership on pots and livestock, giving rise, some suggest, to semiotic codes of limited scope. Certainly they are embryonic forms of writing often associated with specific claims to property. (Goody 1986: 47)

Whilst such graphic marks are an important step towards literacy, even Quivron states that 'there is no evidence in the pre-Indus material so far available of a gradual progress towards real writing' (Quivron 1997: 60). Goody concurs that such recording systems are not in writing and that writing itself allows a number of barriers to greater socio-economic integration to be overcome (Goody 1986). Goody argues that non-literate societies can expand only to a certain size, after which fission occurs as the links between centre and periphery become too great (ibid.: 111), however, he states that:

The presence of a literate bureaucracy ... mitigates against those fissiparous tendencies, providing a consolidating factor in state building—not only because of the fact and content of communication ... but also because the use of a common written language or a common logographic script helps to overcome the diversity of spoken tongues and dialects. (ibid.: 112)

Goody's model is clearly applicable to the processes of socio-political integration which culminated in the creation of the Harappan world. Writing also contains a number of key elements such as exactness and legitimacy and that, as well as proving a means of communication between centre and periphery, it also is a method of distancing oneself from direct contact (ibid.: 48-50). Whilst enabling the alienation of property and the organization of the means of production and the organization of production it also expands 'the capacity of the memory store ... so that more transactions could be kept track of, and hence carried on, at any one time' (ibid.: 78). He also highlights the fact that 'reciprocities and obligations themselves became more precise when they were set down in writing than being held in the storage system of the brain with its homeostatic tendencies' (ibid.: 82). If we are to recover similar information and hypothesis for the Indus script we have to return the context of the material itself, and indeed to acknowledge what is missing from the archaeological context.

Many scholars agree that the corpus of Indus script which has survived within the archaeological record is only a fragment of what may have been written on perishable materials, indeed as Postgate et al. have pointed out 'for inscriptions which are meant to last, expensive and durable materials are chosen, for ephemeral and utilitarian texts cheap and perishable materials are used' (Postgate et al. 1995: 464). Indeed, Postgate and his colleagues have now suggested that it is precisely due to this transitory nature of utilitarian inscriptions that we are left with a top heavy view stating that:

A popular, long-held and much-published view is that writing was developed for ceremonial

purposes. However, recent evidence from Egypt and elsewhere suggests instead a utilitarian, administrative origin. (Postgate et al.: 478)

One might also include in this process the new evidence for the existence of pre-Asokan Brahmi as represented by fourth century BC inscribed sherds from Anuradhapura (Coningham et al. 1996). Having acknowledged that the objects which have survived in the archaeological record may have been exceptional rather than common examples we may now begin to identify some of the key elements for further study. The first point must be to concentrate on an analysis of the structural context in which these inscriptions have been found. It is highly striking, for example, that little research has actually been carried out in such an area. Interpretations for the use of the Indus script have remained at very general levels (Ratnagar 1991), and unless we understand more fully about the
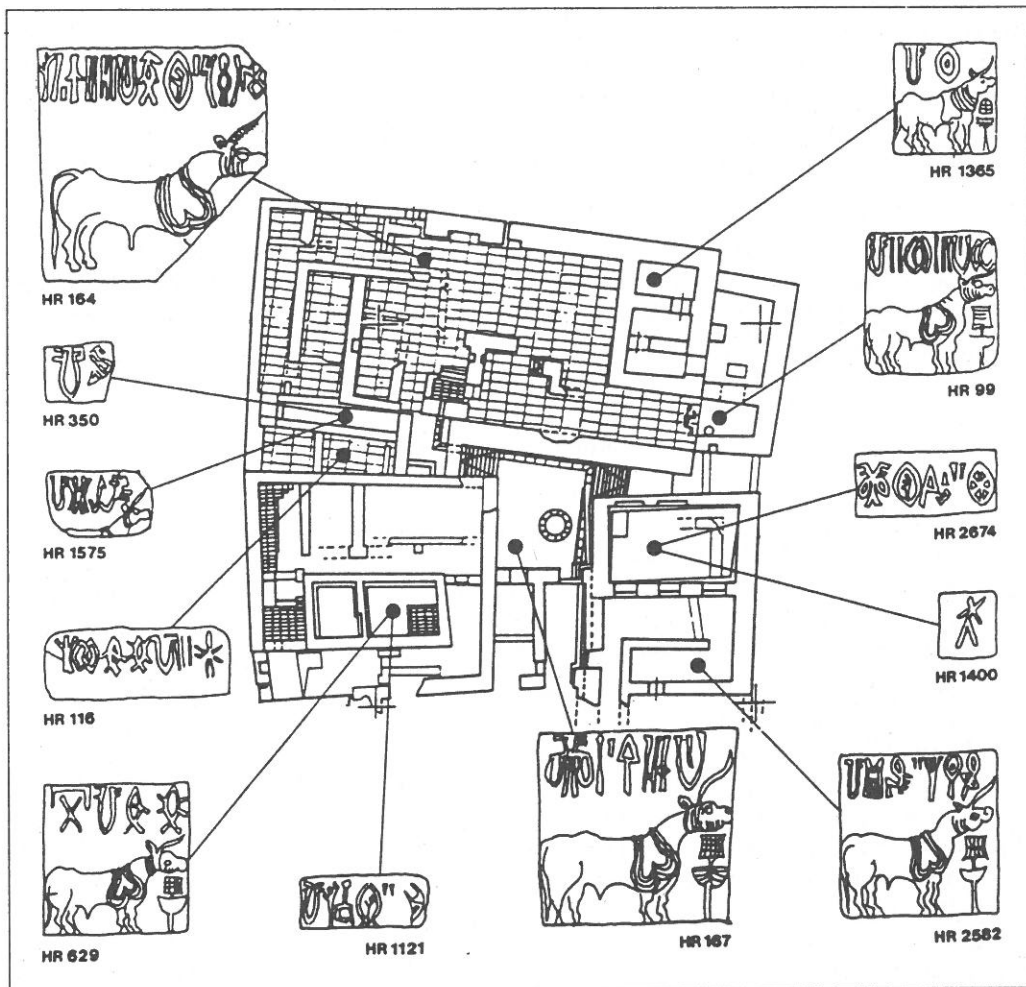
Fig. 16. Distribution of seals within House AI, Block I, HR area at Mohenjo Daro
       (after Jansen 1987: 160).

site formation process in action which created the fills of those actual rooms we are unlikely to create more specific models. For example, the discovery of twelve seals in house I in area HR of MohenjoDaro has been rather underplayed by many scholars (Parpola 1994: 118; Possehl 1996) (Fig. 16). Of the seven seals which depicted an animal, all depicted the same animal—the unicorn. As Jansen, as Wheeler before him (1968), has identified this building as one of special architectural function, perhaps a temple (Jansen 1987), is it not likely that the 'unicorn' motif which links the seals together may not represent the resident deity? Whilst such hypothesis are difficult to test, as the material was excavated well over half a century ago, the current excavations at Harappa are yielding very detailed evidence.about the use of the script, and more importantly, its archaeological context (Meadow and Kenoyer 1997). Indeed of their 130 inscribed objects from the 1994 to 1995 seasons, a number appear to have been made with exactly the same moulds as those recovered from other parts of the city in the 1930s. The study of such examples afford, as Meadow and Kenoyer suggest, 'contemporaneity of occupation as well as soicoeconomic and perhaps ritual interaction between inhabitants of distinct sectors of the city' (ibid.: 157), a wider study utilizing such a methodology would allow intra-regional and inter-regional patterns to be studied. In conclusion perhaps then we should concur with the statement by Meadow and Kenoyer:

Using modern archaeological techniques of excavation combined with technical and contextual analyses should enable us to gain a better understanding of the cultural domain of the inscribed items, as opposed to knowledge of the actual language, decipherment of which still seems a distant dream. (Meadows and Kenoyer 1997: 163)

REFERENCES

Alekseev, G.V. 1976. Characteristics of the Proto-Indian Script, in *The Soviet Decipherment of the Indus Valley Script: Translation and Critique* (A.R.K. Zide and K.V. Zvelebil Eds.), pp. 17-22. The Hague: Mouton.

Allchin, B. and F.R. Allchin 1982. *The Rise of Civilization in India and Pakistan*. Cambridge: Cambridge University Press.

Allchin, F.R. 1980. Archaeological and Language-Historical Evidence for the Movement of Indo-Aryan Speaking People into India and Pakistan, *Journal of the K.R. Cama Research Institute* 48: 68-102.

Barth, F. 1972. Ethnic Processes on the Pathan-Baluch Boundary, in *Directions in Socio-linguistics: the Ethnography of Communications* (J.J. Gumperz and D. Hymes Eds.), pp. 454-64. New York: Holt, Rinehart & Winston.

Bellwood, P. 1995. Early Agriculture, Language History and the Archaeological Record in China and Southeast Asia, in *Archaeology in Southeast Asia* (C-T Yeung and B. Li Wai-ling (Eds.), pp. 11-22, Hong Kong: University of Hong Kong.

Bisht, R.S. 1991. Dholavira: a New Horizon of the Indus Civilization, *Puratattva* 20: 71-82.

Chakrabarti, D.K. 1995. Review of 'Deciphering the Indus Script', *Journal of the Royal Asiatic Society* 5: 428-30.

Childe, V.G. 1956. *Piecing Together the Past*. London: Routledge & Kegan Paul.

Coe, M.D. 1995. On Not Breaking the Indus Code, *Antiquity* 69: 393-5.

Coningham, R.A.E. 1995. Dark Age or Continuum?: an Archaeological Analysis of the Second Emergence of Urbanism in South Asia, in *The Archaeology of Early Historic South Asia: the Emergence of Cities and States* (F.R. Allchin Ed.), pp. 54-72. Cambridge: Cambridge University Press.

Coningham, R.A.E., F.R. Allchin, C.M. Batt and D. Lucy 1996. Passage to India? Anuradhapura and the Early Use of the Brahmi Script, *Cambridge Archaeological Journal* 6 (1): 73-97.

Durrani, F.A. 1984. Some Early Harappan Sites in Gomal and Bannu Valleys, in *Frontiers of the Indus Civilization* (B.B. Lal and S.P. Gupta Eds.), pp. 505-10. Delhi: Books & Books.

Edens, C. 1995. Tackling Torquemada, *Nature* 374: 223-4.

Ehret, C. 1988. Language Change and the Material Correlates of Language and Ethnic Shift, *Antiquity*, 62: 564-74.

Elfenbein, J.H. 1987. A Periplus of the Brahui Problem, *Studia Iranica* 16: 215-33.

Fairservis, W.A. 1992. *The Harappan Civilization and Its Writing: a Model for the Decipherment of the Indus Script*. Lahore: Vanguard Books.

Falk, H. 1994. Copper Hoard Weapons and the Vedic Vajra, in *South Asian Archaeology 1993* (A. Parpola and P. Koskikallio Eds.), pp. 193-206. Helsinki: Annales Academiae Scientiarum Fennicae, Series B, Vol. 271.

Finley, M.I. 1968. *Aspects of antiquity*, London: Chatto & Windus.

Gadd, C.J. 1931. Sign-List of Early Indus Script: Some External Features of Its Writing, in *Mohenjo-daro and the Indus Civilization* (J.H. Marshall Ed.), pp. 406-14. London: Arthur Probsthain.

Goody, J. 1986. *The Logic of Writing and the Organization of Society*. Cambridge: Cambridge University Press.

Heras, H. 1953. *Studies in Proto-Indo-Mediterranean Culture*. Bombay: Indian Historical Research Institute.

Higham, C.F.W. 1995. Lingnan and Southeast Asia in Prehistory, in *Archaeology in Southeast Asia* (C-T Yeung and B. Li Wai-ling Eds.), pp. 23-39. Hong Kong: University of Hong Kong.

Hrozny, B. 1951. *Ancient History of Western Asia, India and Crete*. Prague: Artia.

Hunter, G.R. 1934. *The Script of Harappa and Mohenjo-daro and Its Connection with Other Scripts*. London: Kegan Paul, Trench, Trubner & Co.

Jansen, M. 1987. Mohenjo-daro—a City on the Indus, in *Forgotten Cities on the Indus* (M. Jansen, M. Mulloy and G. Urban Eds.), pp. 145-66. Mainz: Philip Von Zabern.

Joshi, J.P. and Parpola, A. 1987. *Corpus of Indus Seals and Inscriptions: Vol. 1*. Helsinki: Suomalainen Tiedeakatemia, Soumalaisen Tiedaeakatemian Toimituksia Annales Academiae Scientiarum Fennicae, Sarja Series B, NIDE Tome 239.

Kak, S.C. 1988. A frequency Analysis of the Indus script, *Cryptologia* 12 (3): 129-43.

Kinnier Wilson, J.V. 1974. *Indo-Sumerian: a New Approach to the Problems of the Indus Script*. Oxford: Oxford University Press.

Knorozov, Yu. V. 1976. The Characteristics of the Language of the Proto-Indian Inscriptions, in 1976, *The Soviet Decipherment of the Indus Valley Script: Translation and Critique* (A.R.K. Zide and K.V. Zvelebil Eds.), pp. 55-62. The Hague: Mouton.

Krishna Rao, M.V.N. 1966. *Indus Script Deciphered.* Delhi: Agam Kala.

Lal, B.B. 1960. From the Megalithic to the Harappan, Tracing Back the Graffiti on the Pottery, *Ancient India* 16: 4-24.

——— 1966. The Direction of Writing in the Harappan Script, *Antiquity* 40: 52-5.

——— 1974. Some Aspects of the Archaeological Evidence Relating to the Indus Script, *Puratattva* 7: 20-4.

——— 1979. On the Most Frequently Used Symbol in the Indus Script, *East and West* 29: 27-35.

Langdon, S.H. 1931.The Indus Script in *Mohenjo-daro and the Indus Civilisation* (J.H. Marshall Ed.), pp. 423-55. London: Arthur Probsthain.

Leach, E.R. 1990. Aryan Invasions Over Four Millennia, in *Culture Through Time* (E. Ohnuki-Tierney Ed.), pp. 227-45. Stanford: Stanford University Press.

Mahadevan, I. 1977. *The Indus Script: Texts, Concordance and Tables*. New Delhi: Memoirs of the Archaeological Survey of India 77.

——— 1988. What Do We Know About the Indus Script? *Neti Neti* ('Not This Nor That'), Indian Historical Congress, 49th Session, Section V, Dharwad.

——— 1997. An Encyclopedia of the Indus Script, *International Journal of Dravidian Linguistics* XXVI (1): 107-22.

Mallory, J.P. 1989. *In Search of the Indo-Europeans: Language, Archaeology and Myth*. London: Thames and Hudson.

Marshall, J.H. 1924. First Light on a Long Forgotten Civilisation, *The Illustrated London News* (20 September): 528-32.

——— 1931. *Mohenjo-daro and the Indus Civilisation*. London: Arthur Probsthain.

Meadow, R.H. and J.M. Kenoyer 1997. Excavations at Harappa 1994-5: New Perspectives on the Indus Script, Craft Activities and City Organisation, in *South Asian Archaeology 1995* (F.R. Allchin and B. Allchin Eds.), pp. 139-72. New Delhi: Oxford-IBH.

Mitchiner, J.E. 1978. *Studies in the Indus Valley Inscriptions*. New Delhi: Oxford-IBH.

Newberry, J. 1980. *Indus Script of the Mohenjo-daro Shamans*. Victoria: John Newberry.

Parpola, A. 1994. *Deciphering the Indus Script*. Cambridge: Cambridge University Press.

Possehl, G.L. 1996. *Indus Age: the Writing System*. Philadephia: University of Pennsylvania Press.

Postgate, N., T. Wang and T. Wilkinson 1995. The Evidence for Early Writing: Utilitarian or Ceremonial, *Antiquity* 69: 459-80.

Priyanka, B. and A. Manatunga 1988. *Studies in the Decipherment of the Harappan Script and Harappan seals*. Colombo: Archaeodocumentation.

Quivron, G. 1997. Incised and Painted Marks on the Pottery of Mehrgarh and Nausharo-Baluchistan, in *South Asian Archaeology 1995* (F.R. Allchin and B. Allchin Eds.), pp. 45-62. New Delhi: Oxford-IBH.

Rao, S.R. 1982. *The Decipherment of the Indus Script*. Bombay: Asia Publishing House.

Ratnagar, S. 1991. *Enquires into the Political Organisation of Harappan Society*. Pune: Ravish.

Renfrew, A.C. 1984. *Approaches to Social Archaeology*. Edinburgh: Edinburgh University Press.

——— 1987. *Archaeology and Langauge: the Puzzle of Indo-European Origins*. London: Jonathan Cape.

Robb, J. 1991. Random Causes with Directed Effects: the Indo-European Language Spread and the Stochastic Loss of Lineages, *Antiquity* 65: 287-91.

Ross, A.S.C. 1938. *The Numeral Signs of the Mohenjo-daro Script*. New Delhi: Memoirs of the Archaeological Survey of India 57.

Shaffer, J.G. 1984. The Indo-Aryan Invasions: Cultural Myth and Archaeological Reality, in *The People of South Asia* (J.R. Lukacs Ed.), pp. 74-90. New York: Plenum Press.

——— 1993. Reurbanisation: the Eastern Punjab and Beyond, in *Urban form and Meaning in*

South Asia: the Shaping of Cities from Baluchistan to Precolonial Times (H. Spodek and D.M. Srinivasan Eds.), pp. 53-67. Hanover: University Press of New England.

Shah, S.G.M. and A. Parpola 1991. *Corpus of Indus Seals and Inscriptions: Volume.* Helsinki: Suomalainen Tiedeakatemia, Soumalaisen Tiedaeakatemian Toimituksia Annales Academiae Scientiarum Fennicae, Sarja Series B, NIDE Tome 240.

Sherratt, A. 1988, Review of 'Archaeology and Language', *Current Anthropology* 29 (3): 458-63.

Sherratt, A. and S. Sherratt 1988. The Archaeology of Indo-European: an Alternative View, *Antiquity* 62: 584-95.

Stein, M.A. 1931. *An Archaeological Tour in Gedrosia.* New Delhi: Memoirs of the Archaeological Survey of India 43.

Waddell, L.A. 1925. *The Indo-Sumerian Seals Deciphered.* London: Luzac & Co.

Wheeler, R.E.M. 1968. *The Indus Civilisation.* Cambridge: Cambridge University Press.

Witzel, M. 1995. Rigvedic History: Poets, Chieftains and Polities, in *The Indo-Aryans of Ancient South Asia: Langauge, Material Culture and Ethnicity* (G. Erdosy Ed.), pp. 307-54. Berlin: Walter de Gruyter.

Zide, A.R.K. and K.V. Zvelebil (Eds.) 1976. *The Soviet Decipherment of the Indus Valley Script: Translation and Critique.* The Hague: Mouton.

Zvelebil, K.V. 1970. *Comparitive Dravidian Phonology.* The Hague: Mouton.