CHAPTER - IV

AN ASSESSMENT OF THE METHODOLOGY FOLLOWED BY S. R. RAO

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INTRODUCTION

The problem of deciphering the Indus Script has engaged the concerted efforts of scholars for the past fifty or more years. One of the difficulties that has continually impeded the decipherment of the Indus Script is the determination of the exact number of its symbols while most scholars have considered Indus Script as static all through. For the first time it is S.R.Rao[1] who pointed out that the Indus Script passed through several stages of development, the number of signs being much reduced in the latest phases, as exemplified particularly by late seals from Mohenjo-daro[2], Harappa[3], Lothal-B[4], Rangpur[5], Dholavira[6a,b], Jajjhar[6c], Alamgirpur[6d], Rakhishahpur[6e], Daimabad[7], Surkotada[8] and Rojdi[9] (Fig. 11 -14). The excavations at Lothal from 1955 to 1962 have revealed that the Indus Civilization did not die a sudden death in 1900 B.C., but survived for nearly 300 years more in Gujarat than in the Indus Valley. The Harappans at Lothal continued to use the simplified writing, so much so that it is now possible to trace the evolution of the Indus Script from a sophisticated picture-cum-cursive system of the early days (2500-1900 B.C) to the purely cursive system in the Late phase (1900-1600 B.C.)[2] (Fig. 15-16).

Inscriptions of (Late Levels)

Harappa[2]

Mohenjo - daro[2]

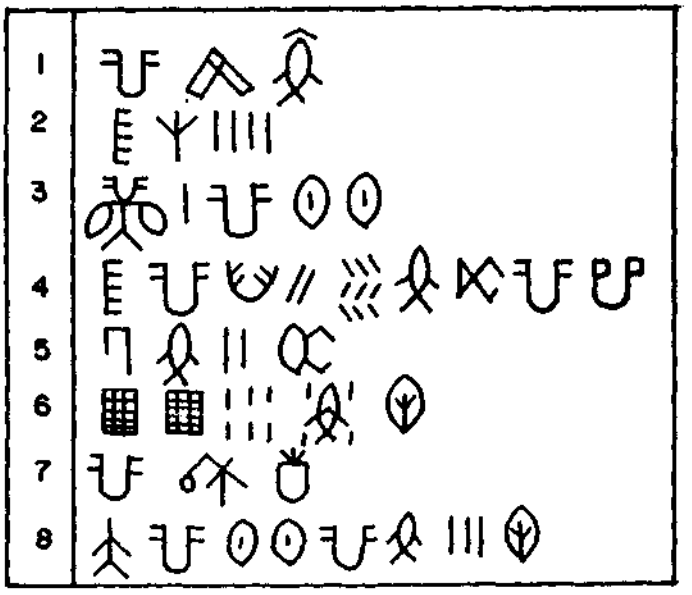
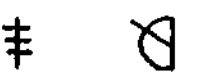
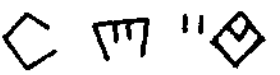
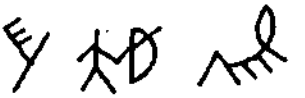
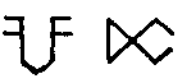


FIG. 11

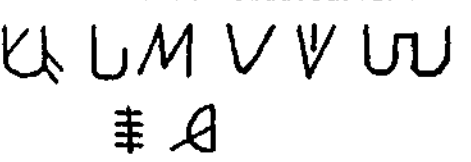
Inscriptions of Late levels

Lothal

No.	Inscription
1	
2	
3	
4	
5	
6	
7	
8	

Jajjhar

Rangpur IIc–III



Rojdi

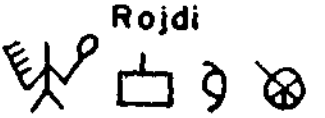
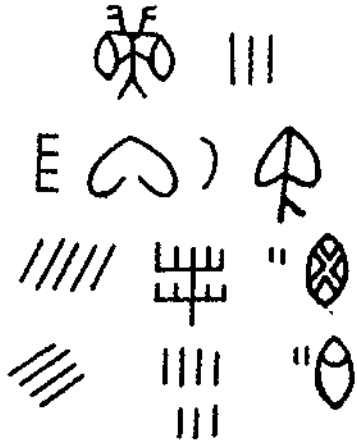


FIG. 12

Inscription of Late levels

Dholavira Late levels



Rakhi - Shahpur (Jajjhar)

Kalibangan

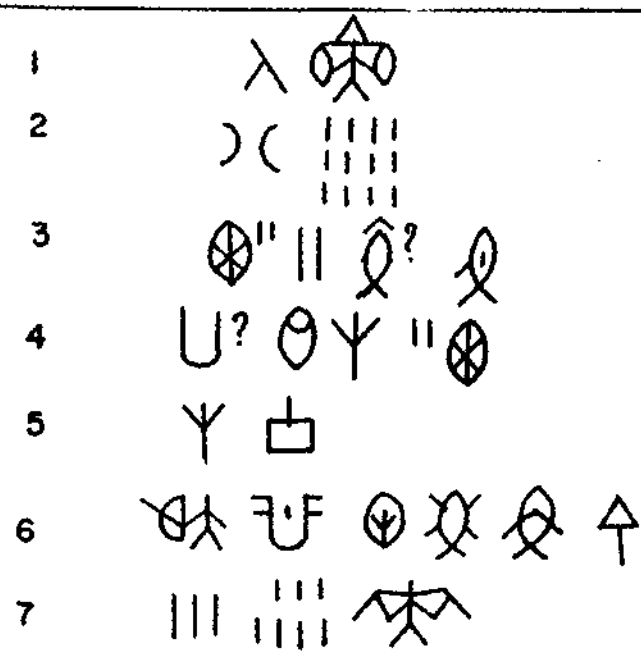


FIG. 13

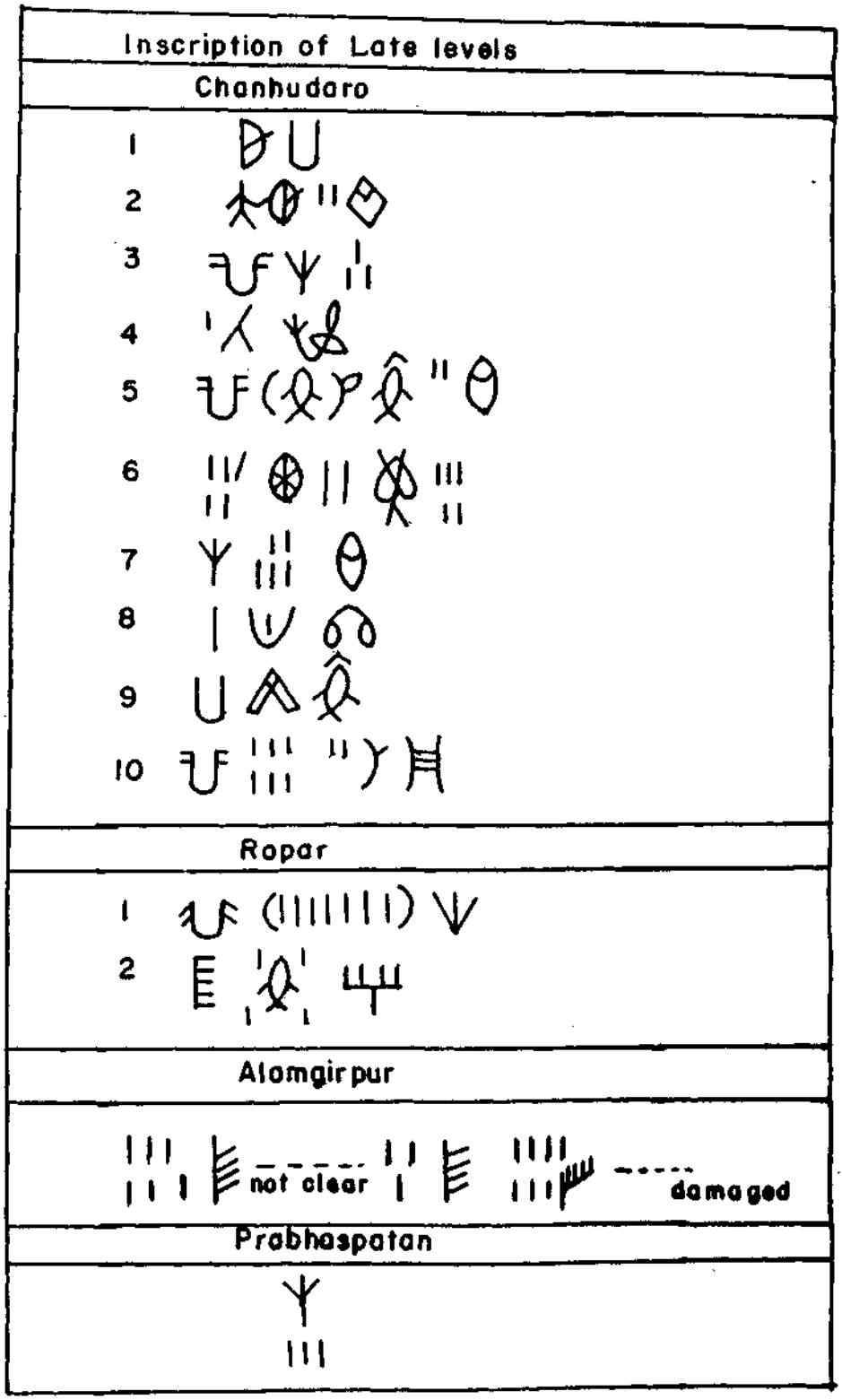

Inscription of Late levels
Chanhudaro
1
2
3
4
5
6
7
8
9
10
Ropar
1
2
Alamgirpur
not clear
damaged
Prabhaspatan

FIG. 14

Inscriptions with pictures

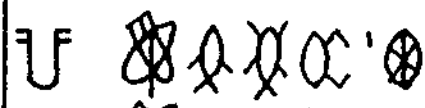
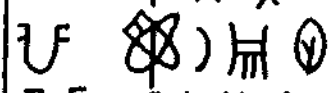
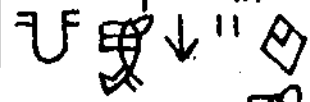
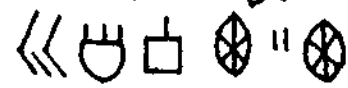
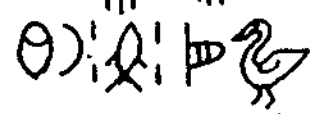
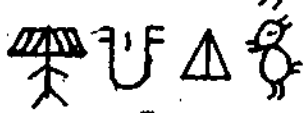
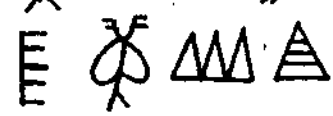
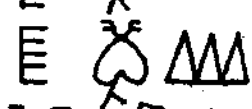
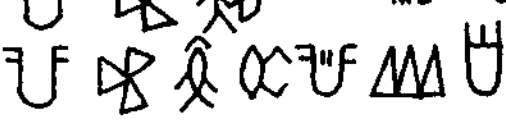
No.	Inscription	Site	Plate	No	Source
1		HP	LXXXVI	16	Vats
2		MD	CVIII	161	Marshall
3		MD	CVIII	181	Marshall
4		MD	CIII	13	Marshall
5		HP	LXXXVIII	97	Vats
6		MD	CV	69	Marshall
7		HP	LXXXIX	120	Vats
8		HP	XCII	284	Vats
9		MD	CVI	83	Marshall
10		MD	CIV	36	Marshall
11		MD	CVIII	182	Marshall
12		MD	CVIII	143	Marshall
13		MD	CVIII	163	Marshall
14		MD	CXIII	417	Marshall
15		MD	CXIII	420	Marshall

FIG. 15

Inscriptions with cursive signs only

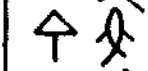
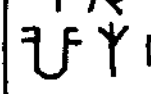
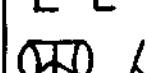
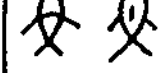
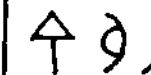
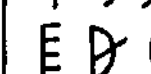
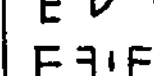
No.		Site	Plate	No	Source
1		HP	LXXXIX	155	Vats
2		HP	LXXXVI	31	Vats
3		HP	LXXXIX	149	Vats
4		HP	LXXXIX	129	Vats
5		HP	XCIV	646	Vats
6		HP	XCV	422	Vats
7		MD	CIX	195	Marshall
8		MD	CXIII	409	Marshall
9		HP	XCV	379	Vats
10		MD	CIX	204	Marshall
11		MD	CVII	127	Marshall
12		MD	CXIII	455	Marshall
13		MD	CVIII	176	Marshall
14		HP	XCV	422	Vats
15		HP	LXXXIX	161	Vats
16		HP	LXXXIX	149	Vats
17		HP	LXXXIX	113	Vats
18		Lothal	CXXV	12	S. R. Rao
19		Lothal	CXXV	2	S .R. Rao

FIG. 16

This cursive writing noticeable in Late Mohenjo-daro[2] and Harappa levels also continued to be in use at Surkotada[8], Dholavira[6a,b], Rangpur[5] (Gujarat) upto 1500 B.C. and Daimabad[7] (Maharastra) and even later at Bet Dwarkā[10].

It is Dr.S.R.Rao who carried out an extensive study on the decipherment of Indus Script. An exclusive evaluation has been made to assess his contribution in regard to decoding of the Indus Script.

S.R.Rao has demonstrated convincingly that the decipherment of an unknown script such as the Indus Valley script written in an unknown language is not possible unless the stage of development of the writing itself is determined. This is possible only when the number of basic signs in the script is determined by a careful analysis of the compound signs. He has also pointed out that an a priori assumption of language misleads the dicipherer. Rao has further highlighted the drawback of assuming pseudo-pictures as words in the assumed language. The necessity of analysing them is stressed by him for finding basic signs. It is the number of basic signs which determines whether the script is pictographic, logographic or phonetic.

Pictographic and Ideographic scripts have thousands of signs, while logographs like the Egyptian, Sumerian and Hittite scripts have signs ranging from 700 to 450. Phonetic scripts have 100-150 signs, (e.g. Sumerian) or even less, (e.g. Hittite syllabic writing). All signs in the Indus

Script cannot be considered as basic signs for many have additional strokes or diacritics attached to them and hundreds of signs are compound signs. In these circumstances it was felt necessary to carry out the structural analysis of compound signs, so as to arrive at the correct number of basic signs in the Indus Script.

An important point brought out by S.R. Rao is that the Indus, Brāhmi and Devnāgari Scripts have certain common features such as the doubling of signs, (e.g. p + p = pp) attaching strokes (diacritics) to basic signs and joining of two or more signs to form conjunct consonants (Samyukta Aksharas) (e.g. pta, tra, dra, pr etc.). The diacritics were used as vocalic indicators in Brāhmi (k + a = ka, k + ae = kae etc.). These two techniques originated in Indus writing. The Indus compound signs, formed by joining two or more basic signs look like pictures and are given word value by Soviet[11], Finnish[12] and other scholars. In fact, S.R. Rao assumed that the majority of the signs in the inscriptions are modifications of the basic signs made by adding short strokes (Fig. 17) and by doubling the same sign or compounding two or more signs with or without the appendage of these strokes (Fig. 18). These processes of modification of the basic signs are essentially like those found in Asokān Brāhmi (Fig. 19) and Kharoshthi inscriptions and inherited by all the later derivative Indic writing systems[13].

By separating the simple signs from those with strokes attached (Fig. 20) and by a careful analysis of pseudo

pictures such as 'archer', 'porter' etc. S.R. Rao concluded that the number of basic signs in Indus Script is not 400 as presumed by most other scholars but only 62 in Early Harappan Script and 24 in Late Harappan (Fig. 21). He has listed 40 cursive signs and 12 pictograms in Early Harappan Script (2500 - 1900 B.C) and 22 cursive in Late Harappan Script which had dropped pictures and some alternate cursive signs also. With such a small number of basic signs the script cannot be pictographic, ideographic or logographic but it has to be classified as phonetic, partly syllabic and partly alphabetic[14]. There appear to be a few determinatives in addition to 40 cursive signs and 12 pictograms in the Early Harappan writing. The linear signs stand for cardinal numbers.

In assigning phonetic values to the twenty basic signs of the Late Harappan Script, S.R. Rao is guided by the more or less contemporary consonantal Semitic Script of the Lachish and Ahiram inscriptions (1600 - 1300 B.C.), 17 of whose signs are shown to bear remarkably close resemblance to those of Late Harappan.

In comparing similar signs of two distinct scripts one must be careful to make sure that they are contemporary or almost contemporary as in the case of Late Harappan and Semitic scripts. Some signs in any two ancient or even modern scripts are likely to bear resemblance but this should not lead the decipherer to assign the phonetic value of the signs in a late or recent script to similar Indus signs if there is

a gap of a thousand years or more. This is the reason why Rao did not take phonetic value of Brāhmi signs into account in the beginning for decipherment. On the other hand he confined himself to the 18th -16th century B.C. Semitic writing for comparison with Late Harappan Script. Here the term Late Harappan is used for the declining phase of Mature Harappa culture dated 1900-1600 B.C.

The inscriptions of Tell-el-Hesy (1600 B.C.), Lachish (1250 B.C.) and Deir Alla (1500-1200 B.C.) in Jerusalem-Palestine-Sinai Peninsula are contemporary with those of Lothal[4], Rangpur[5] IIB-C (1900-1600 B.C.), Rojdi[9] (1900-1600 B.C), and Daimabad (1600-1200 B.C.)[7]. Lately he has taken the Late Mohenjo-daro and Harappa Script of 1900-1750 B.C. also into account. Among the western Semites, the Cananaites and Phoenicians had trade contacts with India even before 14th century B.C. either directly or through the south Arabian people who also used a Semitic Script. In Bahrain all the eight seals of early levels carry Indus cursive signs and Cuneiform Script appeared later here. The Late Harappan Pottery (LHP) and Script are also found in the 16th century B.C. levels of Bahrain. The Kassites and Phoenicians met the Late Harappans in Bahrain. By 19th century B.C. the LHP writing had already become a cursive alphabetic script in Mohenjo-daro and Lothal and the Semites seem to have borrowed signs from LHP. The LHP sign for 'm' is analogous to the sign for this sound in south Semitic which has at least 13 more signs resembling LHP signs (Fig. 22). All the LHP cursive

signs occur with or without pictograms in the Harappan (HP) script also. Both the Semitic and Indus Script are written from right to left. The inscription on seals is in the negetive and it is the mirror impression (positive) that should be read from right to left. In very rare instances the Indus writing seems to be from left to right. It is reasonable to infer from the identity of more than 70% of the Semitic cursive signs with 75% of the basic cursive signs of the Indus writing that the analogous signs in the two scripts had the same phonetic value.

Thus on the basis of such resemblance between the two contemporary scripts S. R. Rao has made a thorough investigation to determine the phonetics of various signs of the Indus Script. The language of 137 Indus inscriptions read in the first stage is found to belong to the Indo-European family. In Vocabulary, Semantics and gramatical features, it shows close affinity to Old-Indo-Aryan (OIA). Other words which are not readily recognizable as Indo-Aryan, are not interpreted as such. Some of the words are monosyllabic roots, used as nouns or adjectives. Many of them were in fairly common use in the Rg. Veda.

After reading Indus inscriptions in which signs identical with Semitic signs occur, other inscriptions involving the use of non-Semitic signs of **'man'** and **'fish'** are read. Both the signs are fully accented and used phonetically. As the Indus language is found to be akin to OIA, the **'fish'** and **'man'** signs are given the value **'ś'**

derived from 'śakula' or 'śafari' a variety of fish and 'ṛ' derived from 'nṛ' for man respectively. Rao himself has pointed out that a few signs were used as ideographs for instance, the **'cross-road'** sign and **'triangle'** with horizontal lines.

The cursive signs are accented and joined to form compound signs, (Fig. 20), so also some pictures e.g. **'field', 'hill', 'pipal leaf', 'cross-road', 'scorpion' and 'triangle' with horizontal lines.**

They form compound signs. The only pictures not joined are the bird and dog-like animal, the latter appearing very rarely. In an ideographic writing the ideographs are never joined because each picture or sign stands for an independent idea or action. The analysis of compound signs shows that the total number of basic signs including pictures in the Harappan Script is 62 which got reduced to 22 in the Late Harappan Script as a result of dropping pictures and alternate basic cursive signs. With such a limited number of basic signs, the Indus Script could not have been ideographic.

A number of pictorial signs regarded as depicting the **'pipal leaf', 'scorpion', 'bird', 'field', 'insect', 'hand', 'hill' and 'horn'** are treated as phonograms and on the basis of the initial syllables of the OIA words for these pictures. From the words Aśvattha, Vṛścika, Śakunta, Kṣetra, makṣa etc. the first syllable of the word namely aśv, vṛś, ś'ak and kṣa/kṣe is taken for respective pictograms.

Another important point for consideration is whether all the Indus signs stood for words. In most instances the basic sign did not stand for a word but sometimes the accented form of a solo sign e.g. ra, da, pa, ha, sa and compound signs which were open or closed syllables stood for word. For instance, ppra, pah, pak/ppaka, gṛ, tṛ/tra, bhag, mhah, śah, ppat/pata and śās/sāś are all compound signs each of which conveyed the full sense of the words **'great', 'protect', 'guard'/'guardian', 'sing', 'save'/'saviour', 'bountiful', 'great', 'victorious', 'govern', and 'rule'** respectively. Fundamentally each cursive basic sign had a single phonetic value and it is only the combination of signs looking like pictures which produced a word or syllable. It is only the sounds k, p, b, t, and d had two signs each in early stage. The evolution from a partly logosyllabic through syllabic into an alphabetic system is fairly clear from the chronologically arranged seals of Lothal and those from the latest levels of Mohenjo-daro and Dholavira.

Rao has given 120 examples of nominal compounds in Indus seal inscriptions and listed 70 verbal bases which bear ample testimony to the Indus language being closely related in Semantic, vocabulary and etymology to old Indo-Aryan. He has demonstrated that it was an inflexional language. The Indus Script represents a pre-separation phase of the Indo-European language, which Rao calls Proto-Indo-Aryan.

Moreover, an eminent epigraphist, Maurer[15] who reviewed 'Decipherment of Indus Script' says " the

decipherment of an unknown script, the enciphered language of which cannot be ascertained beforehand is intrinsically bound to be a controversial matter because, so many attempts by scholars of highest repute have gone before. But on the basis of Rao's methodology it can be said that he has approached the difficult problem with praiseworthy impartiality as to the enciphered language and its implications to the historians ".

ANALYSIS OF COMPOUND SIGNS

Dr. S.R. Rao has analysed most of the compound signs of the Indus Script by adopting the following techniques only:

(a) Short strokes were added to basic signs
(b) The same basic sign was doubled to form a compound sign
(c) Short strokes were added to the doubled signs also
(d) Two and occasionally three different basic signs were joined to form compound signs
(e) Short strokes were added to the compound signs
(f) While combining three different basic signs one of them was doubled.

It has been found that altogether 20 basic signs are being involved in the addition of short strokes attached to them (Fig. 17).

Fig. 23 shows how some basic signs are doubled to form compound signs. It has clearly indicated here that only two basic signs have been doubled to form four different compound signs.

The analysis of compound signs (Fig. 24) shows that short strokes are added to the compound signs formed by combination of either two identical or different basic cursive signs.

It has been found that there are a number of compound signs which are formed by joining two different basic signs but without attaching short strokes. Fig. 18 clearly illustrates the formation of such compound signs. It includes 13 basic signs which are involved in the formation of only 11 compound signs.

Sometimes short strokes are added to the compound signs formed by combination of two or three different basic signs as revealed in Fig. 20. It shows the addition of short strokes to such compound signs that are formed in different ways involving 16 basic signs.

Apart from these, it has been observed that there are a number of compound signs formed by joining three, or occasionally four, basic signs, one of which was doubled as illustrated from the Fig. 25. It clearly points out that 14 different basic signs are involved in such combinations.

The most stricking point to be noted is that all the individual cursive signs which are combined to form different compound signs, occur independently so many times in the same or different inscriptions. Comprehensive charts with regard to the use of the individual basic sign in the formation of various compound signs are given to substantiate the identity of such signs.

Short strokes are added to the basic signs

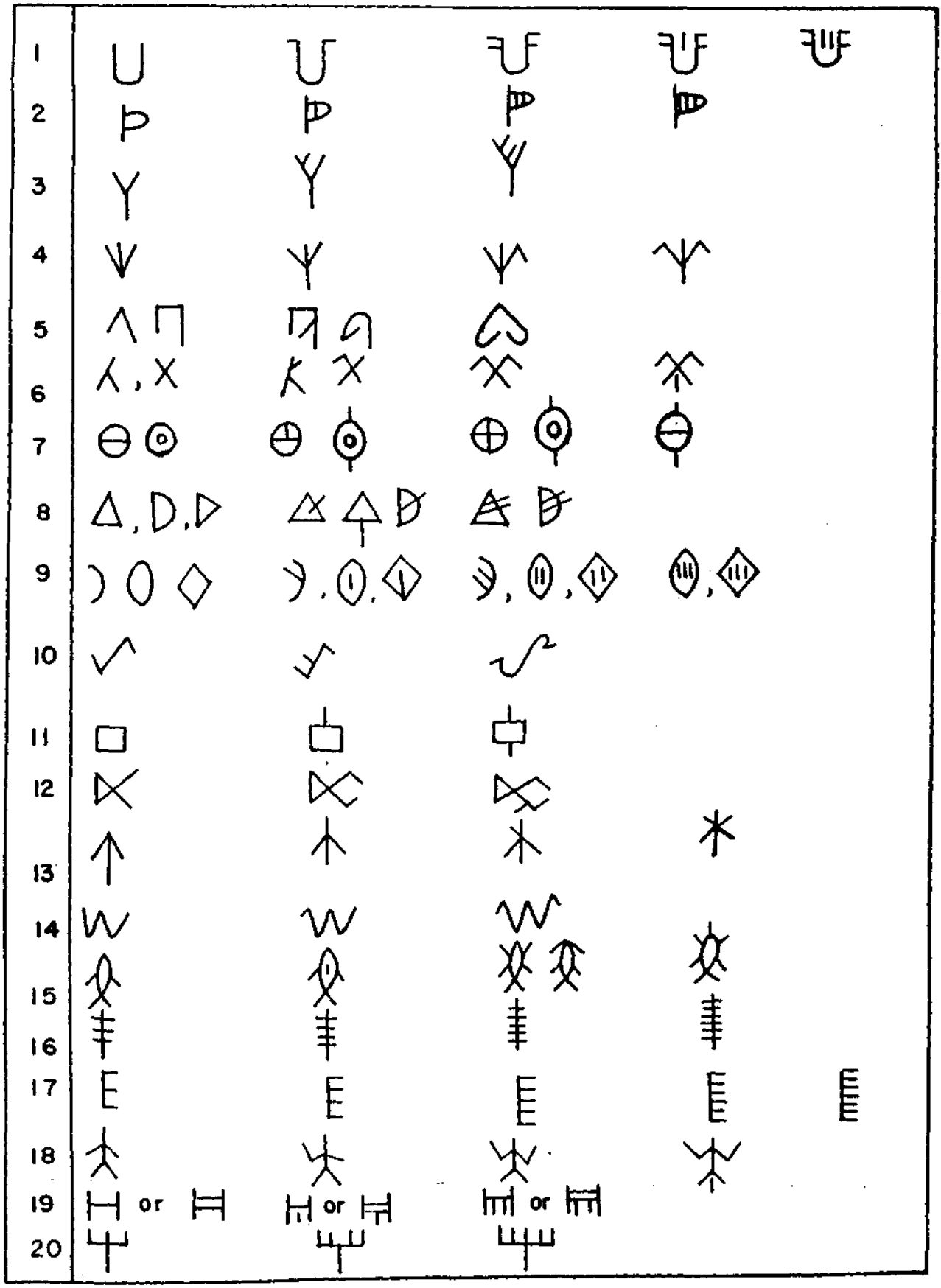


FIG. 17

The compound signs formed by joining two different basic signs.

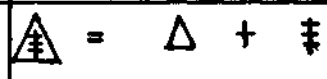
No.	Compound sign Analysis	No.	Compound sign Analysis
1		7	
2		8	
3		9	
4		10	
5		11	
6			

FIG. 18

Late Harappan and Aśokan Brāhmi Script

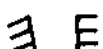
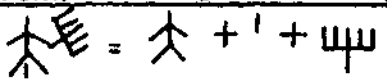
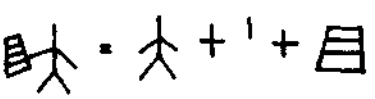
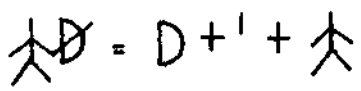
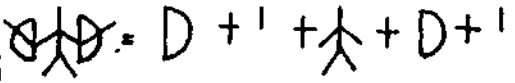
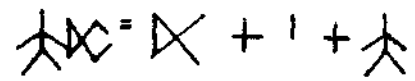
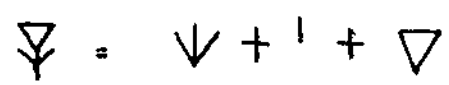
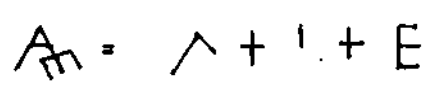
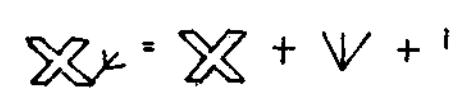
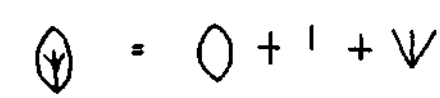
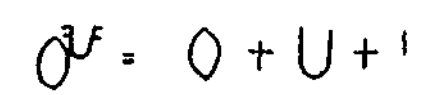
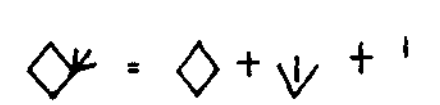
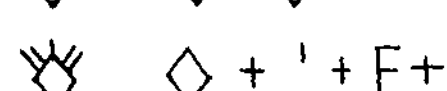
No.	Late Harappan (1900-1500 B.C.)	Aśokan Brāhmi (3rd Century B.C.)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

FIG. 19

Analysis of the compound signs in which short strokes are being added.

No.	Compound sign	Analysis
1		= + ' +
2		= + ' +
3		= D + ' +
4		= D + ' + + D + '
5		= + ' +
6		= + ' +
7		= + ' +
8		= + + '
9		= + ' +
10		= + + '
11		= + + '
12		+ ' + + '

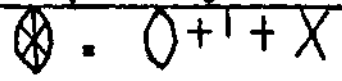
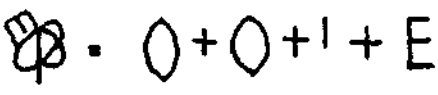
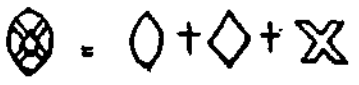
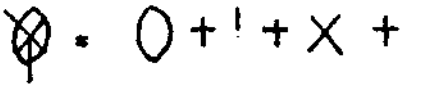
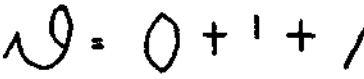
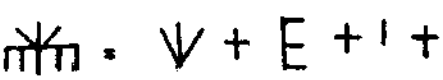
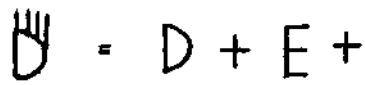
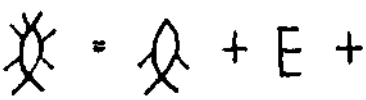
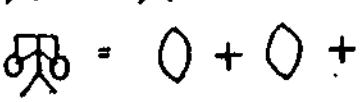
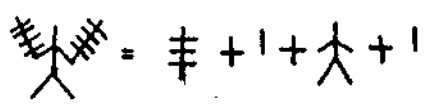
No.	Compound sign	Analysis
13		= + ' +
14		= + + ' +
15		= + +
16		= + ' + + '
17		= + ' +
18		= + + ' + '
19		= D + + '
20		= + + '
21		= + + + '
22		= + ' + + ' + + '
23		= + + ' +

FIG. 20

Basic Cursive Signs of Indus Script identified by S.R. Rao

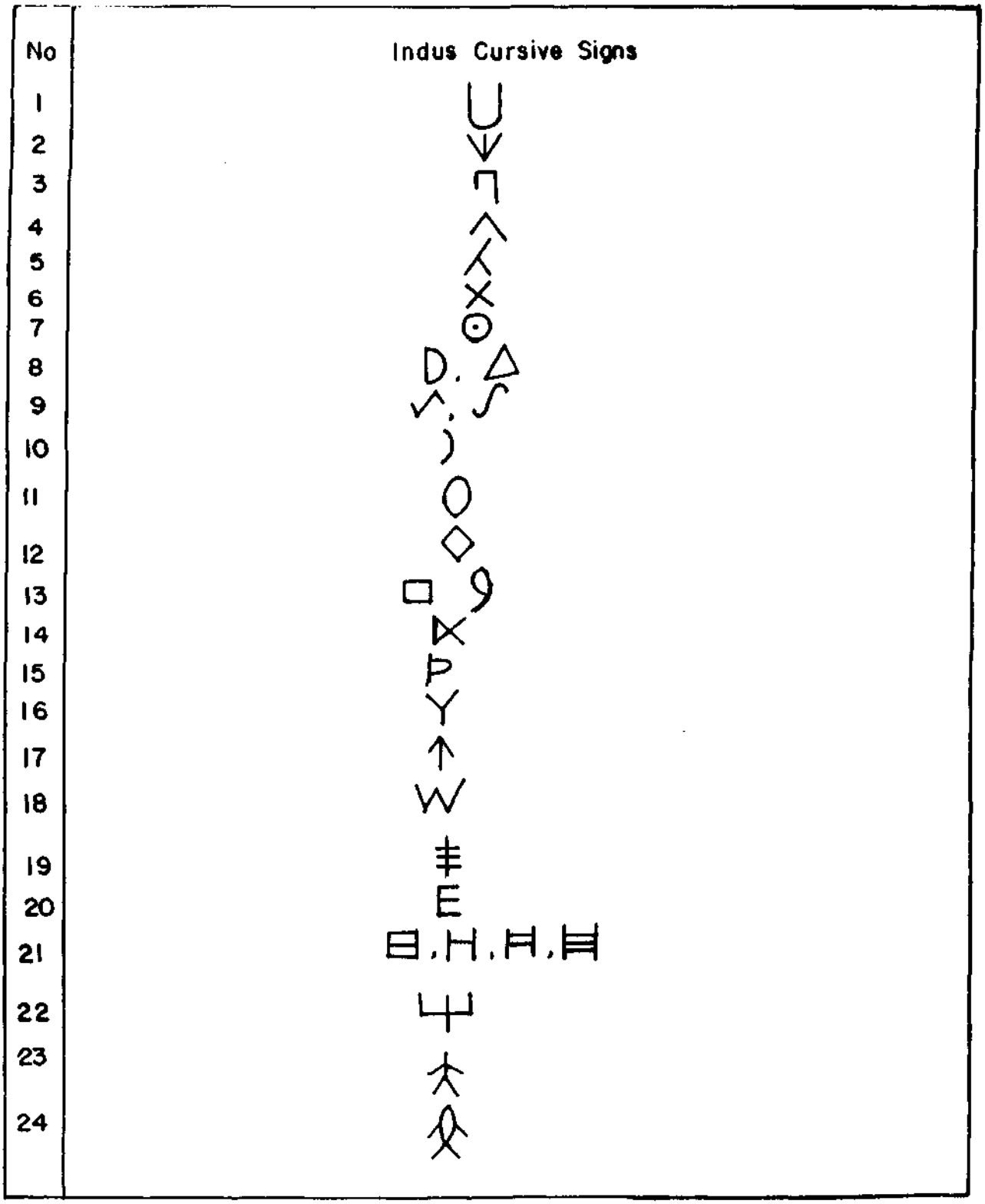


FIG. 21

Comparison of the Signs, Semitic, Early Harappan and Late Harappan

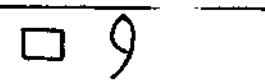
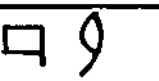
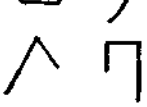
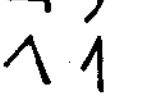
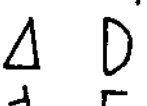
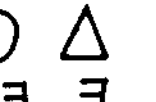
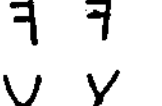
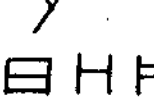
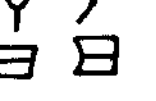
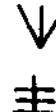
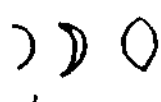
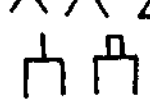
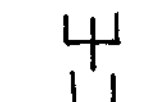
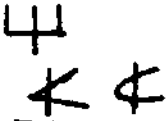
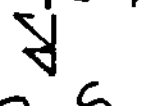
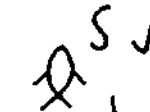
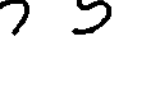
No.	Early Harappan sign	Late Harappan sign	Old North Semitic
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

FIG. 22

The same basic sign is doubled to form a compound sign.

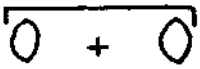
No.	Compound sign	Analysis
1		
2		
3		
4		

FIG .23

Short strokes are added to the doubled sign

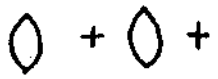
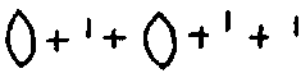
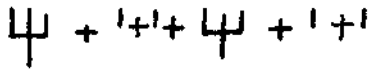
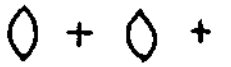
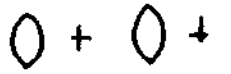
No.	Compound sign	Analysis
1		
2		
3		
4		
5		
6		
7		

FIG. 24

Analysis of the compound signs formed by joining three different basic signs of the Indus Script, one of which being doubled.

No.	Compound sign	Analysis	Double sign (basic)
1		= ○ + ○ + 人	(○)
2		= ▷ + 人 + ▷	(▷)
3		= ○ + | + ○ + 人	(○)
4		= ≡ 人 + ≡	(≡)
5		= ⩛ + ∪ + ⩛	(⩛)
6		= ○ + ∪ + ○	(○)
7		= ○ + ○ + ∪ + ⩛	(○)
8		= ○ + ○ + 目	(○)
9		= ○ + ○ + E	(○)
10		= ○ + ○ + λ	(○)
11		= □ + E + E	(E)
12		= ⋉ + E + E	(E)
13		= ⩛ + ⩛ + ∪ + X	(⩛)
14		= ○ + ○ + ∪ + Y	(○)
15		= ○ + E + E	(E)
16		= ◇ + V + E + E	(E)
17		= ○ + ○ + | + E	(○)
18		= 目 + ∪ + 目	(目)

FIG. 25

The analysis of the compound signs clearly shows the process of their formation by the combination of different basic signs:

Fig. 26 illustrates the use of the sign, ' ' with different basic cursive signs of the Indus Script to form about 11 different compound signs.

Similarly is the case with the sign, ' ' which has been joined with six different cursive signs to form as many as 9 different compound signs (Fig. 27).

The most commonly used **'man'** sign, ' ' of the Indus Script is found to combine with ten different cursive signs in such a way that 21 different compound signs have been formed (Fig. 28).

A very frequently used Indus sign, ' ' has also been found to combine with three different cursive signs in such a way that it produces six different compound signs (Fig. 29).

One of the most important Indus signs is the sign, ' ' which has been found to occur independently in many inscriptions as well as in the combined form with different cursive signs. Fig. 30 has clearly illustrated the formation of as many as 18 different compound signs by joining with this '' sign.

Another important basic sign, ' ' of the Indus Script has been used, although not very frequently, to form quite a number of compound signs by joining with five different cursive signs as ascertained from the analysis of such

compound signs (Fig. 31).

Another most frequently used Indus sign, ' ' has been identified by the analysis of a number of compound signs formed by the combination of the sign, ' ' and different other cursive signs. Fig. 32 clearly illustrates the formation of 18 such compound signs in combination with this sign.

It is intersting to find here that the most controversial **'fish'** sign ' ' of the Indus Script has been found to occur independently as well as combinedly with other cursive signs. A few of such compound signs have been analysed in Fig. 33.

The analysis of certain pictures and pseudo pictures such as ' ', '' of the Indus Script has indicated that they do not really seem to be the picture of something or the other but compound signs are formed by joining the symbol, ' ' and ' ' as illustrated in Fig. 34.

It is clear from the Fig. 35 that the sign, ' ' has been combined with three different cursive signs to form three different compound signs.

Similarly, it has been illustrated in Fig. 36 that the sign, ' ' has not only been found to occur independently in an inscription but also combined with different cursive signs to form several compound signs.

The various processes of combinations of the cursive sign, ' ' with other cursive signs, have been shown in Fig. 37. It shows how this sign has been combined with five

different cursive signs to form five different compound signs.

The analysis of the compound signs has revealed that although there is only a few compound signs formed by joining the sign, ' ' with other cursive signs, it is highly significant from the point of view of identification of basic sign. Fig. 38 has clearly revealed the formation of such compound signs by joining with this sign.

The analysis of another group of compound signs has illustrated the use of an important Indus sign, ' ' in the formation of a number of compound signs by combining with different cursive signs (Fig. 39).

By analysing the compound signs (Fig. 40) the identification of the basic sign, ' ' combined with different cursive signs is easy. This has already been ascertained to occur idependently in many inscriptions.

Apart from these, there are a few more compound signs which were formed by the combination of an important Indus sign, ' ' with different cursive signs (Fig. 41) or strokes added although this has been considered by many scholars as mere a symbol of a **'field'** or so.

The structural analysis of Indus signs has revealed that several picture-like signs were produced by permutation and combinations of only a few basic signs.

Analysis of the compound signs formed by combination of the sign 'Ψ' with different independent signs of the Indus script

No.	Compound sign Analysis	No.	Compound Analysis
1	= + Ψ	7	= Ψ + E
2	= O + ' + Ψ	8	= X + Ψ
3	= O + V + Ψ	9	= ◇ + Ψ
4	= O + U + Ψ	10	= O + O + U + Ψ
5	= Ψ + Ψ + U + X	11	= ψψ + ψψ + Ψ + U
6	= Ψ + E		

FIG. 26

Analysis of the compound signs formed by combination with the signs, 'U'

No.	Compound sign Analysis	No.	Compound Analysis
1	U = + U	6	= Ψ + Ψ + U + O + I + X
2	= + ∧ or + U	7	= ⊙ + E (?)
3	= Ψ + U + Ψ	8	= ⅄ + U
4	= U + Ψ + U + Ψ	9	= O + U + O
5	= Ψ + Ψ + U + X		

FIG. 27

Analysis of the compound signs formed by combination with the sign '人'

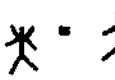
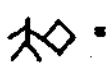
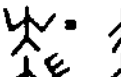
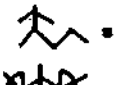
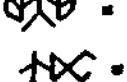
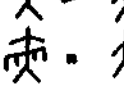
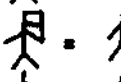
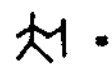
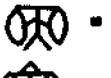
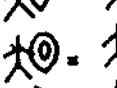
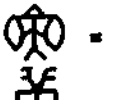
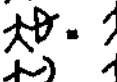
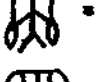
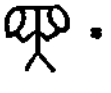
No.	Compound sign	Analysis	No.	Compound sign	Analysis
1			12		
2			13		
3			14		
4			15		
5			16		
6			17		
7			18		
8			19		
9			20		
10			21		
11					

FIG. 28

Analysis of the compound signs fromed by combination with the sign, '人'

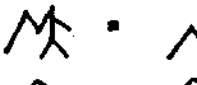
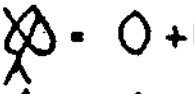
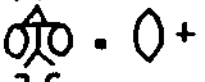
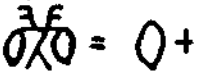
No.	Compound sign Analysis	No.	Compound sign Analyis
1		4	
2		5	
3		6	

FIG. 29

Analysis of the compound sign formed by combination with the sign, 'E'

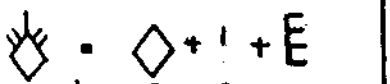
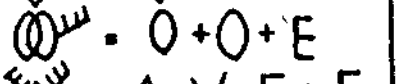
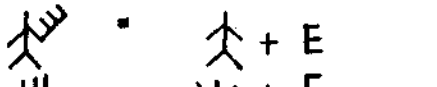
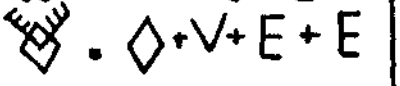
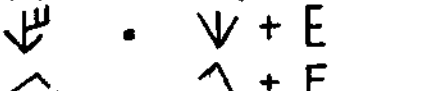
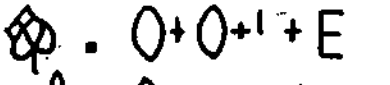
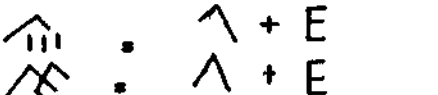
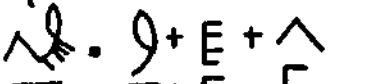
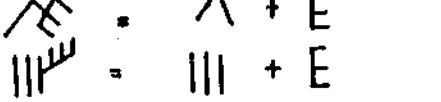
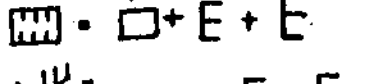
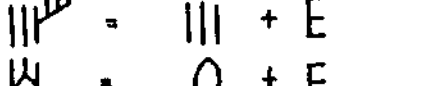
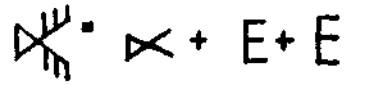
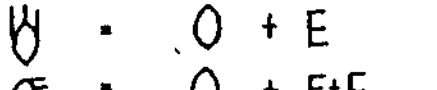
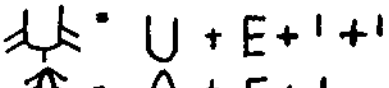
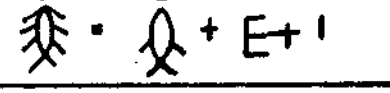
No.	Compound sign	Analysis	No.	Compound sign	Analysis
1		= + E+'+'+'	10		= ◇ + ' + E
2		= + E	11		= O + O + E
3		= + E	12		= ◇ + V + E + E
4		= + E	13		= O + O + ' + E
5		= + E	14		= ϑ + E + ^
6		= + E	15		= □ + E + E
7		= + E	16		= ⋉ + E + E
8		= O + E	17		= U + E + ' + '
9		= O + E+E	18		= + E + '

FIG. 30

Analysis of the compound sign formed by combination with the sign '日'

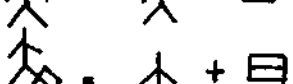
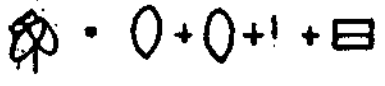
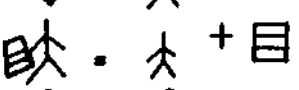
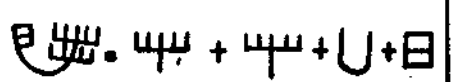
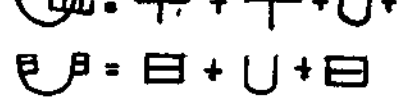
No.	Compound sign	Analysis	No.	Compound sign	Analysis
1			5		
2			6		
3			7		
4			8		

FIG.31

Analysis of the compound signs formed by combination with the sign '○'

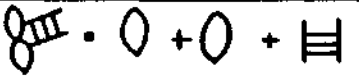
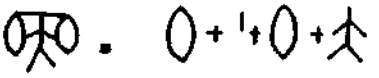
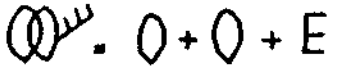
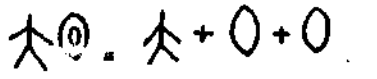
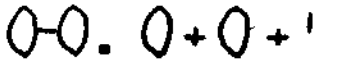
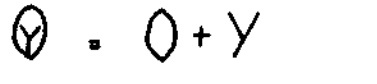
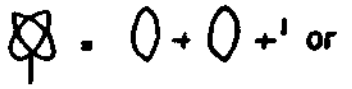
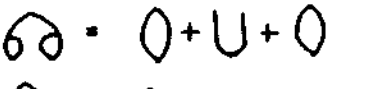
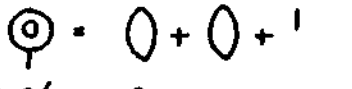
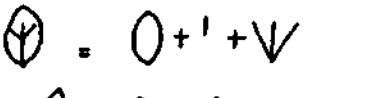
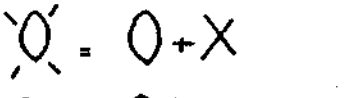
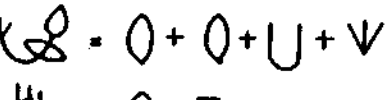
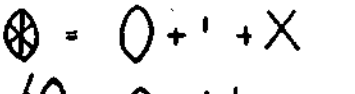
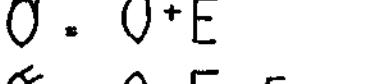
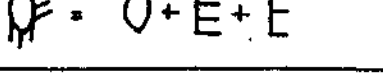
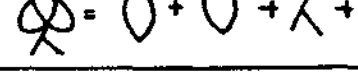
No.	Compound sign	Analysis	No.	Compound sign	Analysis
1		= ○ + ○	10		= ○ + ○ + 目
2		= ○ + 丨 + ○ + 人	11		= ○ + ○ + E
3		= 人 + ○ + ○	12		= ○ + ○ + 丨
4		= ○ + Y	13		= ○ + ○ + 丨 or ○ + 丨 + ○
5		= ○ + U + ○	14		= ○ + ○ + 丨
6		= ○ + 丨 + V	15		= ○ + X
7		= ○ + ○ + U + V	16		= ○ + 丨 + X
8		= ○ + E	17		= ○ + U + 人
9		= ○ + E + E	18		= ○ + ○ + 人 + 丨

FIG. 32

Analysis of the compound signs formed by combination with the sign, ' '

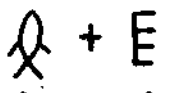
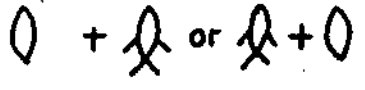
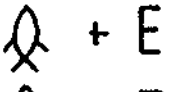
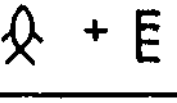
No.	Compound sign		Analysis
1		=	
2		=	
3		=	
4		=	

FIG.33

Analysis of the compound signs formed by combination with the sign, 'D'

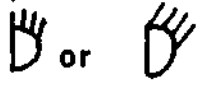
No.	Compound sign	Analysis
1		= D + 1 + 人
2		= D + 1 + 人 + D + 1
3		= D + E

FIG. 34

Analysis of the compound signs formed by combination with the sign, '丰'

No.	Compound sign	Analysis
1		= 丰 + 1 + 人 + 丰 + 1
2		= △ + 丰
3		= 丰 + ∪ + E + 丰

FIG. 35

Analysis of compound signs formed by combination with the sign, '山'

No.	Compound sign	Analysis
1		= 人 + 山
2		= 山 + 山 + ∪ + E
3		= 山 + 山 + ∪ + 日
4		= 山 + 山 + ∪ + V

FIG. 36

Analysis of the compound sign formed by combination with the sign, ' '

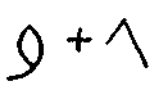
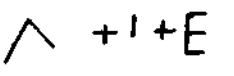
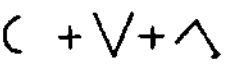
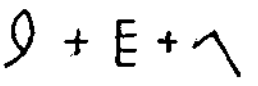
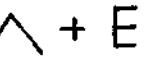
No.	Compound sign		Analysis
1		=	
2		=	
3		=	
4		=	
5		=	

FIG. 37

Analysis of the compound sign formed by combination with the sign ' '

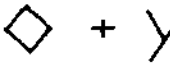
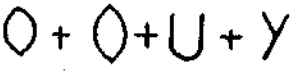
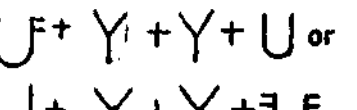
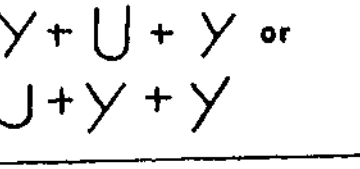
No.	Compound sign		Analysis
1		=	
2		=	
3		=	
4		=	

FIG. 38

Analysis of the compound signs formed by combination with the sign ,'↑'

No.	Compound sign		Analysis
1		=	↑ + ↓
2		=	↑ + ' + O
3		=	↑ + ' + ∧
4		=	↑ + ∪ + ↑ + '
5		=	↑ + ∪ + ↑ + ∝
6		=	↑ + ↑ + ∪ + ∝ + ↑ + ↑

FIG .39

Analysis of the compound sign formed by combination with the sign ,' '

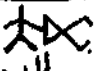
No.	Compound sign		Analysis
1		=	⋈ + ⅄
2		=	⋈ + E + E
3		=	⋈ + E + E
4		=	∝ + E
5		=	⋈ + ' + ⋈
6		=	⋈ + E + E + E

FIG.40

Analysis of the compound sign formed by combination with the sign, ' □ '

No.	Compound sign	Analysis
1	=	□ + E + E or □ + ⁞⁞⁞
2	=	□ + ⊟ or □ + ∃
3	=	□ + E
4	=	□ + V + V
5	=	□ + V

FIG. 41

Picture

In addition to these basic cursive signs and the compound signs formed from the former, there are certain pictures representing parts of the human body **(hand)**, **plants (pipal leaf)**, **animals (dog and goat)**, **birds and insects (scorpion, ant)** etc. which were used extensively in the Harappan Script (Fig. 15). Besides, some inanimate objects such as the **'furrowed field'** and **'hill'** or **'mountain'** are also represented by pictures. In fact, there are only twelve pictures in addition to forty cursive signs in the Harappan Script of the early and middle phases of occupation.

Significantly all the pictures except the **'field'** drawn in outline were dropped in the late seals of Mohenjo-daro, Lothal and Rakhigadhi. In Lothal the existence of various pseudo pictures are less frequently observed in phases IV and V than in I - III[4]. This will be more clear from the period-wise distribution of pictures in the inscriptions from Mohenjo-daro (MD), Harappa (HP), Chanhu-daro (CD), Lothal, Rangpur (RGP) and Rojdi (RJD) illustrated.

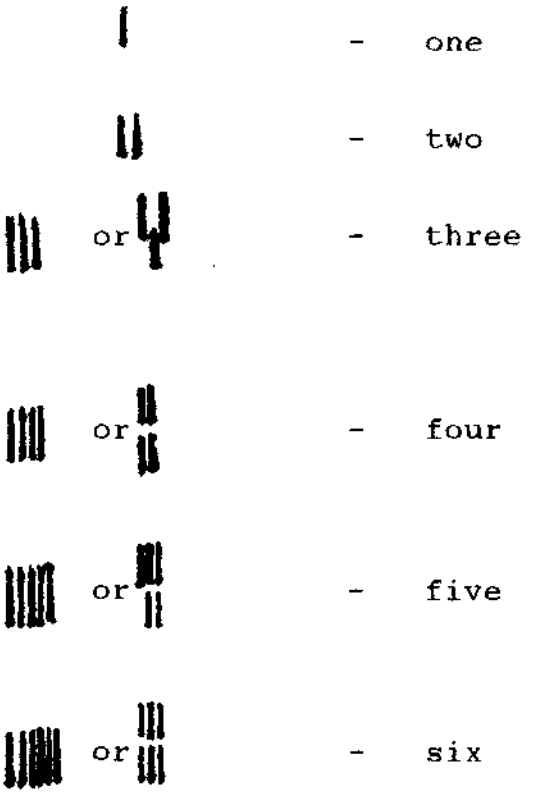
Distribution of Pictorial Signs in the Inscriptions of Harappan and Late Harappan Script

	Harappan Script					Late Harappan Script			
Sign	MD	HP	CD	Lothal	Total	Lothal	RGP	RJD	MD (Dales)
Field	92	20	1	13	126	-	-	-	2
Pipal leaf	41	13	2	4	60	-	-	-	-
Scorpion	35	20	1	3	59	-	-	-	-
Bird	31	4	-	4	39	-	-	-	-
Hill	30	4	-	2	36	-	-	-	-
Insect	23	6	-	4	33	-	-	-	-
Hand	24	6	2	-	32	-	-	-	-
Three animal	20	5	2	1	28	-	-	-	-
Three peaked hill									
Triangle									

A remarkable change can be noticed in Lothal toward less frequent use of picture compared to their use in Mohenjo-daro and Harappa. During the final phase of the Harappa culture in the Indus Valley and Gujarat, the Indus Script was simplified to such an extent that almost all pictures of **'bird', 'hill', 'pipal leaf', 'scorpion', 'hand' and 'insect'** were dropped (Fig. 11 - 14).

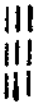
Numerals

Apart from the basic cursive and compound signs there are also the numeral signs on the Indus seals. Numerals 1 to 10 and 12 are represented on the Indus seals by vertical strokes. Except in a few instances where space is very limited the vertical strokes for numerals 1 to 5 are written in one line while numerals 6 to 12 are written in two or three lines one below the other. Of course sometimes 3 to 5 also are written in two lines. Following signs stand for the cardinal number in the Indus Script.



- seven

- eight

 - nine

- ten

- twelve

A few examples of inscriptions with cardinals are given in the fig. 42.

Inscriptions: Numerals with cursive and pictures

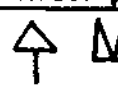
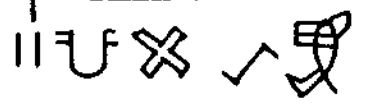
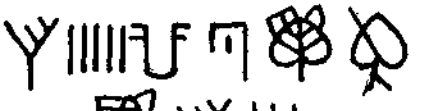
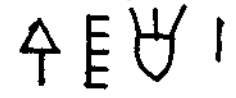
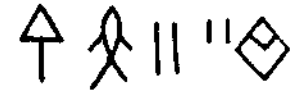
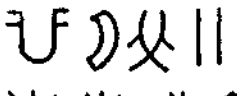
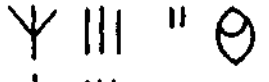
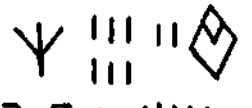
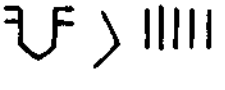
No.	Inscription	Site	Plate	No.	Source
1		HP	XC	233	Vats
2		MD	LXXXIX	369	Mackay
3		MD	CVV	542	Marshall
4		MD	LXXXIV	90	Mackay
5		HP	XCIX	614	Vats
6		MD	CX	309	Marshall
7		HP	LXXXIX	148	Vats
8		MD	CXV	551	Marshall
9		MD	CVII	120	Marshall
10		MD	CVII	131	Marshall
11		MD	CIX	220	Marshall
12		MD	CX	266	Marshall
13		MD	CVII	133	Marshall
14		MD	CVIII	157	Marshall
15		HP	XCIX	618	Vats
16		MD	CIX	243	Marshall

FIG. 42

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