

## **DANI'S HYPOTHESIS ON THE SYMBOL FORMATION IN BRĀHMĪ**

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In spite of repeated endeavours to unravel the mystery about the principle of symbol formation in Brāhmī, the subject still remains enigmatic. Recently A. H. Dani tried to devise a principle and argued for an internal derivation of the numerical symbols from the basic sign for ten. Dani's hypothesis is critically examined and contested on many grounds.

**Key words :** Brāhmī numerals, Kharoṣṭhī numerals, James Prinsep, Inscriptions, Left to right system

### **I**

The problem of the origin of the Brāhmī numerals is a subject of wide controversy among scholars and remains to be solved scientifically and satisfactorily. The subject has engaged the attention of scholars ever since the discovery of the existence of the old Brāhmī numerical symbols by James Prinsep in 1838<sup>1</sup>. Since then a large number of theories have been advanced to explain the origin of the Brāhmī numerals. The old idea that the symbols represent the alphabetical forms has long been disproved<sup>2</sup>. The other hypothesis that the Brāhmī numerical system is a borrowing from a foreign source is similarly unconvincing<sup>3</sup>. Besides, a group of scholars conjectured the indigenous origin of the Brāhmī without furnishing any direct proof to corroborate their stand<sup>4</sup>. Thus, none of the theories could stand the test of scholarly criticism. They have been critically summarized by B. B. Datta and A. N. Singh,<sup>5</sup> S. Gokhale,<sup>6</sup> and Richard Saloman<sup>7</sup>. It is needless to make a detailed re-

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examination of such theories. In his Preface to the second edition of *Indian Palaeography*, A. H. Dani briefly stated his ideas about the origin of the Brāhmī numerals for the younger generation of scholars to work the detail<sup>8</sup>. The present paper attempts to test the hypothesis of Dani.

## II

By placing the Kharoṣṭhī and Brāhmī numerals side by side, Dani has made a comparison between the two and has come to the conclusion that both the Kharoṣṭhī and Brāhmī numerals accepted the units of four, ten, twenty and eighty,<sup>9</sup> and that the Kharoṣṭhī numerals followed a ‘quaternary system’, where the unit is twenty while the Brāhmī numerals followed a ‘decimal system’ with the symbol for ten forming as the unit. He has observed a similarity in the symbol formation of the first four numerals – one, two, three and four – in both the written forms. The difference being that the Kharoṣṭhī has vertical lines |, ||, ||| while Brāhmī has horizontal lines –, =, ≡ and that the symbol for four is a cross, whether Roman + or Maltese cross X. He discarded the idea of applying any alphabetic value to this symbol for four. However, after four, he noticed a complete departure in the two written forms, but at the same time he maintained that the signs for a hundred and a thousand in Kharoṣṭhī are formed under the influence of Brāhmī.

The main plank of Dani’s hypothesis rests on the point that all the numerical symbols from 5 to 100 are derived from the basic sign for 10 comprising of a semi-circle or semi-elliptical, to which a handle is added to the left.<sup>10</sup> He makes us believe that the symbols from five to nine have shown a principle of reducing from the basic symbol of ten. While the symbols of twenty, thirty, etc. follow the principle of multiplication. He further stated that the basic symbols of the numbers from five to nine are derived from the main unit ten by the Indian method of additional strokes. In Fig. 1 we have the principle of symbol formation in Brāhmī for all the twenty signs from 1 to 1000 as constructed by Dani.

1. —
2. =
3. ≡
4. †
5. U (+) | = 4 or 6
6. C (+) C = 3
7. ∩ (+) | = 7
8. U (+) | = 5
9. ∩ (+) | = 2
10. C or C (+) ∇ or √ = ∞ or ∞
20. ∩ (+) U (+) | = ⊖
30. U (+) ∟ (+) | = ∩ ; actually U (x) ≡
40. U (+) † or X = 4 ; actually U (x) X
50. ∩ (+) 6 = C ; actually U (x) ∩
60. U (+) ∩ = 3 ; actually U (x) 3 or 3
70. U (+) h = 4 ; actually U (x) h or h
80. O (+) | = ⊕
- or ∩ (+) ∩ (+) — = ∞ ; actually ∩ (x) ∩
90. ∩ (+) ∩ (+) U (+) U (+) — = ⊕ or ⊕
100. ∩ (+) ∩ (+) | = ∩ ; actually ∩ (x) ∩ (x) |
- or ∩ (+) U (+) | (+) ∟ = 2
1000. O (+) | = 9

Fig. 1. Dani's principle of symbol formation in Brāhmī

According to Dani five is a symbol of ten with its mouth open upward and a vertical stroke added to it; six is two ten symbols, placed one on the top of the other, both having their mouth open to the right, seven is the symbol of ten with its mouth downward and a stroke extends the right arm downward, eight is the sign of ten, open upward, with a stroke or hook added on the right arm; and nine is again the sign of ten, open to the left, with a stroke added to the bottom (Fig. 1). Thus, all the symbols from five to nine are based on the basic form of ten.












So far as the symbols for the multiplication of ten are concerned, Dani conjectured that they actually show extraordinary addition of strokes to the original ten symbol. To him the symbol for twenty is double ten, one facing down and the other facing up, joined together to form a circle and an additional horizontal stroke drawn in the middle. The rest of the multiples of ten up to seventy are formed by adding the signs of the units to the symbol for ten (Fig. 1). Thus, thirty is formed by the signs of ten and three, forty by the signs of ten and four, fifty by the signs of ten and five, sixty by the signs of ten and six, and seventy by the signs of ten and seven. In the case of eighty and ninety, he opined that the 'symbol for ninety is again double ten, up and down with a stroke in between' (Fig. 1). The symbol for hundred is formed in two ways: (a) two signs of ten with a stroke, and (b) two signs of ten with a stroke and a curve. The symbol for one thousand is a full circle with a vertical on the right. To corroborate his hypothesis, Dani argued that the vertical strokes are always added to the right of the Brāhmī numerical symbols as the script is written from left to right.

Thus, the theory propounded by Dani about the origin of the Brāhmī numerals has been named as 'decimal principle', with 'no value of zero'. He has also claimed that the discovery of the main unit of ten disposes of all the previous theories.

### III


In the following paragraphs an attempt has been made to critically examine the hypothesis of Dani.

(i) Dani has worked on the hypothesis that both the Kharoṣṭhī and Brāhmī numerals accept the units of four, ten, twenty and eighty. In order to support his view he emphasizes that the above units are derived from the human limbs such as four hand (?), ten or twenty fingers and four twenties making eighty. At the same time he maintains that in Brāhmī the basic sign of ten out of which all the signs from 5 to 100 are derived. These are two contradictory statements. In the numerous Kharoṣṭhī inscriptions of the Sakas, the Pārthians and the Kushānas the symbols for four, ten and twenty (not eighty) are accepted as units. The signs from five to nine are derived from the basic symbols of four, ten has a separate sign; so also twenty. The other multiples of ten have no independent signs. Thirty is expressed by the symbols for twenty and ten and similarly forty by the symbol for twenty written twice and so on. Thus, there is some truth in the remark that Kharoṣṭhī has accepted the units of four, ten and twenty, but there is no reason to subscribe to his view that the Brāhmī numerals too accepted the same numbers and units. The Brāhmī numerals from five to nine do not derive from the basic unit of four, and similarly there are independent symbols for each of the multiples of ten up to ninety. The principles of derivation in the two systems are quite dissimilar and any comparison between them does not hold good. The system of Kharoṣṭhī notation appears to have little connection with that of Brāhmī. Moreover, his contention that the signs for hundred and thousand in Kharoṣṭhī are formed under the influence of Brāhmī is unconvincing. However, there is nothing to dispute his observation about the symbols of the first four numbers of Brāhmī. The symbols for one, two and three are one, two and three horizontal lines respectively and the symbol for four is a simple cross. He has very rightly rejected the idea of attributing alphabetic value to this symbol for four.

(ii) One serious objection to Dani's theory is his basic symbol of ten. The symbol while as he supposes comprises of a semi-circle or a semi-elliptical to which a handle is added to the left:  or . These two symbols of ten are met within some of the inccriptions of the Kusāras of the early centuries of the Christian era.<sup>11</sup> But the Nānāghāṭ inscription of Nāganikā which is assigned to the first century BC is decidedly anterior to the Kusāra inscriptions and the symbol for ten in this epigraph is represented by a circle with two strokes e.g. , .<sup>12</sup> This seems to be the rudimentary form of the symbol for ten. The same symbol with its two side strokes making an angle is also met with in one of the cave inscriptions at Junnar<sup>13</sup> and in the Mathura Museum inscription of the Kusāra King Vasudeva.<sup>14</sup> The triangular or hook shaped handle which is joined to the left of the semi-circle is in fact evolved out of the circular appendage of the Nānāghāṭ symbol. The development could have been made in the following manner:  →  →  →  →   
 → . The circle is also represented on a number of occasions in the Kusāra inscriptions. We see no reason why Dani takes up a later example from the Kusāra inscriptions to formulate his hypothesis. Secondly, he fails to explain properly how the triangular or hook shaped of ten is reduced to from the symbols from five to nine. Even Dani himself admits, "it appears that all the additional strokes reduce the value of ten symbol but I have failed to discover a set principle". Thirdly, omission of the appendage and duplication of the semi circle or semi elliptical as in the case of six is quite unintelligible.

(iii) The process of symbol formation of the multiples of ten as explained by Dani is totally erroneous and misleading. First of all he does not find any reason why the so-called handle of the symbol of ten is dropped while multiplying it with those of the units to obtain the symbols for the multiples of ten. Secondly, it is wrong to believe that the original sign of twenty is a circle with a horizontal bar in the middle. Because the Nānāghāṭ inscription supplies one of the earliest examples of the symbol of twenty which is a perfect circle and there is no trace of the horizontal bar in its middle.<sup>15</sup> Thirdly, the way in which Dani has mutilated, twisted and turned the symbols from three to eight

while they are multiplied with the basic sign of ten is purely arbitrary. The symbol of three is mutilated in the sense that two of its strokes joined to the left limb of the sign of ten while the other one to the top of its right limb. The 'Roman' cross + of the Brāhmī numeral four is turned into a 'Maltese' cross X. The symbol for five as figures in the column under Dani's 'Basic forms in Brāhmī' is different from the one he explains in multiplying it with the sign of ten to obtain fifty. The symbol of six is totally reversed. The symbol of seven is considerably twisted and turned to obtain the desired result. The symbol of eight is also turned upside down. Finally, the process of symbol formation of eighty and ninety as worked out by Dani does not hold good and can be judged as pure imagination and nothing else. In the first place, he has seen at least two different ways of forming of the symbol of eighty, one is represented as a circle with a vertical stroke in its middle, and the other one consists of two semi circles facing down and a horizontal closing their mouths (Fig. 1). The former is in fact the earliest example as appeared in the Nānāghāṭ inscription<sup>16</sup> while the latter is seen in the Kṣātrapa coins of the 2<sup>nd</sup>-3<sup>rd</sup> centuries AD.<sup>17</sup> There is a clear gap of nearly two centuries between the two and there is nothing to dispute that the Kṣātrapa coin example is a derivative of the Nānāghāṭ symbol for eighty. Thus, if the Nānāghāṭ example is taken to be the rudimentary form of eighty, Dani's hypothesis of the decimal principle of symbol formation appears to be based on a false assumption. Similarly his other assumption that ninety is formed of four signs of ten, two facing down and two facing up, and a horizontal bar in the middle is not well founded. Here Dani does not share his ideas about the process how the basic unit of ten is multiplied with the sign of nine to produce ninety, although he believes in the principle of multiplication for the symbol formation of the multiples of ten.

(iv) Further Dani's formulation that the basic symbol of ten is modified to form the symbols of a hundred as well as a thousand is built on a weak foundation. According to him the symbol of hundred is formed in two different ways (Fig. 1). The first symbol  is met with in the Nāsik<sup>18</sup> and Kanheri<sup>19</sup> cave inscriptions and also in the Western Kṣātrapa coins<sup>20</sup> while the second

symbol 𑀘 is seen in the Nānāghāṭ inscription.<sup>21</sup> It appears that the first symbol is later in date and possibly evolved out of the Nānāghāṭ example. A close investigation into the symbol of 200 as appeared in the Sahasram<sup>22</sup> and Brahmariri<sup>23</sup> edicts of Asoka makes it apparent that the symbol is closer to the Nānāghāṭ than the Nāsik and Kanheri example. This further establishes the antiquity of the second symbol and gives credence to the view that the first symbol is a derivative of the second. Here again Dani picks up a later example of a hundred sign to formulate his hypothesis. Likewise Dani also relies on the symbol of a thousand comprising of a circle with a vertical on the right 𑀉 as noticed in the Nāsik cave inscriptions<sup>24</sup> to prove his theory while one of the well known earliest examples expressed by a symbol closely resembling to the English letter T is ignored.<sup>25</sup>

#### IV

Thus on many grounds, Dani's hypothesis can be contested. He has erroneously relied on later examples to substantiate his theory. He fails to 'discover a set principle' by which the symbols from five to nine reduce from the basic sign of ten. The way he mutilates, twists and turns the units while they are multiplied with the sign of ten is unconvincing and unacceptable. Above all, the theory which is chiefly based on the 'decimal principle' as Dani makes us believe, crashes when we observe that the very 'basic' sign of ten is a derivative and not a rudimentary one.

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