



AST-2

## ARCHITECTURE IN THE NATYASAstra

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The *Natyasastra* of Bharata is the earliest extant treatise on Indian dramaturgy. It is considered to be the 'pañcama veda', i.e., the fifth Veda. While stating about the origin of this Veda, Bharata himself says that it originated from Brahma. In the 'treta yuga' the world became a place of jealousy and sins and hence Brahma, at the request of the *devas*, created this Veda so as to preach good lessons through it to all classes of people in the society including the *sudras*. Later on Bharata was assigned the duty of implementing this Veda.<sup>1</sup>

While explaining about different aspects of dramaturgy, Bharata also speaks about the construction of the theatre hall, where *natya* is to be staged. The second chapter of the *Natyasastra* deals with this topic. The chapter is named as *preksagrhalaksanam*.<sup>2</sup> The chapter consists of 109 verses. Out of these, 35 verses can be kept aside as these deal with rituals only and hence are irrelevant for our present discussion. Therefore, we have 74 verses left to us from the second chapter of the *Natyasastra* as solid material to find out as to how advanced was the architecture of ancient India.

Apparently, the text of the *Natyasastra* is often clumsy, confusing and even contradictory. It is more so as the main discussions are often mixed with injunctions for superstitious rituals. It becomes even further more confusing when read with the commentaries, as commentators differ in their views. Yet a careful study of the text can help us in having some ideas about the construction of the theatre hall.

Bharata speaks about three kinds of theatre halls from the viewpoint of shape. These are - *vikrsta*, *caturasra* and *trysra*.<sup>3</sup> Scholars explain these terms as - '*vibhagena krstah dirghah*' is *vikrsta*, meaning thereby that it is *vikrsta*, where length is more than the breadth. '*Caturasru diksu samyena iti caturasrah*', meaning thereby, that it is called *caturasra*, where all four sides are equal. Again '*tisro asrayah trysri tadasminniti trysrah*', which means that it is called *trysra*, which has three angles.<sup>4</sup>

After a careful study of the *Natyasastra* on types of theatre hall, we can find that there appear two contradictory views. Abhinavagupta, the famous commentator on the *Natyasastra*, has pointed out these two views<sup>5</sup> and later modern scholars have quoted him.<sup>6</sup> These are as follows - according to one view, *vikrsta* is *jyestha* (big), *caturasra* is *madhya* (medium) and *trysra* is *avara* (small).<sup>7</sup> The other view divides each *vikrsta*, *caturasra* and *trysra* into *jyestha*, *madhya* and *avara*, thus getting nine types, which when measured in *hastas* and *dandas*, would finally be eighteen in number.<sup>8</sup>

At this point of our discussion we should explain the terms *hasta* and *danda*. *Hasta* and *danda* are units of measurements used in ancient India. *Hasta* literally means a hand i.e., the portion of a hand measuring from the elbow to the tip of the middle finger. We find several units of ancient measurement in the *Natyasastra*. It says that the smallest unit of measurement is *anu* (atom). A table of measurement is given as follows: eight *anus* make one *raja* (dust), eight *rajas* make one *bala* (hair end), eight *balas* are equal to one *liksa* (nit), eight *liksas* are equal to one *yuka* (lice), eight *yukas* make one *yava* (barley grain), eight *yavas* make one *angula* (finger),

twenty four *angulas* make one *hasta* (hand) and four *hastas* make one *danda* (stick)<sup>9</sup>

Going back to our discussion on contradictory views in the text, we find that besides the abovementioned two contradictory views, there are many other ambiguities in the *Natyasastra*. For example, in one place Bharata has said that the big hall will have 108 *hastas*, the middle will have 64 *hastas* and the small one will be of 32 *hastas*.<sup>10</sup> But in another place, while speaking about the *vikrsta* type of hall, (which he mentions to be the big one) he says that its measurement should be 64x32 *hastas*.<sup>11</sup>

Here we would like to put our own submission in this regard. In doing so, we would keep in our mind that during the time of Bharata, people had lot of limitations while staging a play, as they did not have advanced scientific devices like electric lights to illuminate the house or mike system to make utterances clearly audible to the audience.

First of all, we would like to opine that Bharata's intention is never to say about eighteen varieties of theatre houses. He has nowhere mentioned this number. In fact, he has said about the breadth of a theatre hall in two places only and there he speaks about 32 *hastas* to be the breadth of the theatre halls.<sup>12</sup> So, we can safely say that he wants the breadth of the houses to be not more than 32 hands i.e., 48 feet, as one hand consists of one and a half feet, as known from the measurements still used in the rural areas of modern India. Again, 4 *hastas* make 1 *danda*. If we measure the breadth in terms of the *danda* unit of measurement and take the breadth to be 32 *dandas*, then in terms of feet it becomes 48x4 = 192 feet, which is too big a measurement for a theatre hall of those days, when there were above mentioned limitations in staging a play. Hence, according to us, when Bharata says that measurement of the theatre halls can be taken in terms of both the units - *hasta* and *danda*, he must have meant that the same length can be expressed either in the unit of a hand or that of a stick. Therefore, when the breadth of a hall is said to be 32 hands, in terms of sticks it will be 32 divided by 4 is equal to 8 sticks, as 1 stick is equal to 4 hands.

Bharata has indicated that theatre houses of all three shapes can be big, medium and small. But it is very evident that from the viewpoint of convenience he has suggested that a theatre hall should not normally be bigger than 64x32 square hands.<sup>13</sup> Again if 32 hands be the breadth of the houses of all the shapes than obviously the rectangular one will be the biggest, the square will be the medium and the triangular one will the small. This reasoning solves many of the abovementioned controversies.

But whatever may be the confusions in the text or in the minds of the commentators, it is found that Bharata has actually discussed only about three types of theatre houses - naming them as *vikrsta*, *caturasra* and *trysra*. These divisions are made from the viewpoint of their shapes and not sizes. From the viewpoint of sizes they may be big, medium or small, but he has stated that the theater hall of the size of 64x32 hands will be the best. And this falls under the category of rectangular shape, i.e., the *vikrsta* type.

On the very outset of his discussion on the first category of the theatre hall, Bharata opines in two places that the medium size of a theatre hall is the best, as it has certain advantages. The audience can clearly see the actors in the stage and what is said in the stage can easily be heard.<sup>14</sup>

According to Bharata, before construction of the theatre hall, the soil must be tested carefully. It must be even (*sama*), firm or compressed (*sthira*), hard (*kathina*) and black or white in colour.<sup>15</sup> The soil should then be ploughed and bones, nails, skulls, grasses, clump of trees etc. are to be removed.<sup>16</sup> After the cleaning of the soil this way, the land should be measured for construction. It is to



be noted here that according to geological science, the soils that are black or white in colour are sticky, and very hard. Construction over such kind of soils can be expected to be long lasting. But these kinds of soils generally contain impure things like humus. Hence it is a very apt instruction that such soils are to be purified before constructions are made over them. Then the soil should be measured with a white thread. The measuring tape should be free from joints.<sup>17</sup>

Measuring 64 hands in length and 32 hands in breadth, the plot should then be divided into two equal halves, one for the auditorium and the other for the stage. The stage is then divided into two equal halves again - the front and the rear, the latter being the green room. The front part is again divided into two parts. The part behind is said to be the head of the stage (*rangasirsa*) and the front part is the stage proper (*rangapitha*). In the *rangapitha* the proper acting is done.<sup>18</sup> Importance is given in erecting four major pillars. These should be made of wood and should be placed very firmly.<sup>19</sup>

The stage proper (*rangapitha*) will be 8x16 hands, the back stage will be 8x32 hands and the greenroom will be 16x32 hand. By both the sides of the stage proper, two portions, each measuring 8x8 hands, are to be kept. These are named as *mattavaranis*. These two portions are to be 27 inches (one and half *hastas*) higher than the floor of the auditorium.<sup>20</sup> Some scholars opine that they are to be higher than the stage proper.<sup>21</sup> But in our opinion a careful study of the text shows that Bharata actually wants them to be at an equal level with the stage proper.<sup>22</sup> Moreover, if *mattavaranis* are constructed at a higher level than the stage proper, then these will bar the viewers in having a clear sight of the performance at the stage. Scholars differ in their opinion regarding the utility of these two places at the stage. Some say that these are to be used to bar the audience to be very near the stage, while others opine that these are to be used as wings.<sup>23</sup> In our opinion these seem to be very big places for the said purposes. Probably these are kept aside to be used for building different settings.

Question arises as to whether Bharata instructs to build up roof over the theatre hall or it is to be made roofless. Some scholars opine that, Bharata must have thought of a roofless theatre hall as he has not mentioned anything in this regard.<sup>24</sup> In our opinion it is not so. Bharata has clearly said that the *natyamandapa* should be like a cave of a mountain (*sailaguhakara*).<sup>25</sup> It suggests that Bharata's intention here is to speak about the theatre hall with a roof. Moreover, Bharata uses the terms *mandapa* and *grha* to speak about the theatre hall.<sup>26</sup> It is obvious that a *mandapa* and specially a *grha* (house) must have roof. Yet, it is true that Bharata has not suggested as to what materials are to be used for the construction of the roof of the hall. Probably his silence in this regard signifies that same materials are to be used in construction of a theatre hall also, which are generally used in construction of roof of any common house.

Some instructions are given by the *Natyasastra* regarding acoustics of the theatre hall. It is stated that while constructing the windows it should be kept in mind that strong wind must be prevented from entering into the theatre hall. On the other hand mild breeze is essential in the hall<sup>27</sup>, obviously to prevent suffocation. Again, it is advised not to place any other door or even an window in front of a door.<sup>28</sup> It seems that by this way, cross ventilation of strong wind would be barred to enter the hall.

The use of the term *sailaguhakara* is important from the viewpoint of acoustic also. Works on modern architecture suggest - "along with the overall shape and size of the auditorium the ceiling and side walls also do play an influential part in acoustical design. The ceilings and sidewalls should, provide favorable reflections or reinforce the sound that reaches the rear parts of a large auditorium.

----- To avoid echoes further, a smooth ceiling should not be parallel to the floor. The sidewalls should be curved or splayed such that they held in reinforcing the sound by way of reflection particularly for large halls. Echoes between sidewalls, can be avoided making them divergent splayed, non-parallel or tilted walls."<sup>29</sup> In our opinion while stating that the theatre hall should be like a mountain cave, Bharata must have had the idea of a theatre hall in his mind which possesses uneven ceiling and walls. He himself says that by making the theatre hall just like a cave of mountain good sound effect may be acquired.<sup>30</sup>

After speaking about the *vikrsta* type of theatre hall, Bharata says about the second variety, i.e., the *caturasra* type. He says that it should be 32x32 hands. Most of the features in both the types of halls are same.<sup>31</sup> Yet, there are obviously certain differences, which are pointed out by Bharata.

It is to be noticed that Bharata instructs the use of bricks, while constructing the walls and seats for the audience in the *caturasra* type of *natyamandapa*.<sup>32</sup> But regarding use of bricks in these constructions of the *vikrsta* type, he remains silent. There seems to be a scientific reason behind it. The science of sound says that sound waves after being reflected by the hard walls revert back and cause echoes, which become noise and disturb the audience in proper hearing of utterances and music etc. So, to reduce such kind of noise, we find that in modern auditoriums on the walls and ceilings special linings are used. That is why works on architecture say - "by using air filled materials like felts, straw-boards, glass wool quilts, celotex, acoustex, etc., for lining the walls and ceiling, and constructing floating floors, the room can be made sound-proof and the noise or sound can be isolated."<sup>33</sup> But when the auditorium is small in size, the effect of echo is also less and so Bharata is not against use of bricks for construction of the smaller, i.e., medium size auditorium. However, since the effect of echo is more in large auditorium, Bharata has suggested the use of lining (*lepa*) to reduce the noise while constructing the *vikrsta* type of theatre hall.<sup>34</sup>

One more point to be carefully noticed is that the auditoriums are often constructed in gallery system for the audience. This helps not only to have proper view of the stage for the audience, but also to reduce the effect of noise as the dresses or costumes used by the audience work as wall of lining or sound absorbents. In absence of such gallery system, sound wave will travel over the heads of the audience and hit the rear wall and will cause noise. Because of this Bharata has specially mentioned of gallery system for the medium size auditorium so that in absence of linings etc. on the walls and ceilings whatever noise is caused is reduced by the audience with their dresses, sitting in the gallery.

The *Natyasastra* has taken due care to suggest that in case of the rectangular hall, i.e., the *vikrsta* type of hall which is generally bigger than the medium sized *caturasra* (square) hall, the rare part of the stage where orchestra party or musicians sit, should be elevated.<sup>35</sup> The reason behind is to facilitate proper propagation of musical waves in scientific way.

After stating about the *caturasra* type of hall, Bharata in three verses only speaks about characteristic features of the third category of theatre hall, which is called *trysra natygrha*. It is to be made triangular. At the centre of the house *rangapitha* should be made, which is also to be triangular,<sup>36</sup> its base being parallel to the base of the theatre hall and the vertex of the stage being towards the vertex of the theatre hall. While the *nepathy*, i.e., the green room will be at the base of the triangular theatre hall and the door for the audience, to enter into the hall, will be at the vertex of



the triangular hall.<sup>37</sup> Other characteristics like construction of walls, erecting the pillars etc. are same with that of the medium size hall.<sup>38</sup> It seems to be a peculiar type of hall, which probably has certain difficulties, because of which it does not seem to be popular and hence not recommended highly by Bharata.

From the above discussion we can sum up that Bharata, the author of the *Natyasastra* is not devoid of scientific and technological knowledge while prescribing the construction of the theatre hall.

#### References

1. Vide, *The Natyasastra*, 1.6 - 25.
2. cf. "iti bharatiye natyasastre preksagrhalaksanam nama dvitiiyo'dhyayah" - at the end of the second chapter of the *Natyasastra*.
3. cf. "iha preksagrham drstva dhimata visvakarmana. tirividhah sannivesascha sastratah parikalpitah: vikrstascaturasrasca tryasrascaiva tu mandapah. tesam trini pramanani jyestham madhyam tatha'varam:"  
*Natyasastra*, II. 7 - 8
4. Vide, *Natyasastra*, Vol.I., B.Sukla Sastri, Chaukhamba Sanskrit Sansthan, Varanasi, 1984, p.459
5. Vide, *Abhinavabharati*, on the *Natyasastra*, II. 7 - 8
6. Vide, *The Indian Theatre*, Chandra Bhan Gupta, Motilal Banarsidass, Banaras, 1954, p.31 and see *Natyasastra*, Vol.I., B. Sukla Sastri, p.36
7. Vide, *Natyasastra*, II.14
8. ibid, II. 8 - 9
9. ibid, II.16 - 19
10. ibid, II. 10
11. ibid, II.20
12. ibid, II.20 and II. 91
13. ibid, II. 21
14. ibid, II.12 and II.24
15. ibid, II. 27 - 28
16. ibid, II.29
17. ibid, II.31 - 32
18. ibid, II.37 - 38
19. ibid, II.48 - 49
20. ibid, II. 67 - 68
21. Vide, *The Indian Theatre*, C.B.Gupta, Motilal Banarsidass, Banaras, p.48
22. cf. "utsedhena tayostulyam kartavyam rangapithakam" - *Natyasastra*, II.69
23. Vide, *The Indian Theatre*, C.B.Gupta, p.49
24. Vide, *The Indian Theatre*, Adya Rangacharya, National Book Trust, New Delhi, p.43
25. Vide, *Natyasastra*, II.85
26. ibid, II.3 and II.7
27. ibid, II.86
28. ibid, II.84 - 85
29. Vide, *Planning and Designing Buildings*, Yashwant. S. Sane, Allies Bookstall, Poona, 1975, p.100
30. Vide, *Natyasastra*, II.83 - 84
31. ibid, II.92 - 93
32. Vide, *Natyasastra*, II.95
33. Vide, *Planning and Designing Buildings*, p.101
34. Vide, *Natyasastra*, II.87
35. ibid, II.104
36. ibid, II.106
37. ibid, II.107
38. ibid, II.108