

From "Dancing Girl" to "Shatataraka": An Aayaadi-Based Investigation of the Mohenjo-daro Bronze Figurine

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Abstract—The bronze figurine popularly known as the "Dancing Girl" was discovered in 1926 by archaeologist Ernest J. H. Mackay during excavations at the HR Area of Mohenjo-daro, an important urban settlement of the Indus Valley Civilization in present-day Sindh, Pakistan. The HR Area is generally interpreted as a residential and craft-working quarter, where archaeological evidence indicates activities such as bead-making, shell working, and copper-bronze craftsmanship. The excavation of Mohenjo-daro itself was part of a larger archaeological programme conducted under the Archaeological Survey of India (ASI). The project was initiated and supervised by Sir John Marshall, the then Director-General of the Archaeological Survey of India, who played a major role in bringing the Indus Valley Civilization to international recognition.

Other prominent archaeologists associated with the early exploration and excavation of Mohenjo-daro include Rakhaladas Banerji (R. D. Banerji), who first identified the archaeological importance of the site in 1922, Kashinath Narayan Dikshit (K. N. Dikshit), who participated in subsequent excavations, and Madho Sarup Vats (M. S. Vats), who contributed significantly to the excavation and documentation of Harappan sites.

The figurine was recovered from this context and is considered one of the finest examples of Harappan bronze casting using the lost-wax technique. Today, the original sculpture is preserved in the National Museum, New Delhi, India.

The bronze figurine popularly known as the "Dancing Girl" of Mohenjo-daro is one of the most celebrated artifacts of the Indus Valley Civilization. Since its discovery in 1926, the sculpture has been studied extensively for its artistic style, metallurgy, craftsmanship, and cultural significance. However, its dimensions have not been systematically examined through the traditional Indian Aayaadi measurement system. This study presents a preliminary metrological analysis of the figurine using Aayaadi principles. The research investigates whether the published dimensions of the sculpture correspond to specific Aayaadi calculations and explores the possible relationship between its measurements, the nakshatra Shatataraka,

and selected iconographic features as a testable research hypothesis requiring further interdisciplinary investigation.

Index Terms—Aayaadi, Aayaadi Sutra; Ancient Indian Metrology; Vastu Shastra; Indus Valley Civilization; Harappan Civilization; Mohenjo-daro; Dancing Girl; Bronze Figurine; Angula; Kishku; Shatataraka; Shatabhisha; Nakshatra; Archaeological Metrology; Traditional Indian Measurement System; Proportion Analysis; Symbolism; Interdisciplinary Research; Cultural Heritage.

I. INTRODUCTION

The bronze figurine popularly known as the "Dancing Girl" is one of the most iconic sculptures of the Indus Valley Civilization and is dated to approximately 2500–2000 BCE. Cast using the sophisticated lost-wax (cire perdue) technique, the sculpture measures approximately 10.5 cm in height and demonstrates remarkable craftsmanship despite its small size. The figure depicts a young female standing in a relaxed yet confident posture, with one hand resting on the hip and the other hanging naturally by her side. The weight of the body appears to rest on one leg, creating a dynamic stance.

The figurine is minimally clothed and is adorned with several ornaments. A necklace is visible around the neck, while the left arm bears approximately twenty-four bangles extending from the wrist towards the upper arm. In contrast, the right arm carries only four bangles near the wrist, producing a distinctive asymmetrical ornamentation. The hair is carefully arranged and tied into a bun or braid positioned behind the head. The facial features are simple and stylized, with elongated limbs and slender proportions that emphasize artistic expression rather than anatomical realism.

Although the sculpture is universally known as the "Dancing Girl," this designation was assigned by early archaeologists based primarily on its posture. No archaeological inscription or contemporary textual evidence has yet confirmed the identity, occupation, or intended symbolism of the figure, leaving its original meaning open to further scholarly investigation.

Scholarly Interpretations of the Bronze Figurine

Since its discovery in 1926, the bronze figurine of Mohenjo-daro has attracted considerable attention from archaeologists, historians, and art historians. Archaeologists generally regard it as one of the finest examples of Harappan bronze casting, demonstrating the advanced metallurgical knowledge and lost-wax casting technique practiced by the Indus Valley Civilization. The figurine is widely admired for its technical excellence, naturalistic modelling, and confident posture.

Art historians have often described the sculpture as a masterpiece of early South Asian art because of its dynamic stance, asymmetrical balance, and expressive body language. The relaxed pose, with one hand resting on the hip, has been interpreted by many scholars as conveying confidence, movement, or self-assurance. Based largely on this posture, early archaeologists informally referred to the sculpture as the "Dancing Girl," a name that has remained in popular and academic usage.

Historians have proposed various interpretations regarding the identity of the figure. Some have suggested that she may represent a dancer, performer, young woman, artisan, or a member of an elite social group. Others consider the sculpture to be an idealized artistic representation rather than the portrait of a specific individual. The ornaments, particularly the numerous bangles on the left arm and the necklace, have also been discussed as possible indicators of status, identity, or cultural tradition.

Despite nearly a century of research, no inscription or contemporary textual evidence has been discovered that definitively identifies the figure or explains its symbolic significance. Consequently, the precise identity, purpose, and meaning of the bronze figurine remain subjects of scholarly discussion and continued research.

II. PUBLISHED DIMENSIONS OF THE BRONZE FIGURINE

The bronze figurine popularly known as the "Dancing Girl" has been carefully measured and documented in archaeological literature. According to the published excavation reports and museum records, the sculpture measures approximately 10.5 cm (105 mm or 4 $\frac{1}{8}$ inches) in height. It is a solid bronze casting produced using the lost-wax (cire perdue) technique and is regarded as one of the earliest known examples of sophisticated bronze sculpture from the Indus Valley Civilization. The present study adopts the published height of 10.5 cm as the standard reference dimension for all subsequent Aayaadi metrological calculations and proportional analyses presented in this report.

III. MEASUREMENT SOURCE

The dimensional data used in this study are based exclusively on published archaeological records rather than independent physical measurements. The height of the bronze figurine, recorded as 10.5 cm (105 mm or 4 $\frac{1}{8}$ inches), has been consistently reported in the excavation reports of E. J. H. Mackay and subsequently reproduced in museum catalogues and scholarly publications. Since the original sculpture is preserved in the National Museum, New Delhi, direct measurement was not undertaken for the present study. Accordingly, the published height of 10.5 cm has been adopted as the primary reference dimension for all Aayaadi calculations and metrological analyses presented in this research. This approach ensures that the study is based on accepted archaeological data and allows the methodology to be independently verified by other researchers using the same published measurements.

IV. MY RESEARCH BEGINS.

Every research journey begins with a question. For more than five years, I have been engaged in the study of the Aayaadi system and its application to ancient Indian architecture, sculptures, temples, and traditional measurement principles. During this period, I examined many structures and artifacts, repeatedly observing that their dimensions were often governed by mathematical relationships rather than arbitrary choices. This long association with Aayaadi

gradually transformed the way I looked at historical monuments and sculptures.

One day, while studying the famous bronze figurine of Mohenjo-daro, popularly known as the "Dancing Girl," a simple question arose in my mind:

"What if this sculpture is also based on Aayaadi principles?"

To my knowledge, archaeological studies had analysed the figurine from the perspectives of art, metallurgy, craftsmanship, and cultural history. However, I could not find any published work that examined its dimensions through the traditional Aayaadi measurement system.

This curiosity led me to collect the published dimensions of the sculpture and analyse them using the same methodology that I had previously applied to numerous ancient Indian structures and images. As the calculations progressed, several observations emerged that appeared worthy of further investigation. The measured height corresponded to three Angula in the adopted Aayaadi scale, leading to an association with Shatataraka according to the computational framework employed in this study. Furthermore, the asymmetrical arrangement of the ornaments approximately twenty-four bangles on the left arm and four on the right prompted additional questions regarding their possible numerical significance.

These observations do not, by themselves, constitute proof. Rather, they form the basis of a research hypothesis that deserves careful interdisciplinary examination. Whether these numerical relationships are intentional or coincidental can only be determined through rigorous investigation involving archaeologists, historians, Sanskrit scholars, metrologists, architects, and experts in ancient Indian knowledge systems.

This report is therefore not presented as a final conclusion, but as an invitation to explore an overlooked perspective. If the methodology presented here encourages further scholarly discussion on ancient Indian metrology and its possible application to archaeological artifacts, then the objective of this research will have been fulfilled.

V. AAYAADI: DEFINITION AND CLASSICAL SOURCES

Aayaadi is a traditional system of architectural and metrological calculations described in the Sanskrit literature of Vaastu Shastra and Silpa Shastra. The term "Aayaadi" refers to a group of mathematical procedures used to determine the auspiciousness of dimensions adopted for buildings, temples, images, Deity, Sculptures and other architectural works. These calculations relate measurements to parameters such as Aya (gain), Vyaya (loss), Nakshatra, Yoni, Vaaram (weekday), Tithi, Aamsa, Ayu etc and other associated factors. The objective of the Aayaadi system is to ensure that selected dimensions are harmonized with traditional architectural principles.

The Aayaadi system is described in several authoritative Vaastu and Silpa texts, including Manasara, Mayamata, Samarāṅgaṇa Sūtradhāra, Aparājītapṛcchā, and Visvakarma Prakasa. Among these, the Manasara provides one of the most systematic explanations of Āyādi-Ṣaḍvarga, while Mayamata and Aparājītapṛcchā discuss proportional measurements and architectural canons that complement the Aayaadi tradition.

VI. AAYAADI CALCULATIONS AND OBSERVATIONS

The present analysis is based on the published height of the Mohenjo-daro bronze figurine, recorded as 10.5 cm (105 mm). According to the Aayaadi methodology adopted in this research, the primary unit of measurement is the Kishku Angula, where one Angula is equal to $1\frac{3}{8}$ inches. When the published height of the sculpture is divided by this unit, the result is 3 Angula, yielding an exact whole-number Aayaadi dimension.

This integral value is significant because, within the Aayaadi system, it serves as the Aayaadi Number, which forms the basis for a series of traditional mathematical evaluations. The Aayaadi Number 3 was subsequently analysed using the sixteen (16) Aayaadi formulae adopted in this study. The results indicate that fourteen of the sixteen Aayaadi parameters produce auspicious outcomes according to the Aayaadi formulas of Vaastu shastra.

Among these results, one of the most noteworthy observations is the Nakshatra determination. The

Aayaadi calculations associate the Aayaadi Number 3 with Shatataraka (Shatabhisha), the 24th Nakshatra in the traditional Vedic sequence.

This observation becomes particularly interesting when considered alongside the iconographic features of the sculpture. The figurine is generally described as wearing approximately twenty-four bangles on the left arm and four bangles on the right arm.

Numerical Correspondence Between the Bangles and Shatataraka Nakshatra: A Research Hypothesis

One of the most distinctive features of the Mohenjodaro bronze figurine is the asymmetrical arrangement of its ornaments. Archaeological descriptions generally record approximately twenty-four bangles on the left arm and four bangles on the right arm, a deliberate numerical contrast that has attracted scholarly attention for nearly a century but has not received a universally accepted explanation.

The Aayaadi calculations presented in this study identify the figurine's measurement with Shatataraka (Shatabhisha), the 24th Nakshatra in the traditional Vedic sequence. This numerical correspondence raises an intriguing possibility. The twenty-four bangles on the left arm may symbolically represent the 24th Nakshatra, while the four bangles on the right arm may

correspond to the four Padas (quarters) that constitute every Nakshatra in the traditional astronomical system.

When these observations are considered together, a coherent numerical pattern emerges:

- Aayaadi Number: 3 (a neckless pendent in her neck with 3
- Derived Nakshatra: Shatataraka (24th Nakshatra)
- Left Arm: Approximately 24 bangles (represents 24th nakshatra)
- Right Arm: 4 bangles (corresponding to the four Padas of nakshatra)

At present, no archaeological inscription or contemporary textual source confirms that the ornaments were intentionally designed to represent the Nakshatra and its four Padas. Therefore, this interpretation should be regarded as a research hypothesis rather than an established historical conclusion. Nevertheless, the convergence of independent numerical observations derived from measurement and iconography suggests a possibility worthy of systematic interdisciplinary investigation involving archaeology, ancient Indian metrology, Sanskrit literature, astronomy, and the history of art.

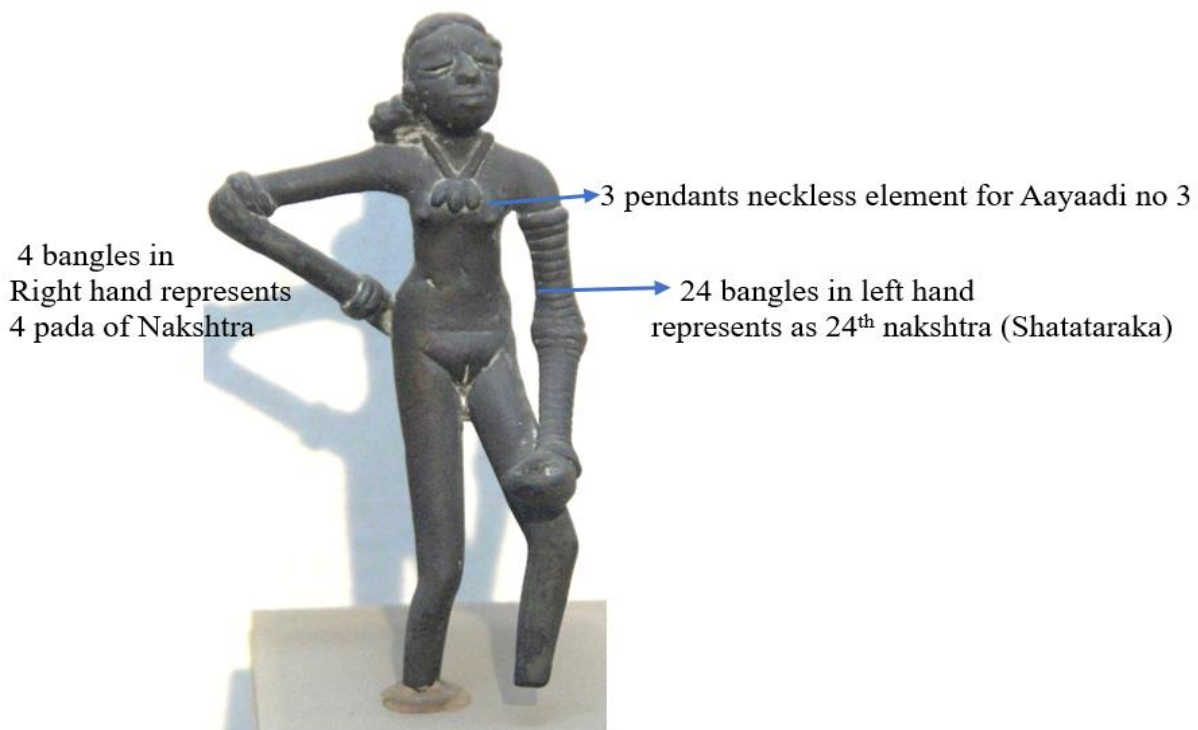


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Proposal for an Alternative Interpretive Name

The designation "Dancing Girl" was assigned by early archaeologists solely on the basis of the figurine's posture and has remained the conventional archaeological name despite the absence of direct evidence identifying the figure as a dancer. In the Indian tradition, names are often associated with Nakshatras, reflecting symbolic and cosmological significance. The present study proposes that, if the Aayaadi-derived association with Shatataraka Nakshatra is supported by further interdisciplinary research, the figurine may also be interpreted under the alternative name "Shatataraka." This proposal is not intended to replace the established archaeological designation but to offer a culturally grounded interpretive perspective for future scholarly discussion.

VII. CONCLUSION

The present study proposes a new metrological perspective for examining the bronze figurine of Mohenjo-daro through the traditional Indian Aayaadi measurement system. Using the published height of 10.5 cm, the analysis derives an Aayaadi Number of 3 and identifies an association with the Nakshatra Shatataraka according to the adopted methodology. Additional numerical observations, including the approximate twenty-four bangles on the left arm, four bangles on the right arm, and other proportional features, have been examined as possible symbolic correspondences. It is hoped that this research will encourage archaeologists, historians, Sanskrit scholars, architects and experts in ancient Indian. Whether the observed correspondences are intentional or coincidental remains an open question, inviting future interdisciplinary research.

VIII. THE ORIGINAL HEIGHT OF THE MOHENJO-DARO PRIEST-KING: A PROPOSED NINE ANGULA RECONSTRUCTION BASED ON AAYAADI PRINCIPLES

Introduction

The so-called Priest-King of Mohenjo-daro is one of the most famous sculptures discovered from the Indus Valley Civilization. It is carved from soapstone (steatite), a soft stone that can be easily carved and then heated to make it hard and durable. Although the sculpture is popularly known as the "Priest-King,"

there is no archaeological evidence proving that the figure was either a priest or a king. The name was given by early archaeologists based on the figure's dignified appearance and richly decorated robe.

The ancient city of Mohenjo-daro was first identified as an important archaeological site by R. D. Banerji (Rakhal Das Banerji) in 1922. Later, large-scale excavations were carried out under the supervision of Sir John Marshall, the Director-General of the Archaeological Survey of India. The Priest-King sculpture was discovered during the 1925–1926 excavation season by K. N. Dikshit (Kashinath Narayan Dikshit) in the DK Area (DK-1909) of Mohenjo-daro. It was found at a depth of about 1.37 metres in a narrow passage between brick walls. Archaeologists believe that the sculpture had probably fallen there after the surrounding structure collapsed.

Many local workmen participated in the excavation of Mohenjo-daro and played a vital role in recovering its priceless antiquities. Unfortunately, the official excavation reports did not record the names of the individual workers who actually uncovered the Priest-King sculpture. This was a common practice in early archaeological excavations, where the contributions of local labourers were rarely documented.

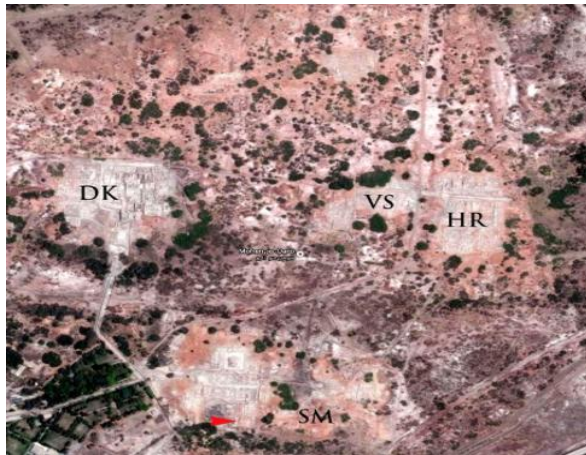
Today, the surviving sculpture is only 17.5 cm high because its lower portion is missing. Only the head, shoulders and upper chest remain. The missing lower part has led to many discussions regarding the sculpture's original height and posture. Some scholars believe that it represented a seated figure, while others have explored different possibilities. Since the lower portion has never been found, its original dimensions remain unknown.

The sculpture displays remarkable artistic skill. The carefully carved beard, half-closed eyes, headband, pierced ears and robe decorated with trefoil designs show the high level of craftsmanship achieved by the people of the Indus Civilization nearly four thousand years ago. Traces of red pigment found within the trefoil motifs suggest that the sculpture was originally painted, making it even more impressive than its present appearance.

"The sculpture was recovered from the DK Area, a well-planned residential sector of Mohenjo-daro

containing substantial brick houses, private wells, and sophisticated drainage. Although these features suggest occupation by relatively affluent residents, there is no archaeological evidence identifying the community, profession, or social status of the inhabitants. Consequently, the context of discovery does not establish that the figure represents either a priest or a king."

"The Priest-King from the DK Area and the Dancing Girl from the HR Area were discovered only a few hundred metres apart within Mohenjo-daro. Although they originated from different excavation sectors and cannot be directly associated with one another, their close spatial relationship within the same city makes a comparative study of their proportions and possible measurement systems both relevant and worthwhile."



The straight-line distance between these excavation areas is approximately: 150–250 metres (estimated from site plans). Photo from internet source.

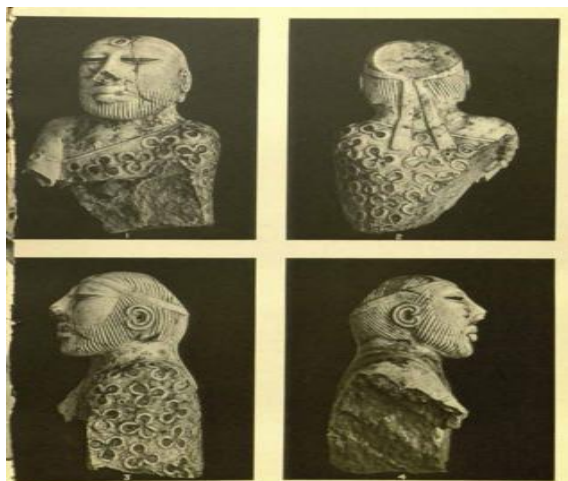


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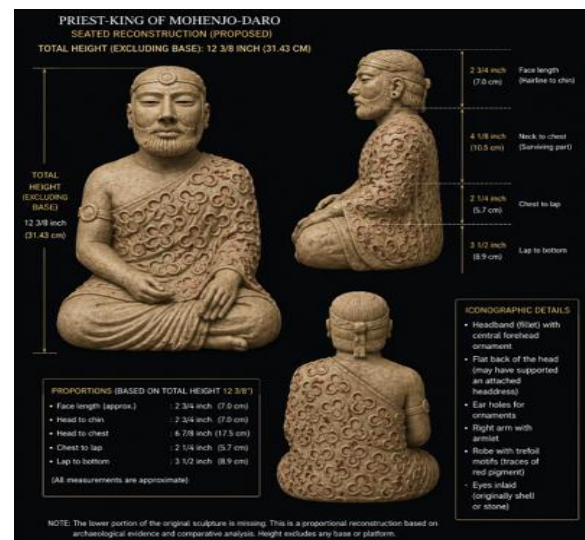
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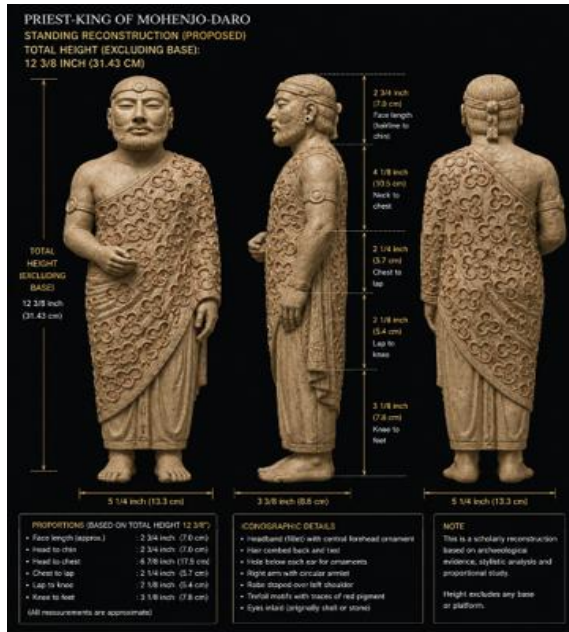
Edited by SIR JOHN MARSHALL, C.I.E., Litt.D., Ph.D., F.S.A., Hon. A.R.I.B.A. Hon. Fellow of King's College, Cambridge Late Director-General of Archæology in India In three volumes, with plan and map in colours, and 164 plates in collotype Volume III: Plates XV-CLXIV

Proposed Reconstruction of the Original Height of the Priest-King Sculpture

The Priest-King sculpture of Mohenjo-daro survives only as its upper portion, with the lower body missing. Consequently, its original height has remained uncertain since its discovery. The present study proposes that the complete sculpture originally measured 12 $\frac{3}{8}$ inches (31.43 cm) from the feet to the top of the head. This reconstruction is based on proportional analysis of the surviving fragment together with the application of traditional Indian measurement principles described in Aayaadi sutra.

The proposed reconstruction assumes that the sculptor employed the Kīṣku Māna system as the fundamental unit of measurement. Since the Indus Civilization demonstrates a high degree of precision in architecture, brick dimensions, weights and urban planning, it is reasonable to investigate whether a similarly standardized system governed sculptural proportions. The surviving facial dimensions of the Priest-King exhibit harmonious





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proportions that correspond closely with iconographical principles described in the Shilpa Shastras. Using these proportional relationships, the missing lower portion can be reconstructed mathematically.

According to the Aayaadi calculations presented in this study, the complete height of 12 $\frac{3}{8}$ inches corresponds to Aayaadi Number 9, which is regarded as an auspicious numerical outcome. This value is not selected arbitrarily but results from the application of the proposed measurement system to the reconstructed figure. The associated Nakshatra obtained through the Aayaadi calculation is Jyeshthā, the eighteenth lunar mansion. The term Jyestha literally means "the elder" or "the senior," a symbolic association that may be considered consistent with the mature facial features, composed expression, and dignified appearance of the figure. While this symbolic relationship cannot be treated as archaeological proof, it provides an interesting interpretative dimension that merits further investigation.

Another point supporting the proposed reconstruction is the overall visual balance of the surviving fragment. The preserved head, neck, shoulders and upper torso do not appear oversized when compared with a hypothetical total height of 12 $\frac{3}{8}$ inches. Instead, the reconstructed proportions produce a harmonious figure consistent with classical canons of sculptural design. Alternative reconstructed heights should

likewise be examined and compared against the surviving measurements to determine which provides the closest proportional agreement.

The present reconstruction is therefore offered as a research hypothesis rather than an established historical fact. Its validity depends upon the consistency of the proportional analysis, the application of the Kīṣku Māna measurement system, and the explanatory value of the Aayaadi calculations. Future archaeological discoveries, particularly the recovery of the missing lower portion of the sculpture or additional evidence relating to Indus measurement systems, may either support or challenge the hypothesis. Until such evidence becomes available, the proposed height of 12 $\frac{3}{8}$ inches (31.43 cm) should be regarded as a mathematically derived reconstruction intended to stimulate further scholarly discussion on the metrology and design principles of the Indus Civilization.

About the Researcher

Ar. Samrat Rahul Sarode is an architect, independent researcher, and author specializing in the interdisciplinary study of ancient Indian architecture, traditional metrology, Vaastu Shastra, and archaeological heritage. He has conducted extensive research on the Aayaadi system, applying its mathematical principles to the analysis of thousands of temples, sculptures, monuments, and historical structures across India. His work seeks to bridge traditional Sanskrit knowledge with modern architectural and archaeological investigation through measurable and reproducible methodologies. He has authored several research papers exploring the scientific, geometric, astronomical, and symbolic dimensions of India's architectural heritage. His continuing research is dedicated to rediscovering and documenting the mathematical foundations of ancient Indian knowledge systems and their relevance to archaeology, architecture, and cultural history.

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