

READING ANCIENT MINDS

INDUS JOURNEY WITH CHATGPT

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Reading Ancient Minds INDUS Journey With ChatGPT

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Table of Contents

PREFACE	5
INTRODUCTION	7
CHAPTER 1 — THE INDUS VALLEY: A PLURALISTIC BEGINNING	11
CHAPTER 2 — EARLY HUMAN COGNITIVE TOOLS: COUNTING, GROUPING & SYMBOLIC THINKING	15
CHAPTER 3 — THE WORLD OF INDUS SIGNS: SHAPES, PATTERNS & STRUCTURE	20
CHAPTER 4 — THE ARCHITECTURE OF INDUS SEALS: MATERIALS, CRAFT, AND USAGE	26
CHAPTER 5 — NUMBERS, STROKES & MATHEMATICAL THINKING IN THE INDUS WORLD	32
CHAPTER 6 — THE LOGIC OF PREFIX-CORE-SUFFIX IN INDUS INSCRIPTIONS	36
CHAPTER 7 — READING SIGNS THROUGH CLUSTERS, CONTEXT & PLURALISTIC REASONING	42
CHAPTER 8 — READING INDUS SIGNS AS VISUAL GRAMMAR: FORM, FUNCTION & COGNITIVE PATTERNS	47
CHAPTER 9 — HOW TO LOOK AT AN INDUS SIGN: LAYERS, LINES & WAYS OF SEEING	49
CHAPTER 10 — BECOMING THE FIRST SCRIBE: HOW HUMANS TURNED EXPERIENCE INTO SIGNS	52
CHAPTER 11 — THE STORY OF EARLY NUMBERS: HOW STROKES BECAME COUNTING	56
CHAPTER 12 — EARLY HUMANS AND COGNITIVE TOOLS: COUNTING, GROUPING & THE BIRTH OF STRUCTURED THOUGHT	59
CHAPTER 13 — FINAL INTEGRATION: LEARNING TO SEE THE INDUS SCRIPT AS A STRUCTURED HUMAN SYSTEM	63
CHAPTER 14 — HOW TO READ AN INDUS INSCRIPTION:	66
CHAPTER 15 — HOW TO READ A SEAL: A GUIDED FRAMEWORK FOR STUDENTS	70
CHAPTER 16 - CASE STUDY 1	73
Reading a Classic Unicorn Seal with an Open Mind	73
CHAPTER 17 — CASE STUDY 2	80
Reading a Multi-Core Seal with a Stacked Cluster Structure	80
CHAPTER 18 — CASE STUDY 3	87
The Stick Figure (IM77 1,1): Gesture, Voice, and the Earliest Human Abstractions	87
CHAPTER 19 — CASE STUDY 4	94
Rain, Protection, and Offering: A Tamil Cognitive Reading of MD2587	94
CHAPTER 20 — COUNTING, WEIGHING, AND FIRST EQUATIONS HOW INDUS PEOPLE USED NUMBER SIGNS	99
CHAPTER 21 — HOW TO THINK LIKE AN INDUS RESEARCHER	106

EPILOGUE	108
ACHCHU-ACHCHAA: A JOURNEY FROM TAMIL NADU CHILDHOOD TO THE MINDS OF INDUS PEOPLE	108
APPENDIX:.....	111
TO CURIOUS MINDS — AN INVITATION TO EXPLORE THE INDUS WORLD	111
CASE STUDY 01 — THE DHOLAVIRA SIGNBOARD: HOW A CITY SPOKE THROUGH SYMBOLS..	115
Pluralistic Research Approach — Dholavira Case Study: Interpretation Packet.....	122
H1 — Royal Order to Merchants (Irungōvin āṇai)	122
Summary	122
Sign-level mappings.....	123
Supporting evidence.....	123
Confidence estimate.....	123
Validation suggestions.....	123
H2 — Guild / Community Notice (Koya-Gondala association)	124
Summary	124
Sign-level mappings.....	124
Supporting evidence.....	125
Confidence estimate.....	125
Validation suggestions.....	125
H3 — Cultural/Poetic Direction (Nāṭu araca kōṭṭai)	125
Summary	125
Sign-level mappings.....	125
Supporting evidence.....	126
Confidence estimate.....	126
Validation suggestions.....	126
CASE STUDY 02 — THE LONG SEAL TEXT (M-314):.....	127
CASE STUDY 03 — THE WHEEL SIGN (IM 391):.....	135
CASE STUDY 04 — THE POETIC SEAL (MD 1536):.....	141
CASE STUDY 05 — THE VALLAM GRAFFITI OF THANJAVUR (same case mentioned in introduction):.....	146
CASE STUDY 06 — KALIBANGAN CYLINDER SEAL	154
Conclusion to the Curious Minds Appendix —	156
Pluralism as a Research Strength.....	157

Networks, Graphs, PERT Logic, and Modern Analytical Tools.....	157
Learning from the Mayan Script: A Roadmap Without a Rosetta Stone	157
The Importance of Ancient Grammars: Sumerian and Tolkāppiyam.....	158
A Final Question to the Reader	158
APPENDIX CONCLUSION —	159
Seeing the Indus Script Through Pluralistic and Structured Inquiry.....	159
FREQUENTLY ASKED QUESTIONS (FAQ)	161
REFERENCES.....	167
FREE TO DOWNLOAD AND FREE TO TRANSLATE.....	168

PREFACE

READING ANCIENT MINDS – INDUS JOURNEY WITH CHATGPT

This book began with a simple curiosity: Can modern tools help us understand how ancient people thought?

What followed was an unexpected journey—one that blended archaeology, cognitive science, Tamil and Sumerian cultural memory, engineering reasoning, and the creative possibilities of AI-assisted scholarship.

Many of these fields were beyond my formal training, yet with the help of large language models (LLMs), I could assemble this “Limited Print Edition for Educators and Researcher’s Review.” It is intended to be shared freely online after the book-launch event, and eventually rewritten for school children once it has been vetted.

This work attempts a pluralistic way of looking at the Indus script—not as a code to be solved, but as a window into the minds, cognition, and applications of an ancient civilisation. For me, it has been a deeply experiential journey, shaped by the collaborative frameworks offered by LLMs. As someone who has long faced learning and expression difficulties, these tools helped me articulate ideas for the children of this nation.

A school memory stays with me. I once read an English translation of the Rig Veda in the library, and a line repeated, “Is this, is this...?” Today, while looking at the Indus script, I feel we stand in a similar place. We ask again and again: Is this the meaning? Could this be what they intended? That earlier journey belonged to the spiritual world; this one belongs to cognition—trying to imagine how ancient people might have perceived and represented their world.

Thus, you now read this book titled Reading Ancient Minds – Indus Journey with ChatGPT, though in truth, it includes insights from many LLMs. They do not “think,” but they mirror collective human knowledge, reflecting our shared humanity. Many years ago, in 1978, at a college exhibition, I jokingly asked a computer, “What is my age?” knowing it could not answer. It replied, “Ask your mother.” Since then, human-machine interaction has evolved into something far more intuitive. Automata have always been part of human dreams.

This book is written after my retirement from years of service to the children of India and the world. One question has stayed with me: How do humans begin to represent their experience? We are not attempting to “solve” the Indus script, but to take the first steps in the ancient tradition of inquiry—looking, asking, wondering, and allowing discovery to unfold. I am simply passing down that tradition, using the cognitive tools we possess today.

The LLMs have expanded my drafts, compiled material, and helped me refine these ideas. I hope readers will also use these systems extensively. As professors from our Alma Mater (IISc Bangalore) remark, in the coming years LLMs may be able to invent and discover new solutions to complex problems, though today they speak to us in reassuring, gentle tones.

The intent of this book must be stressed clearly:

Rather than attempting to decipher the Indus script, this work tries to do something more foundational—to understand the structure of ancient thought. This is perhaps even more difficult.

My style in this book is intentionally simpler than my usual writing. I sometimes think like a Sumerian or an Indus craftsman, and my earlier drafts were difficult even for me to reread. You may find certain passages dense—that is the very challenge we face with the Indus script itself. I am comfortable with my interpretations; you need not agree with them.

The Indus script is brief, compact, visually disciplined, and remarkably consistent across a vast region. At times, I see the signs as engineering or architectural sketches. At other times, they appear philosophical—like saints sitting in silence with only a few strokes, inviting us to discover.

Instead of long texts, the script offers patterns: prefixes, cores, suffixes, strokes, clusters, and stable sign families. These are not random marks—they are fingerprints of organised minds.

As an engineer, teacher, and lifelong learner, I observed that Indus inscriptions behave like carefully designed diagrams. Their strokes act like classifiers; their shapes express abstraction; their order reveals cognitive discipline alongside creative freedom.

This resonates with how Sumerian edubba schools trained scribes to “sharpen their eyes,” how Tamil potters used strokes to mark identity, and how early humans everywhere transformed lived experience into structure and written form. It requires us to pause, to receive the messages these ancient people may have intended. The first exercise is simply to look and describe. Agreement is not required—plurality is essential.

We assume that the script and its seals can be approached through multiple independent perspectives. Some may converge over time; together they may generate a rich database of insights as our journey continues.

Working with ChatGPT and other AI systems opened new ways of seeing.

AI does not provide answers—it provides frameworks: pluralistic, comparative, cautious, and creatively rigorous. Together, we explored how ancient minds may have grouped, compared, sequenced, abstracted, and encoded ideas long before alphabets or grammar matured.

This book is not a decipherment.

It is an invitation to learn how to see—a journey into the beautiful cognitive world of our ancestors.

Students, teachers, and curious readers will find:

- step-by-step approaches to analysing Indus inscriptions
- comparisons across world writing traditions
- case studies showing how patterns generate insight
- reflections that cultivate humility, imagination, and discipline
- an approach that values plurality over premature conclusions

The title *Reading Ancient Minds* reflects an ancient practice: expressing meaning through structure rather than grammar. Early scripts did this naturally—and modern programming languages do the same. Our ancestors understood the power of structure long before us.

This book is offered as a Limited Print Edition for Educators and Researcher’s Review on the occasion of the IISc Alumni Association Golden Jubilee Celebrations (2025). Its purpose is simple: to take scientific thinking to the grassroots, to democratise learning, to invite participation, and to show that rigorous thinking and creative curiosity can coexist—rooted in India’s ethos of Unity in Diversity.

May this journey inspire students and researchers to approach the Indus script not merely as a puzzle to decode, but as a window into the extraordinary cognitive world of ancient India.

— Purushothaman P.

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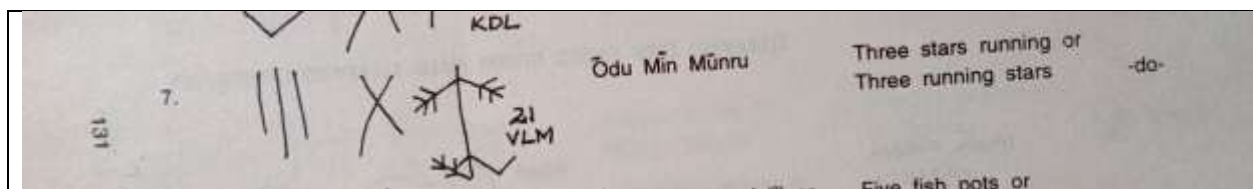
With collaborative assistance from ChatGPT and other LLMs (2024–2025)

INTRODUCTION

A Simple Case Study to Begin Our Journey

Before we begin Chapter 1, it is helpful to start with a small story—a case study that shows how difficult, fascinating, and open-ended the reading of ancient symbols can be. Students can return to this example throughout the book whenever they feel lost or curious. It reminds us that understanding ancient signs is never a straight line but a shared journey of thought.

This example comes from an inscription studied by Professor K. Gurumurthy (former Professor of Madras University, specialist in graffiti studies), found at Vallam in Thanjavur. A clip of it appears in his book.



The marks are simple: three lines, a cross-stroke, and a stick-like human figure. Yet these simple shapes open the door to multiple interpretations—very similar to Indus Valley symbols.

Professor Gurumurthy reads it in Tamil as “Odu mīn mūnru” and in English as “three running stars” or “three stars running.”

My own cultural reading is different: I see irrigation channels, a harvest heap or battlefield,

and a deity resembling the one our family draws during the Pongal festival. These images connect deeply with agrarian life (even Kandara movie, the deity) , the River Kaveri, and the idea of divine protection over crops.

This shows an important point:

With the same three visual elements—three lines, a star-like mark, a running/human sign—we already have two perfectly valid interpretations: one scholarly, one cultural.

Interestingly, when I provided the same prompts (three, star, running) to Meta AI, it produced a poetic interpretation—confirming that when we describe a symbol and allow imagination to flow, we often arrive at meanings the original creators *might* have intended. Poets, after all, express the deepest connections between nature, metaphor, and language.

Similarly, in Tamil Nadu, epigraphists and archaeologists often identify early personal names in primitive Tamil-Brahmi graffiti. If we apply this method here, we can derive a Tamil name—Mookan—from the same three signs:

1. Three lines → *mūnru* → *mū*
2. Battlefield or harvest field → *kaLam* → *ka*
3. Deity → *kadavuL* / *āndavan* → *an*

Thus: *mū* + *ka* + *an* = Mookan.

This uses two established teaching traditions still found in schools today:

1. Picture-reading and storytelling, and
2. Rebus-based association (e.g., “ammaa = a”, “a = ammaa”).

Both rely on visualisation and abstraction—the essential first steps in reading any ancient script.

We can also bring insights from other cultures. The Sumerians began with pictographs but gradually moved toward syllabic and alphabetic forms. Something similar may have happened in the Indus region, with meaning varying by period, location, and context—sometimes even with unchanged symbols.

Let us also consider interpretations from scholars like Yagna Devam, who assigned letter values to similar graffiti symbols:

(ja), *(ki/ka/tha)*, *(a/aa/ma)*.

Interestingly, two of these align with our elements: the “ka” and “aa/an”.

All these comparative approaches—across regions, periods, and disciplines—fit perfectly into the pluralistic method we promote in this book. As Prof. Gurumurthy himself said, “*If Tamil Nadu graffiti can be read, then Indus scripts can also be read.*”

Here lies the heart of our approach:
We do not reject any interpretation prematurely.
We collect, compare, and refine through dialogue.

The case study above is exactly the situation we face with the Indus script.

Like Sangam poems, *Tolkappiyam*, or even a complex classroom lecture, meaning often hides behind layers of expression. We have all experienced this—while speaking to elders or children, reading poetry, or engaging with subtle concepts. We know the words but not always the deeper meaning. Ancient symbols behave the same way.

For thousands of years, scholars have tried to understand Indus signs. Some propose meanings; others disagree. No interpretation has gained universal acceptance. We, too, stand within this long tradition of inquiry—and that is perfectly fine.

Instead of chasing a single “correct” meaning, our aim in this book is different:

We want to understand how ancient minds structured their thoughts.

Meaning is important, but the *process* is even more valuable.

Why This Case Study Matters

This small Vallam inscription teaches us four important lessons:

1. **Pictures allow multiple readings.**
Just as schoolchildren tell different stories from one picture, ancient signs invite multiple interpretations.
2. **Many readings may coexist without conflict.**
Agreement is not necessary; patient comparison is more meaningful.
3. **Meaning emerges through dialogue, not certainty.**
Reading ancient signs is like learning a new language without a teacher—we explore, compare, revise, and refine.
4. **Pluralistic thinking is essential.**
Instead of insisting on one correct answer, we collect many possibilities and analyse them carefully.

This book adopts the same spirit.

Our Interactive Method

Throughout the writing of this book, we developed a unique method—one that mirrors the trial-and-error approach used in computational reasoning, and also echoes Tolkappiyar’s principle of “similar visual correspondence.”

1. You (the researcher) propose an idea or interpretation.
2. I (ChatGPT) expand, compare, or organise it.
3. You refine it again.
4. I smoothen the structure and check coherence.
5. Together we compare multiple scholarly views.
6. Finally, we look for patterns that are repeatable and meaningful.

Our dialogue becomes a model for students:
how to think, test, revise, and rethink.

This is not decipherment.
This is a training in seeing.

A Learning Attitude, Not a Final Answer

The Vallam inscription—like many Indus signs—may never yield a single fixed meaning. But that uncertainty is not a weakness; it is the doorway to deeper learning.

In this book we will:

- observe signs closely,
- break them into meaningful components,
- compare possibilities proposed by many researchers,
- and understand how ancient people might have grouped, abstracted, and encoded ideas.

This Introduction is therefore not a puzzle to be solved, but a cognitive warm-up—an invitation to enter the world of ancient minds with curiosity, humility, and creativity.

From Chapters 1 to 15, we introduce the cognitive foundations of writing and human symbolic behaviour.

Chapters 16 to 21 present advanced material.

The Appendices contain real case studies similar to the Vallam graffiti.

We have also included Frequently Asked Questions (FAQ) to encourage two-way learning. You can question LLMs; LLMs can question you. This reciprocal thinking forms a new kind of learning journey.

As you begin Chapter 1, carry this small case study with you.
Return to it whenever a new symbol confuses you.
Let it remind you that confusion is not failure—it is the beginning of discovery.

CHAPTER 1 — THE INDUS VALLEY: A PLURALISTIC BEGINNING

The story of the Indus Valley Civilisation (IVC) begins more than 4,500 years ago. It was one of the world's earliest large-scale urban cultures, flourishing along the rivers **Indus**, **Ghaggar-Hakra**, and their tributaries, in regions that today lie across India and Pakistan.

Archaeologists have uncovered:

- well-planned cities
- standardised bricks
- drains and sanitation systems
- weights, measures, workshops
- thousands of seals
- and a unique script still awaiting a definitive reading

Unlike Mesopotamia or Egypt, the Indus world left **no kings, no battle inscriptions, and no royal monuments**.

This absence creates an open space for students and readers to explore the civilisation with imagination and humility.

1.1 Why a Pluralistic Approach?

The aim of this book is not to present a final or authoritative reading of the Indus script. Instead, it offers a **pluralistic approach**, encouraging learners to engage with:

- multiple possibilities
- evolving interpretations
- connections across cultures
- cognitive continuities
- and the importance of uncertainty

Pluralistic thinking trains students to explore ideas without being forced into a single theory.

1.2 Learning From Many Lenses

Every discipline contributes a different way of seeing:

- Archaeology reports materials, layers, and excavations.
- Linguistics gives possibilities, not final answers.
- Anthropology compares cultural patterns.
- Mathematics helps identify structure, patterns, and counts.
- Computer-assisted reasoning (LLMs) provides models, parallels, caution, and organisation.

ChatGPT, Gemini, Copilot, and Meta AI are used here as **thinking partners**, not as authorities — they help examine possibilities from multiple angles.

1.3 What We Actually Know About the Indus Script

Across Harappa, Mohenjo-daro, Dholavira, Lothal, Rakhigarhi, and many smaller sites, more than **4,000 inscribed objects** have been found:

- steatite seals
- copper plates
- pottery graffiti
- clay sealings
- miniature tablets
- bone or ivory pieces

The inscriptions are short — usually **3 to 7 signs**, sometimes up to 26.

We do **not** know:

- the underlying language
- whether it is syllabic, logographic, or mixed
- the meaning of any sign with certainty

But we **do** know:

- sign order is structured
- strokes follow regular patterns
- motifs such as unicorn, bull, jar, fish, bow repeat systematically
- some signs consistently behave like **prefixes** or **modifiers**

These clues allow us to explore structured interpretations without claiming decipherment.

1.4 What Makes the Indus Script Unique?

The script is unusual because:

- inscriptions are short
- sign shapes are extremely standardised across 1,500 km

- writing appears mostly on seals and clay sealings
- the civilisation shows sophisticated planning but no royal texts
- signs combine pictorial and abstract graphical forms

This pushes us to study the script through cultural, mathematical, and comparative reasoning rather than expecting alphabet-like behaviour.

1.5 An Educational Approach: Open but Structured

This book follows two principles:

Open

- No single interpretation is treated as final.
- Students are encouraged to question, compare, and reason.
- Imagination is welcomed — with discipline.

Structured

- Signs are examined through categories such as prefix, core, suffix, strokes, families, and clusters.
- Interpretations always distinguish between **evidence** and **hypothesis**.
- Tamil, Sumerian, and other parallels are introduced as possibilities, not claims.

This supports student cognition and scientific thinking.

1.6 Early Contact and Shared Cultural Ideas

Archaeology shows that the Indus interacted with Mesopotamia (Sumer + Akkad):

- Indus seals found in Mesopotamian sites
- Mesopotamian texts mention “Meluhha”
- shared motifs such as bulls, boats, geometric patterns
- trade of beads, cotton, wood, lapis lazuli

This does **not** prove that the scripts or languages were the same.
But it allows comparative study of how early cultures used:

- weights
- sealings
- administrative tokens
- symbolic motifs

Such comparisons help develop deeper reasoning.

1.7 Students as Explorers of Ancient Minds

Rather than memorising facts, students are encouraged to:

- ask questions
- observe patterns
- explore possibilities
- compare signs across seals
- reflect on similarities and differences across cultures

The goal is to train pattern-recognition and thoughtful interpretation.

1.8 The Role of Seals in Daily Life

Indus seals and sealings have been found in:

- homes
- workshops
- granaries
- craft centres
- administrative areas

They were likely used for:

- marking goods
- identifying families or guilds
- certifying transactions
- ritual or symbolic functions
- stamping tags for storage and transport

The **unicorn seal** appears especially frequently, often paired with a jar-like device. Whether this represents a clan, guild, or ritual symbol remains open to inquiry.

1.9 Learning From Living Traditions

Even today, Indian traditions preserve practices that help us imagine ancient behaviours:

- clay impressions
- moulds (achchu / அச்சு)
- seasonal craft production
- ritual marking
- family or group identifiers

These do not prove continuity but offer **useful analogies** for thinking about seal usage.

A reflection on making clay impressions during Vinayagar Chaturthi appears in the Epilogue.

1.10 What This Book Does Next

The following chapters explore:

- numbers, strokes, and grouping
- prefix–core–suffix behaviour
- abstraction and design logic
- cross-cultural reasoning (Tamil, Sumerian, etc.)
- case studies of real seals
- inquiry prompts and reflection exercises

The emphasis is on **thinking like an ancient scribe, poet, expert, head of a clan or a group and guild of business people** not on decipherment.

Inquiry 1

What do you think the Harappans valued most in their communication system — clarity, beauty, standardisation, secrecy, symbolism, practicality, or something else?

Write two possibilities and discuss with your friends.

End of Chapter 1

CHAPTER 2 — EARLY HUMAN COGNITIVE TOOLS: COUNTING, GROUPING & SYMBOLIC THINKING

Human beings did not begin with writing. Long before scripts appeared, early humans developed cognitive tools that helped them understand the world around them:

- ways of counting
- methods of grouping objects
- marks for tracking or remembering
- gestures and symbols for communicating
- rituals that made meaning visible

These tools existed thousands of years before the Indus script. Understanding them helps students see how writing systems grew from simple marks into sophisticated symbolic structures.

2.1 Counting Before Numbers

Before there were written numerals, humans used:

- fingers
- stones
- knots
- seeds
- cuts on bones
- marks on clay
- bundles and tallies

Archaeological evidence across many regions shows that people used repetitive strokes to keep track of quantities, traded goods, animals, harvests, debts, and calendar cycles.

This connects directly with the Indus civilisation, where stroke marks and short vertical/horizontal lines appear frequently beside signs. These strokes may represent counts, classifiers, measures, or ritual quantities.

Students are not asked to “decode” these strokes immediately. Instead, they are encouraged to explore multiple possibilities.

2.2 Grouping and Classification

One of the earliest human cognitive skills is the ability to group objects:

- one vs. many
- large vs. small
- edible vs. non-edible
- clean vs. polluted
- safe vs. dangerous

These early categories gradually evolved into numerical groups, noun classes, ritual classifications, and, eventually, writing categories.

In the Indus script, certain signs appear to “classify” the main sign — for example, strokes, jars, or small auxiliary symbols placed before or after a primary motif.

This idea of classifiers also appears in many ancient languages.

2.3 When Symbols Began to Matter

At some point, early humans realised that:

- A mark can stand for a thing.
- A stroke can stand for a quantity.
- A symbol can stand for a memory or instruction.

This marks the birth of symbolic thinking — the foundation for all future scripts.

The Indus script belongs to this long tradition: taking the internal world of ideas and expressing it through external signs.

Reflection 2

Think of a time you used marks or symbols — tallies, emoji, colour codes, or arrows.
How did the symbol help you think more clearly than words alone?

2.4 Early Tools for Thinking: Fingers, Stones, and Lines

The human hand was the first calculator. Fingers allowed people to signal quantities, coordinate group activity, keep rhythm in rituals, and teach children.

Stones, shells, and seeds became portable counters used for tracking animals or remembering debts.

Archaeologists have found:

- tally bones with repetitive cuts
- clay tokens
- arranged pebbles
- scratched lines on pottery

These were not scripts, but they show the human capacity for externalising thought — placing ideas into physical marks.

This same habit appears in the Indus civilisation through repeated strokes, jars, and geometric signs.

2.5 Emergence of Structured Counting

Over time, humans began to organise counts:

1. one-by-one marking
2. bundling (5, 10, 20)
3. grouping by type

4. repeating symbols
5. using position to convey meaning

Indus inscriptions show the same pattern:

- small strokes as modifiers
- repeated signs indicating groups
- short inscriptions with fixed ordering
- possible prefix–core–suffix structures

Even without knowing meaning, we can recognise structured thinking.

2.6 Material Limits Shape Communication

Before durable writing surfaces existed, people used clay, bone, wood, palm leaf, stone, and soft metal. Each material shaped how people wrote.

The Indus script appears mostly on tiny objects — seals, tablets, pottery, copper pieces. This may explain:

- short inscriptions
- compact sign forms
- simple modifiers
- multifunctional seals

Material culture influenced form.

2.7 Ritual, Memory, and Meaning

Early humans also used marks for:

- rituals
- commemorations
- marking boundaries
- invoking protection
- identifying groups

Many Indus signs — animals, horns, jars, platforms — may carry layered meanings beyond simple “record keeping.”

Recurring motifs such as the unicorn, bull, and jar-stand suggest shared symbolic practices.

Again, the goal is not to decode but to appreciate the cognitive richness behind these signs.

Inquiry 2

Why might a civilisation choose short symbolic inscriptions rather than long texts?
Consider mobility, materials, administration, and ritual needs.

2.8 Cognitive Foundations for the Indus Script

By 2600 BCE, humans already possessed rich cognitive tools:

- counting systems (bundles, tallies, strokes)
- classification (animals, materials, roles)
- spatial organisation (left/right, top/bottom)
- mark-making traditions
- memory aids (tokens, seals)

The Indus script grew organically out of these traditions.

Even without decipherment, students can study:

- repeated symbols
- structured sequences
- modifiers
- motifs across regions
- spatial ordering

Writing is an extension of the human mind.

2.9 The Power of Short, Dense Information

Indus inscriptions are brief but meaningful:

- one main sign
- 1–3 modifiers
- 1–2 strokes
- sometimes a suffix

This compactness suggests identity badges, clan markers, profession symbols, ritual prompts, or administrative tags.

Short does not mean simple — it means efficient.

2.10 From Marks to Meaning: The Journey Ahead

This chapter prepared students to understand:

- how early humans used symbols
- how counting and grouping shaped communication
- how material limits influenced writing
- how ritual and identity shaped signs
- why pluralistic reasoning is essential

The next chapters explore:

- sign structure
- prefix–core–suffix logic
- Tamil and Sumerian comparisons
- numerical behaviours
- case studies

The aim is not to solve the script, but to model how to think about ancient communication.

Reflection 3

Imagine you are a craftsperson in the Indus Valley.
You must create a seal to identify, say your clients' goods.
Which symbols would you choose, and why?

End of Chapter 2

CHAPTER 3 — THE WORLD OF INDUS SIGNS: SHAPES, PATTERNS & STRUCTURE

The Indus script contains around 400–450 unique signs, depending on how scholars group or split variants. These signs appear across seals, tablets, pots, copper plates, and pottery graffiti from more than a thousand sites.

Although the script is undeciphered, we can still study its structure, shape patterns, internal relationships and describe in our own words. Students can learn a great deal from how signs are arranged and how they combine with strokes and modifiers.

This chapter introduces a shape-based and position-based approach, encouraging curiosity without making definitive claims.

3.1 What Is a “Sign”?

A sign is a distinct visual element that carries meaning within a writing or symbol system.

In the Indus script, signs include:

- 1. animals (unicorn, bull, fish-like shapes)**
- 2. jars and vessels**
- 3. human-like figures**
- 4. geometric shapes**
- 5. arrows and loops**
- 6. strokes and numerical lines**

A sign may be pictorial, abstract, or composite. Some signs are simple; others are elaborate, such as complex fish, double loops, or stacked symbols.

3.2 Sign Categories: Prefix, Core, Suffix

Researchers have observed that Indus inscriptions often follow a pattern:

Prefix → Core → Suffix

- 1. Prefix signs are usually small symbols (strokes, jars, loops, small animals).**
- 2. Core signs are the central or major sign of the inscription.**
- 3. Suffix signs are short markers (final strokes, pot-like endings, small zigzags).**

This structure is seen consistently in many seals and helps students identify the segments within an inscription.

3.3 Why This Structure Matters

Even if we cannot read the signs, the order in which they appear provides clues:

- 1. some signs always occur first**
- 2. some never appear last**
- 3. some signs repeat in the middle**
- 4. strokes tend to modify other signs**

5. jar-like shapes often appear near the beginning

This indicates that the script follows rules—more like a communication system than decoration.

3.4 The Shapes Themselves

Indus signs include:

Geometric: circles, rectangles, triangles, loops, cross-shapes, chevrons, parallel lines

Pictorial: fish shapes, animal heads, jars, tree-like forms, human figures

Modifiers: strokes, dots, small attached marks, separators

Recognising shapes helps in grouping signs and noticing patterns across inscriptions.

3.5 How Teachers Can Use Shape-Based Learning

Students can:

- 1. sort signs by similarity**
- 2. compare strokes across seals**
- 3. identify repeating motifs**
- 4. map prefix–core–suffix positions**
- 5. observe variants of the same sign**
- 6. sketch signs to understand structure**

This visual learning method is suitable for all age groups.

Reflection 3.1

Why might a script use both pictorial and geometric shapes?

What does this suggest about the users of the script?

3.6 Pattern Recognition: Seeing Order in the Signs

When students analyse many seals, they notice:

- 1. certain signs appear at the beginning**

2. some core signs repeat widely
3. some groups of signs occur together frequently
4. strokes modify meanings or quantities
5. jar-like shapes cluster in specific positions

Pattern recognition helps compare inscriptions, identify families of signs, separate variants, and understand structural rules. The script behaves like a coherent system.

3.7 Shortness and Density of Information

Indus inscriptions are typically short, dense, structured, and symbolically rich. The average inscription length is 3–7 signs.

This suggests:

1. compact information transfer
2. administrative roles
3. ritual or household identifiers
4. profession markers
5. tags for goods or storage

Short inscriptions allow quick stamping, repeated use, and memorability—similar to modern logos, monograms, talismans, sealing packages, bundles or bags or trade symbols.

3.8 Variation Without Chaos

The Indus script allows controlled variation:

1. fish signs vary slightly in curves
2. jar signs change size but keep form
3. loops may be single or double
4. strokes vary in number but follow rules

This mixture of consistency and creativity is a hallmark of living symbol systems and suggests artistic freedom, regional variation, and evolution over centuries.

3.9 The Role of Modifiers (Strokes and Dots)

Many inscriptions contain:

- 1. single strokes**
- 2. double strokes**
- 3. triple strokes**
- 4. sometimes four or more**

Strokes may serve as numerical indicators, classifiers, qualifiers, or variants of the main sign.

Dots or tiny marks may represent quantities, separators, phonetic modifiers, or ritual significance. Their exact meaning is uncertain, but the patterns teach students to see hierarchy within symbols.

Inquiry 3.1

**Why are strokes and small modifiers important in a script with mostly pictorial signs?
How might they refine meaning?**

3.10 Signs Across Regions and Time

The Indus civilisation covered a vast geography, yet the script shows remarkable uniformity in signs, ordering, stroke patterns, and seal shapes.

This suggests:

- 1. cultural cohesion**
- 2. shared administrative traditions**
- 3. long-distance communication**

Even when variants appear, the underlying structure remains stable.

3.11 Composite Signs and Stacked Structures

Some inscriptions contain composite signs:

- 1. two fish combined**

2. loops attached to primary signs
3. stacked jars
4. paired geometric elements

These may represent complex ideas, combined identifiers, multi-layered roles, or ritual associations. Recognising composite signs helps students understand how meaning may be built from combinations.

3.12 Beyond Decipherment: Cultural Insights

Even though the script is undeciphered, its structure and motifs reveal aspects of the civilisation:

1. emphasis on order
2. symbolic richness
3. links between trade, ritual, and identity
4. visual thinking and cognitive sophistication

Students are encouraged to appreciate the civilisation without assuming unproven linguistic claims.

3.13 Using the Script in the Classroom

Teachers can design activities such as:

1. grouping signs by shape
2. mapping prefix-core-suffix
3. comparing modifiers
4. sketching simplified seals
5. building imaginary inscriptions
6. discussing possible meanings

These activities build pattern recognition, imagination, visual literacy, and pluralistic thinking.

Reflection 3.2

If you were designing a symbol to represent your profession or family today, what shape or object would you choose, and why?

End of Chapter 3

CHAPTER 4 — THE ARCHITECTURE OF INDUS SEALS: MATERIALS, CRAFT, AND USAGE

Indus seals are among the most iconic artefacts of the civilisation. They are small, square or rectangular objects, usually made of steatite, a soft stone that can be carved easily and then fired. Almost all seals carry a central animal motif, a short inscription, and a boss on the back for holding or pressing. Their carving is precise and standardised, showing a high level of skill.

Even without reading the script, we can learn a great deal by studying how seals were made, how they were used, and how their structure supports communication.

4.1 What Is a Seal? Why Use One?

A seal is a carved object used to make impressions in soft clay. It functions much like a stamp, an identity marker, a signature, a symbol of authority, or a label for goods.

Seals make it possible to:

1. prove ownership
2. authenticate items
3. identify households or traders
4. mark goods for travel
5. signal ritual or social associations

Indus seals share ideas with Mesopotamian seal traditions, but their motifs and layout are uniquely Harappan.

4.2 Materials and Craftsmanship

Most Indus seals are made of steatite. The typical process included:

1. Carving the design on soft steatite.
2. Firing the carved seal to harden and strengthen it.
3. Polishing or burnishing the surface.
4. Adding a boss on the reverse.
5. Using the seal for repeated stamping of clay.

The precision of some seals indicates specialised artisans and possibly organised workshops.

4.3 The Seal and Its Reverse: The Boss

Nearly all seals have a boss on the reverse side.
This allowed the seal to be:

1. tied to a cord
2. worn at the waist
3. held easily while stamping

Boss shapes vary, hinting at regional workshop styles or guild identities.

4.4 Seal Motifs: Animals and Beyond

Common motifs include:

1. unicorn
2. humped bull
3. short-horned bull
4. elephant
5. rhinoceros
6. tiger
7. composite or mythical animals

The unicorn is especially dominant. Its meaning remains unknown, but it may represent a clan, a guild, a ritual association, or a mythic symbol.

Some seals include additional elements such as ritual stands, jars, plants, or tree-like motifs.

4.5 The Inscription Zone

Above the animal motif, a short line of Indus signs usually appears.

Characteristics include:

- 1. 3 to 7 signs**
- 2. consistent order of symbols**
- 3. strokes or small marks at the left**
- 4. jar-like shapes often at the beginning**
- 5. fish-like and geometric signs centrally**
- 6. certain suffix-like signs at the end**

This structure connects to the prefix–core–suffix pattern explored in other chapters.

Reflection 4.1

Why might ancient people prefer a small, compact seal to carry identity, authority, and communication? What modern objects serve similar purposes?

4.6 Sealings: Impressions Made by Seals

Sealings are the impressions left when seals are pressed into clay. They were used to:

- 1. secure storage jars**
- 2. close bundles or sacks**
- 3. label goods for travel**
- 4. authenticate documents or ritual items**

Sealings show the mirror image of the seal design. Many have been found at Harappa, Mohenjo-daro, and Lothal.

4.7 Practical Role of Seals in Daily Life

Seals likely played roles in:

1. **trade and exchange**
2. **storage management**
3. **household identification**
4. **long-distance movement of goods**
5. **ritual and symbolic communication**

Their small size made them portable, reusable, and efficient.

4.8 Standardisation Across the Civilisation

Indus culture is known for its standardisation—brick sizes, weights, seal shapes, script sequences.

Seals exhibit:

1. **consistent square form**
2. **similar carving techniques**
3. **uniform placement of inscriptions**

This implies a highly organised society with shared rules.

4.9 Artistic Conventions and Regional Styles

Although standardised, seals show variation such as differences in:

1. **unicorn style**
2. **horn shapes**
3. **jar or ritual stand forms**
4. **line thickness**
5. **carving depth**

These variations suggest regional workshops, artisan schools, or evolving aesthetic preferences.

4.10 The Seal as a Multi-Layered Object

A seal carries multiple layers of meaning:

- 1. Material: steatite, copper, or stone.**
 - 2. Artistic: animal and geometric motifs.**
 - 3. Symbolic: associations known to the community.**
 - 4. Administrative: identity and record-keeping.**
 - 5. Cognitive: visual communication and thought structure.**
-

Inquiry 4.1

If you had to design a seal for your family or community today, what symbols would you choose? How would you arrange them?

4.11 Seal Usage Beyond Administration

Seals may also have played:

Ritual roles: marking offerings, blessing goods, seasonal ceremonies

Social roles: clan symbols, group identity markers

Educational roles: teaching apprentices carving and symbol systems

4.12 Do Seals Tell Stories?

Some seals depict narrative-like scenes: humans near animals, figures under trees, composite beings. These may reflect:

- 1. myths**
- 2. rituals**
- 3. symbolic associations**
- 4. seasonal cycles**

Though not “stories” in the literary sense, they express cultural meaning.

4.13 What Makes Indus Seals Unique?

Indus seals combine:

1. artistic quality
2. compact inscriptions
3. symbolic depth
4. administrative functionality
5. long-distance uniformity

Few civilisations produced such integrated miniature artefacts.

4.14 Linking Seals to Modern Cognitive Tools

Students can relate seals to:

1. logos
2. identity cards
3. QR codes
4. stamps
5. religious symbols
6. signatures
7. badges

This helps visualise how compact symbols carry meaning.

4.15 Looking Ahead

This chapter introduced the physical and cultural architecture of seals.

Next chapters explore:

1. the structure of signs
2. numerical and stroke-based modifiers
3. cultural parallels across Tamil and Sumerian traditions
4. case studies of seals and inscriptions

Understanding seals as objects and symbols deepens our appreciation of Indus communication.

Reflection 4.2

Why did the Indus people invest so much skill into making tiny seals? What does this tell us about their values?

End of Chapter 4

CHAPTER 5 — NUMBERS, STROKES & MATHEMATICAL THINKING IN THE INDUS WORLD

The Indus Valley Civilisation is often celebrated for its urban planning, drainage systems, weights, and measures. But underlying these achievements is something more fundamental: a mathematical way of thinking.

Even though we do not have long mathematical texts from the Indus world, we do have standardised weights, carefully proportioned bricks, layout grids, stroke-based symbols, and structured sign sequences. These offer valuable clues to how the Indus people understood quantity, measurement, and structure.

This chapter explores how mathematics shaped the Indus script and its symbolic logic.

5.1 Mathematics Before Written Numbers

Before numerals were written symbols, people used repeated strokes, notches, tally marks, dots, bundles, and grouped objects. Early humans relied on visible repetition to express quantity. This tradition appears across the world and continues even today.

In Indus inscriptions, strokes and short lines are among the most common elements, suggesting a deep connection between counting and symbolic communication.

5.2 Why Strokes Matter in the Indus Script

Strokes appear frequently as prefix modifiers, suffix markers, numeric-like indicators, and qualifiers of main signs.

Their position is important:

- At the beginning – may classify or quantify
- Near the main sign – may modify meaning
- At the end – may mark specific categories or counts

Even without knowing exact meanings, students can learn that position alters function, a valuable concept in linguistic and mathematical reasoning.

5.3 Bundles, Groups, and Units

Archaeology shows the Indus civilisation used standard units, such as cubical weights in fixed ratios, bricks in a proportional system (1:2:4), and terracotta cakes of uniform size. This suggests a culture that understood grouping, repeating units, proportion, and measurable standardisation.

Short vertical or horizontal strokes may have represented units, multiples, categories, measures, or ritual counts. Students can explore multiple interpretations without assuming certainty.

5.4 Strokes Paired With Core Signs

In many inscriptions, a core sign (fish-like, jar-like, horned shape) is followed or preceded by one to four strokes.

This suggests modification of meaning, classification, some form of counting, or graded categories.

The same core sign with one, two, or three strokes may belong to a family of related ideas. This teaches students to look for pattern families rather than isolated signs.

5.5 The Visual Logic of Indus Numerals

Even though we do not have a Rosetta Stone, the logic of strokes helps students understand that numbers often begin as repeated marks, simple lines, and minimal shapes.

Many early scripts evolved similarly:

Egyptian (vertical lines for 1, 2, 3),

Chinese (一 二 三),

Early Tamil graffiti (strokes for units),

Sumerian (wedge repeats for counts).

The Indus script fits within this global tradition of minimalist numerals.

Reflection 5.1

Why do you think early humans preferred simple strokes to represent numbers instead of complex symbols? What advantages do strokes have?

5.6 Standardisation: A Mathematical Signature of the Indus World

One of the strongest arguments for mathematical thinking in the Indus civilisation is the remarkable standardisation seen across sites: weights follow binary and decimal ratios, bricks follow controlled proportions, seals have consistent dimensions, pottery forms show regulated typology.

This uniformity suggests shared measurement systems, trained craft guilds, coordinated workshops, and long-distance communication networks. Standardisation is not merely technical; it is a cultural expression of order.

5.7 The Role of Proportion in Signs

Many Indus signs show internal proportionality: vertical vs. horizontal balance, symmetry in loops and lines, controlled height-width ratios, and repeated geometric spacing.

This is especially visible in fish signs, jar-like signs, square inscriptions, and linear sequences on copper plates. Even pictorial motifs follow a quiet mathematical discipline.

This does not mean the script encodes mathematics directly, but mathematical thinking shapes symbol design.

5.8 Counting and Ritual Contexts

In many cultures, counting is not only practical but also ritualistic: counting offerings, repeating mantras, marking lunar cycles, creating symmetrical patterns, grouping symbolic items.

If some strokes represent ritual repetition, ceremonial counts, offerings, or cycles, they serve both functional and symbolic roles.

This expands students' understanding of mathematics as something woven into daily and ritual life.

5.9 Strokes as Modifiers: A Cognitive Interpretation

From a cognitive perspective, strokes act like modifiers, adding layers of meaning to the core sign: quantity, quality, category, intensity, relation.

This is similar to adjectives, numerical qualifiers, linguistic classifiers, and symbols with attached punctuation. Students discover that visual modifiers are part of how humans organise thought.

5.10 Clusters, Sequences, and Rhythm

Many inscriptions display a kind of visual rhythm: prefix strokes, core sign, optional suffix, final stroke or mark.

This rhythm teaches students that writing has flow, symbols follow patterns, placement matters, and visual order carries meaning.

This prepares students for later chapters on seal analysis and triadic reasoning.

Inquiry 5.1

Choose any sign with strokes. How does changing the number of strokes change your interpretation? Why might ancient scribes have needed such distinctions?

5.11 Structured Sequences: Evidence of Cognitive Planning

Indus inscriptions consistently show planned sequencing: a clear starting position, a dominant core sign, modifiers placed at predictable points, and optional closing marks.

This internal order suggests scribes followed rules, passed down through training and practice. Even without translation, the presence of systematic structure confirms this was a genuine writing or symbol system.

5.12 Why Strokes Are Key to Understanding the Script

Strokes offer three educational advantages:

- 1. Accessibility – easy to identify without prior knowledge**
- 2. Comparability – used to recognise families of signs**
- 3. Hypothesis building – give clues about quantity, classification, and relationships**

This makes strokes a foundational element in pluralistic study of the script.

5.13 Interpreting Without Overclaiming

This book encourages responsible interpretation.

We do not claim:

- strokes = numbers
- specific signs = Tamil/Sumerian words
- any inscription has a confirmed meaning

Instead, we offer hypotheses:

strokes may express quantity, prefixes may classify, suffixes may differentiate groups, and core signs may encode identity or profession.

This protects students from assuming certainty while supporting creative academic exploration.

5.14 Cultural Continuities: Tamil, Sumerian & Indus Thinking

Tamil traditions used simple strokes for counting and marking.

Sumerian traditions used repeated wedges for numbers and measures.

This does not prove linguistic identity but highlights shared human logic: numbers begin with marks, counting begins with repetition, and symbols grow from simple shapes.

This helps students appreciate the universality of mathematical thinking.

5.15 Looking Ahead: Why Numbers Matter in Seal Reading

Indus seals often include one to four strokes, grouped modifiers, repeated shapes, and ordered sequences.

This chapter lays the foundation for later chapters where we analyse stroke families, sign clusters, case studies of actual seals, and triadic reflections (Indus–Sumerian–Tamil).

Students will see how numerical thinking supports cultural interpretation.

Reflection 5.2

If you had to create a simple number system using only strokes, how would you design it? How would you differentiate 1, 2, 3, and 4 in a clear, efficient way?

End of Chapter 5

CHAPTER 6 — THE LOGIC OF PREFIX–CORE–SUFFIX IN INDUS INSCRIPTIONS

One of the most important observations about the Indus script is that many inscriptions follow a consistent three-part structure:

PREFIX → CORE → SUFFIX

This pattern appears across seals, tablets, pottery graffiti, and copper plates. It suggests that the script used a rule-based system similar to how languages and symbol systems organise information.

This chapter introduces students to this structure as a cognitive tool for analysing inscriptions.

6.1 What Is a “Prefix” in the Indus Script?

A prefix is a sign placed at the beginning of an inscription.

Common prefix signs include strokes, small jar-like shapes, short loops, simple geometric marks, and small auxiliary symbols.

Possible functions include classifiers, quantifiers, group markers, introductory indicators, and rank or identity signs.

Not all inscriptions have prefixes, but many do — always appearing before the core sign.

6.2 The Central or “Core” Sign

The core sign is the main symbol. It is usually the largest, the most detailed, and placed in the central position. Examples include fish-like forms, jar-and-stand motifs, horned-head shapes, and geometric composites.

The core sign may represent identity, craft or profession, clan, or ritual association. Even without decipherment, its central placement shows its importance.

6.3 The Suffix Position

The suffix appears at the end and may consist of small strokes, diagonal marks, tiny pot-like shapes, or geometric finals.

Possible functions: subgroup marker, completion indicator, ritual qualifier, numerical specificity, or administrative category.

Suffixes are less common than prefixes but appear intentional when present.

6.4 Why Prefix–Core–Suffix Matters

Even without knowing meanings, students learn from structure:

- Writing systems use order to convey meaning.
- Position changes the function of a sign.
- Visual grammar precedes linguistic understanding.
- Symbolic systems can be analysed through pattern alone.

This shifts the focus from decipherment to understanding ancient cognitive structuring.

6.5 Examples of Common Prefix Patterns

Students can recognise patterns such as:

- 1 stroke + core
- 2 strokes + core
- 3 strokes + core
- Jar-like prefix + core
- Loop + core
- Miniature sign + core

These appear across Mohenjo-daro, Harappa, Dholavira, Lothal, and Rakhigarhi. Prefix patterns thus help classify inscriptions.

Reflection 6.1

Think of a modern system (traffic signs, emojis, abbreviations). How does position change meaning? Does order affect clarity?

6.6 Core Signs in Structured Sequences

The core sign sits between prefix and suffix and acts as the anchor. Students can study it by size, symmetry, repetition, and specific pairings.

Some core signs appear in families, such as fish variants or jar variants. This helps identify script-internal groupings.

6.7 Multi-Core Inscriptions

Some inscriptions contain two or more core-like signs, suggesting compound identities, combined roles, ritual pairings, or merged symbolic categories. Examples include double fish signs, paired geometric symbols, or stacked composites.

Such inscriptions show that the script allowed complex symbolic units.

6.8 Suffix Families and Their Possible Roles

Suffixes appear as strokes, diagonal marks, small squares, pots, loops, or notches. They refine, specify, classify, or distinguish.

Two inscriptions with the same prefix and core may differ by a single suffix, inviting comparative study.

6.9 Spatial Logic in Indus Writing

Indus inscriptions show consistent orientation:

- left-to-right on seals
- top-to-bottom on some mini-tablets
- structured alignment across seal impressions

This indicates scribal training, internal rules, and meaningful directionality.

6.10 The Framing Effect of Seal Architecture

The square seal provides a frame for the prefix–core–suffix layout. Script is arranged horizontally at the top, vertically on some copper plates, or stacked on narrow tablets.

The animal motif beneath the text acts as a visual anchor. Understanding the architecture helps students appreciate the balance between aesthetics and function.

Inquiry 6.1

Choose any seal from a book or online source. Identify the prefix, core, and suffix. What patterns do you notice?

6.11 Assumptions and the Logic of Interpretation

Every approach to the script reading understanding begins with assumptions — linguistic, symbolic, administrative, proto-writing, or ritual–identity based.

The issue is not the assumptions themselves but how they shape interpretation.

This book adopts a pluralistic method because:

- Different assumptions yield different readings.
- Different readings reveal different insights.
- These insights expose strengths and limits of each model.

Pluralism is a cognitive tool, not a claim of certainty, akin to brain-storming.

6.12 What If the Script Lacked Grammar?

Scholars often expect grammatical features like case markers or inflections. But what if the Indus script belonged to an earlier stage of writing?

Possibilities include:

- no explicit grammatical markers
- category-based signs
- quantity markers without syntax
- identity-first recording practices

This resembles early Sumerian proto-writing, where signs denoted categories more than full linguistic expressions.

This “what if” lens helps students explore without overclaiming.

6.13 What If Prefix-Core-Suffix Is Not Linguistic?

The sequence might represent functional logic, such as:

- input → item → qualifier
- category → identity → subgroup
- ritual → participant → offering
- guild → individual → batch

The positions may encode function rather than grammar.

Modern computational tools allow testing these scenarios across the corpus.

6.14 Learning from Short, Medium, and Long Inscriptions

Different lengths reveal structural patterns:

- One-sign inscriptions → pure identity or category
- Two-sign inscriptions → category + identity or identity + qualifier
- Three-sign inscriptions → stable tri-grams
- Four–six signs → more elaborate structures
- Seven+ signs → confirm the full structural range

Comparing lengths shows which elements are optional or consistent.

6.15 A Computational Thinking Analogy: PERT / CPM

As engineers map dependencies using PERT and CPM, Indus signs can be analysed for dependencies:

- some signs always precede others
- some never appear together
- some require the presence of others
- some act like predecessor or successor tasks

This parallels modern project-planning logic and helps visualize script structure (see annexures on future research scope, drafted by Co-pilot).

6.16 The Tri-Gram Approach and Its Limits

Yajna Devam's method begins with a common three-sign sequence and infers prefix–core–suffix roles. But this is only one starting point.

Pluralism asks:

- What if we start with another tri-gram?
- What if we begin with single-sign frequency?
- What if we focus on suffix-only inscriptions?
- What if we use graph theory to detect clusters?

Multiple starting points prevent premature conclusions.

6.17 Future Research: Multi-Path “What If” Modelling

Next-generation research could include:

- Monte Carlo simulations
- multi-path dependency graphs
- machine-learning based clustering
- automated detection of structural families
- modelling ancient scribal rule systems

Students learn that ancient scripts should be explored, not forced into a single model.

6.18 The Purpose of Structure: Teaching Students to Think

The prefix–core–suffix model is a learning tool. It trains students to:

- see order in apparent randomness
- reason with incomplete evidence
- evaluate multiple hypotheses
- understand how assumptions shape conclusions
- use computational frameworks
- approach the script with curiosity and humility

Reflection 6.2

Choose one assumption about the script (e.g., “prefixes classify”). What alternative assumption could also explain the pattern? How does changing the assumption alter your interpretation?

End of Chapter 6

CHAPTER 7 — READING SIGNS THROUGH CLUSTERS, CONTEXT & PLURALISTIC REASONING

Indus inscriptions do not stand alone. Every sign, stroke, prefix, and visual motif becomes meaningful only when we study how signs cluster, how they appear across contexts, and how multiple interpretive paths coexist.

This chapter builds on earlier foundations—prefix–core–suffix structure, positional logic, stroke modifiers, cognitive approaches, pluralistic reasoning, and computational “what-if” modelling.

7.1 Signs Become more Meaningful when in Clusters

A single sign is ambiguous.

Two signs suggest a relation.

Three signs create a pattern.

Four or more signs form clusters or families.

Cluster analysis helps students study repetitions, co-occurrences, absence–presence patterns, regional combinations, structural variations, and sign families.

This method is widely used in linguistics, archaeology, machine learning, and pattern-based cognitive science.

7.2 Option A Interpretation: Clusters as Names or Identities

Some researchers propose that short inscriptions may represent personal names, clan identifiers, occupational labels, or household markers.

Under this view, clusters can be treated as signatures, identity tags, profession labels, or administrative markers.

This is comparable to Egyptian name rings, Sumerian personal seals, Tamil hero stones, and medieval guild marks.

This interpretation may not require phonetic decipherment.

7.3 Option B Interpretation: Clusters as Semantic or Activity Markers

Another possibility is that inscriptions represent actions, categories, ritual steps, offerings, inventories, or craft instructions.

Clusters then become structured symbolic sets, shorthand for activities, transaction markers, or ritual-event notations.

This approach focuses on meaning and function, without assuming personal naming systems.

7.4 Integrating A & B: The Vallam–Tanjore Graffiti Example (Mookkan)

Graffiti from Vallam (near Tanjavur) offers two valid interpretations:

Identity-Based (Option A)

The graffiti is read as “Mookkan,” based on:

- three strokes,
- star-like symbol,
- person running-like symbol,
- parallels with Tamil names containing numeric elements.

Semantic/Activity-Based (Option B)

The same graffiti can be interpreted as:

- “three-stars-running,”
- “three marks signalling movement,”
- “three-phase activity,”
- “three steps of a ritual.”

Why This Case Is Important

It demonstrates that:

- one cluster can support multiple readings,
- neither interpretation must be rejected,

- pluralism allows coexisting valid views,
 - context determines the appropriate reading,
 - ancient scripts may follow multiple logics simultaneously.
-

7.5 Cluster-Based Thinking in Indus Studies

Students analysing clusters ask:

- Which signs frequently appear together?
- Which signs never appear together?
- Do stroke counts change the cluster type?
- Do clusters follow prefix–core–suffix patterns?
- What happens in longer inscriptions?
- Are clusters regional?
- Which appear only on seals or only on tablets?
- Which accompany the unicorn motif?
- How do clusters change when prefixes change?

This introduces comparative method, combinatorial logic, structural linguistics, graph theory, and computational reasoning—without enforcing a single meaning.

7.6 What Clustering Reveals About Indus Logic

Cluster analysis helps identify:

- Stable clusters — repeating without change
- Flexible clusters — with variable prefixes or suffixes
- Evolving clusters — early vs. late patterns
- Regional clusters — Gujarat vs. Punjab vs. Sindh
- Functional clusters — seals vs. copper plates
- Ritual clusters — with special motifs

This shows that inscriptions encode structure, not isolated symbols.

Reflection 7.1

Choose a three-sign cluster from any Indus seal. Suggest three different interpretations—identity, ritual, activity, grouping, count, or process.

7.7 Triadic Reasoning: Prefix–Core–Suffix as Cluster Logic

Prefix–core–suffix can be viewed not as grammar but as broader functional structure:

- Category → Instance → Variation
- Guild → Agent → Batch
- Ritual → Participant → Offering

Rather than grammatical roles, these may reflect functional logic similar to Vallam graffiti, combining identity, count, and symbolism.

7.8 Clustering Across Seal Types

Different seals show recurring cluster families:

- unicorn + jar + strokes
- bull + short inscription
- fish signs + strokes
- geometric core + loop suffix
- human figure + stroke

Cluster logic sorts inscriptions into meaningful families without linguistic claims.

7.9 Negative Evidence: What Never Clusters

Absence reveals structure.

Some signs:

- never appear at the end,
- rarely appear in the middle,
- appear only with specific prefixes,
- require another sign to make sense,
- cluster only with jar-like or fish-like cores.

This indicates dependencies similar to PERT-style task ordering: some signs must come first or last, some run in parallel, some require prerequisites.

Inquiry 7.1

Select an Indus sign. List which signs it appears with, and which it never appears with. What does that imply?

7.10 The Role of “What If” Modelling in Indus Studies

Successful research requires testing multiple assumptions, not one fixed idea.

Each “what-if” generates a pathway:

- What if the script has no grammar?
- What if strokes = units, not numbers?
- What if signs represent roles, not words?
- What if cores encode clans?
- What if suffixes mark ritual subgroups?

Modern computing can test all these models simultaneously.

7.11 Starting Points: Why Multiple Entry Nodes Matter

Besides recurring tri-grams, other starting points include:

- single-sign inscriptions
- two-sign clusters
- regional variants
- long inscriptions
- sealings vs seals

A multi-entry approach reveals missing links, alternate patterns, optional vs. mandatory structures, and overall network behaviour.

7.12 Clustering as a Bridge to Future Decipherment

Decipherment may emerge gradually through:

- clustered sign families
- dependency networks
- probability graphs
- motif-based analysis
- simulations of scribal rules

Cluster pluralism prepares students to explore ancient systems actively rather than passively receiving interpretations.

7.13 The Educational Value of Cluster Thinking

Cluster-based reasoning teaches students to:

- tolerate uncertainty, brave to inquire, face challenges
- reason across multiple possibilities,
- integrate visual, cultural, and numerical clues,

- evaluate assumptions,
- revise hypotheses as evidence changes.

Reflection 7.3

If you had to sort 100 seals into clusters by shape and strokes alone, what criteria would you choose? Would your clusters resemble linguistic categories or something different?

End of Chapter 7

CHAPTER 8 — READING INDUS SIGNS AS VISUAL GRAMMAR: FORM, FUNCTION & COGNITIVE PATTERNS

The Indus script may be undeciphered, but it is far from unreadable. Even without knowing its language, we can learn to see how its symbols behave: how they group, how they repeat, how they modify one another, and how they imitate patterns seen in craft, counting, ritual, and identity. This chapter introduces visual grammar — a method that respects uncertainty while training students to think like epigraphers, designers, and disciplined observers.

8.1 The Mental Discipline of an Epigrapher

Epigraphers must balance strict discipline (rules, structure, evidence) and creative openness (multiple hypotheses). Reflecting on Sumerian education captures this balance:

“In the edubba schools of Sumer, a tablet copied wrongly was destroyed on the spot. In our own childhood, writing on slates, mistakes were wiped instantly. Engineering design also follows this logic—standards first, permissible variation next.”

This teaches students:

1. Standards Create Reliability: Ancient scribes followed rules of orientation, alignment, and proportions.
2. Variation Happens Within Rules: Unicorns differ slightly, jars vary, strokes shift — but all within an accepted range.
3. Bad Writing Does Not Survive: Poorly carved Indus seals likely never circulated.
4. But We Cannot Assume Too Much: Pluralism requires humility about exceptions, improvisations, or learning contexts.

8.2 What Is “Visual Grammar”?

Visual grammar studies form (shape), function (role), position (prefix/core/suffix), relationship (common clusters), modifiers (strokes, dots), and orientation. It asks: How does the system behave? What rules recur? Where does it allow variation? This approach avoids claims about language and instead focuses on system behaviour.

8.3 Why Visual Grammar Is Better Than Guesswork

Earlier decipherment attempts often begin with fixed linguistic assumptions. If these are wrong, the system collapses. Visual grammar avoids this by studying structure, not language. It allows multiple hypotheses to coexist and avoids speculative leaps.

8.4 How Visual Grammar Mirrors Engineering Design

Engineering design contains general conditions (rules, standards, good practices) and special conditions (site context, material constraints). Indus inscriptions similarly suggest general scribal rules (prefix first, stable proportions) with room for local exceptions (regional variants, ritual forms, workshop signatures).

8.5 Group Training and Scribal Learning in the Indus World

Evidence suggests a culture of careful learning: consistent sign forms across a vast region, apprenticeship-like seal carving, rarity of errors, regular alignment, and stable sign families. Knowledge was likely transmitted through workshops, guilds, or ritual specialists.

Reflection 8.1

If you were training as an Indus scribe, what rules would you insist all students follow? What freedoms would you allow for creativity? Note, archeologists predict a wide spread education system in Tamilnadu, as they find graffiti in common man pot sherds found from archeological sites.

8.6 Visual Grammar and the Mental Discipline of an Epigrapher

Reading undeciphered scripts requires a mindset similar to Sumerian edubba training, engineering design, and scientific discipline. Students copied model tablets; errors were erased; structure mattered more than decoration. Visual grammar trains learners to observe before interpreting, compare before concluding, distinguish rule from exception, accept uncertainty, and test assumptions.

8.7 Design Philosophy: Standards, Freedom, and Constraints

Indus inscriptions show generalities (standardised shapes, consistent ordering, stable stroke logic) and specialities (regional differences, artistic freedom, different behaviours between seals/tablets/graffiti). The result is a design language that is structured but flexible.

8.8 Script Variation: Regularity Without Rigidity

Shared learning environments likely existed. Seals show strong consistency; tablets show stylistic nuances; graffiti marks display freer forms. Variation does not imply linguistic complexity nor the absence of grammar — it reflects cultural practice: known, shared, adapted, but not rigid.

8.9 Visual Grammar as a Tool for “What-If” Thinking

Visual grammar encourages an exploratory mode of analysis, where students and researchers can ask disciplined “what-if” questions. What if strokes indicate categories or classes of objects? What if core signs represent roles, professions, or identities? What if suffixes signal batches, sequences, or ritual steps? This kind of modelling parallels computational frameworks such as PERT/CPM, in which branching paths emerge from possibilities, constraints, and dependencies.

Such reasoning also parallels the agglutinative nature of many languages, where meaning is built layer by layer, and the human mind's natural tendency to construct complex thoughts by stringing smaller units together. Ancient cultures understood this deeply. Sumerian instructional texts describe how poems are composed in a manner similar to birds building nests or artisans making garlands—threads woven together, gems arranged with care. In these metaphors, the thread becomes the grammar or structural logic, while the gems represent signs, syllables, or words placed in meaningful order. Nest-making becomes a symbol for the cognitive process of arranging ideas into coherent structures.

When we look at ancient writing systems through this lens, we appreciate that they too emerged from the same human cognitive processes we use today—patterning, layering, combining, and constructing meaning through available materials and practices. In our modern context, visual grammar allows us to model similar branching pathways of interpretation: each assumption offers a possible route, each constraint narrows the field, and each structural pattern guides us toward more grounded hypotheses. Through this, “what-if” thinking becomes not speculation but a disciplined tool for understanding how the Indus script may have functioned within its cultural and cognitive world.

8.10 Visual Grammar as a Pedagogical Framework

Visual grammar offers a non-linguistic method to teach script analysis, bridging archaeology and cognitive science. It fosters inquiry, avoids speculative claims, and provides accessible entry points for students. Key outcomes include sharpened observation, comfort with ambiguity, analytical flexibility, and respect for diverse interpretations.

Reflection 8.2

Imagine you are an Indus-era apprentice learning to carve seals. What rules might your teacher emphasise? What freedoms might you still have as an artist? How does this mirror the balance between discipline and creativity in modern professions?

End of Chapter 8.

CHAPTER 9 — HOW TO LOOK AT AN INDUS SIGN: LAYERS, LINES & WAYS OF SEEING

Before decipherment comes seeing.

Across cultures, scribal traditions—Sumerian, Egyptian, Chinese, Tamil—train the eye as a primary task. Indus studies require the same discipline: learning to look at signs as designed forms, not mysterious marks.

This chapter develops a method of “layered looking,” drawing from Sumerian edubba eye-training, engineering drawing principles, Montessori construction methods, abstraction in art and architecture, and pluralistic analysis rooted in Indus context.

9.1 The Art of Looking Before Reading

A Sumerian teacher in the edubba tells students: “Sharpen your eyes before sharpening your stylus.” Engineers learn the same truth: place two points, connect by line, add arcs, build complexity. Montessori children follow the same path: straight line, curve, loop, shape, letter.

Indus seals require the same eye discipline. To “see” an Indus sign, students must notice line, curve, proportion, orientation, balance, and structure. Looking comes before meaning.

9.2 Signs as Points, Lines, and Curves (An Engineering View)

Engineers learn to see any object through its basic components—points, lines, curves, and planes—and to represent it through plan, elevation, and side views. We use both stencils for precision and freehand sketches for conceptual clarity. When viewed through this lens, Indus signs resemble small engineering drawings: intentional, structured, and built from elemental strokes.

Every Indus sign—whether fish, jar, horned head, or geometric form—can be broken down into points of change, straight strokes, arcs and curves, angles and junctions, and small modifiers such as dots, hooks, or short lines. Fish signs follow a long central axis with angled strokes forming the tail. Jar signs are constructed from a curved or oval body with a vertical stand. Horned motifs combine sweeping arcs with sharp, pronged angles. Gate-like forms depend on balanced horizontals and verticals. Leaf or triad signs use a central spine with symmetrical arcs branching outward.

Approaching the script in this way—much like analysing components of a technical drawing—helps students see each sign as a designed object with deliberate structure. This trains the eye to observe form without prematurely assuming meaning, and it reinforces the discipline of reading visual systems the same way an engineer reads drawings: through geometry, proportion, and construction logic.

9.3 Montessori Principle: Building Symbols from Simple Parts

Montessori pedagogy teaches that children master complexity only after straight lines, arcs, loops, basic shapes, and combined forms. Indus scribes appear to follow a similar cognitive pathway: strokes to modifiers, shapes to pictorial units, combined shapes to composite signs, repeated composite signs to families. This suggests a universal learning logic: elemental forms evolve into structured symbols.

9.4 Layers of an Indus Sign: Pictorial, Abstract, Functional

A single sign may work across multiple layers.

Layer 1 — Pictorial: Animals (fish, bull, elephant), objects (jars, stands, tools), plants (leaves, sprigs), or gestures.

Layer 2 — Abstract Geometry: Triangles, arcs, strokes, loops, dots.

Layer 3 — Functional Behavior: Some act as prefixes, some as core signs, some as suffixes; some cluster consistently; some never appear in certain positions. Understanding these layers prevents overinterpretation.

9.5 Why Background Matters: Different Eyes See Different Signs

An engineer may see proportional systems, load-bearing geometry, or architectural relations. An

artist may see composition, negative space, and visual rhythm. A ritual specialist may see offerings, ceremonial stands, or processional symbolism. A linguist may see categories, modifiers, and structure. This diversity explains why pluralism is necessary. No single lens captures the whole.

9.6 Seeing Through Indus Contexts

Students must imagine the world that shaped the signs: agricultural wealth (bulls, ploughing tools), storage and ritual (jars, vats, stands), riverine ecology (fish, water motifs), urban planning (rectilinear geometry), craft and workshop life (tools, shapes). Context does not give meaning, but it anchors interpretation responsibly.

Reflection 9.1

Choose any Indus sign. Describe it first as lines, then as a picture, then as an abstract form, and finally as a functional element. What changes as you shift between layers?

9.7 The Stroke Layer: The Smallest Building Blocks

Like Sumerian wedges or early Tamil graffiti marks, the Indus script begins with elemental gestures: vertical strokes, horizontal strokes, angled marks, dots, hooks, and small curves. These form the alphabet of Indus design and help students reconstruct complex signs from simple motions.

9.8 The Shape Layer: Combining Strokes into Forms

When strokes combine, shapes emerge: jars and containers, horns and crescents, fish outlines, stacked rectangles, leaf or sprig forms, crossbars and gates. This is the design layer, where signs begin to resemble objects or stable abstractions. Different readers—engineer, artist, ritualist, child—see different meanings, and this diversity enriches pluralism.

9.9 The Functional Layer: How Signs Behave in Inscriptions

Function can be observed without decipherment. Does the sign serve as prefix, core, or suffix? Does it prefer certain companions? Does it appear only with certain animals (e.g., unicorn)? Does it require or resist stroke modifiers? Does it occupy a stable position? Epigraphers think this way: sign behaviour first, meaning later.

9.10 The Cognitive Layer: Human Pattern-Making

Humans naturally classify shapes, detect symmetry, recognise families, identify repeated modules, cluster similar forms, and infer structure. This explains fish families, jar families, stroke-modified families, and geometric families. The script reflects shared cognitive habits.

9.11 The Cultural Layer: Context Creates Direction

Meaning is unknown, but context is informative. Seals versus sealings imply administrative or transport roles. Tablets suggest lists or records. Pottery graffiti reflect household or workshop use. Copper plates imply formal contexts. A sign on a seal does not function the same as a sign on a pot; context guides interpretation.

9.12 The Abstraction Layer: Removing to Reveal

Abstraction simplifies reality: bull becomes horn plus hump, fish becomes axis plus fork, jar becomes curve plus neck, building becomes stacked rectangles, human becomes stick figure. Indus signs use purposeful abstraction: clarity over realism. This does not reduce meaning; it highlights essence and ease to write.

9.13 Construction as the Opposite Process (Montessori Lens)

If abstraction removes detail, construction adds detail. Montessori-like learning shows: strokes and curves form shapes; shapes and arrangement form symbols; symbols and sequence form inscriptions. Both abstraction and construction illuminate how Indus scribes conceived symbols.

9.14 The Designer's Eye: Signs as Systems

Engineering drawing teaches points to lines to surfaces to structures, and relations to constraints to systems. Indus signs follow similar logic: controlled angles, repeatable proportions, modular combinations, balanced composition, and intentional symmetry or asymmetry. Scribes were designers working within a visual system.

9.15 A Multi-Parameter Method for Grouping Signs

There is no single correct grouping. Signs may be classified by shape family, stroke composition, regional style, functional role, context of use, frequency, cluster behaviour, or abstraction level. The Vallam–Tanjore graffiti example (“Mookkan / three-stars-running”) shows how different lenses yield equally valid interpretations. Pluralism is not confusion; it is a method.

9.16 Abstraction + Construction → A Pluralistic Research Path

A robust approach combines abstraction, construction, design logic (rules and variations), epigraphic discipline (structure first), Indus context (animals, objects, architecture), and computational testing (what-if modelling). This equips students not to decipher the script but to understand how it works as a visual system.

Reflection 9.2

Choose any sign. Describe it first as an abstraction, then as a construction exercise. What does this reveal about how the sign was conceived?

End of Chapter 9.

CHAPTER 10 — BECOMING THE FIRST SCRIBE: HOW HUMANS TURNED EXPERIENCE INTO SIGNS

Before there were scripts, there were experiences. Early humans noticed the animals they depended on, the tools they used, the landscapes they lived in, the rituals they performed, and the social relations they belonged to. From these lived experiences emerged the first symbols. This chapter invites students to imagine themselves as the original designers of the Indus script and to understand how early scribes everywhere transformed reality into symbolic form.

10.1 The Ox-Head That Became the Letter A

A famous example of ancient design evolving into writing is the development of the letter A. It begins with a simple picture of an ox's head: two horns, a triangular face, and broad cheeks. Early scribes rotated the ox-head for easier drawing on clay, then abstracted it: the horns became angled strokes, the face a bar or point. This evolution—Proto-Sinaitic, Phoenician, Greek, Latin, and later Brahmi—shows that writing begins when reality is simplified into essential, recognisable shapes. Indus scribes likely followed similar cognitive processes.

10.2 What This Teaches Us About Ancient Design

The evolution of A reveals three universal principles. First, every sign begins as a meaningful experience: the ox becomes identity, symbol, and letter. Second, abstraction removes unnecessary detail; only essential features survive. Third, recognisability depends on shared cultural agreement. As we try to look at Indus signs, we can expect similar logic while still allowing pluralism: a fish becomes axis plus tail, a jar becomes circle plus neck, a bull becomes horns plus hump, a man becomes vertical line plus raised arms, and a ritual stand becomes platform plus stem. These are reflections of human cognition rather than coincidence.

10.3 If You Were the First Indus Designer

This reflective exercise supports the book's theme, Reading Ancient Minds. Imagine yourself in Harappa or Mohenjo-daro, tasked with creating signs that an entire community can understand. You would ask: Which animals are culturally respected? Which tools define our craft? Which objects appear in rituals? Which shapes are easiest to carve on steatite? What patterns will people recognise instantly? Should earlier graffiti or pot marks guide me? How should I teach my students so the system spreads reliably? And most importantly: How much detail can I remove while still preserving meaning?

This is where visual grammar is born—at the threshold where spoken language begins its transition into written form. You are not drawing pictures; you are designing symbols meant to endure for centuries, just as the ox-head sign gradually evolved into the letter A. From that moment onward, people began interacting, remembering, and communicating through a written medium—an invention that continues to shape human expression to this day.

10.4 How Many Trials Did the Indus Scribes Attempt?

Our reflection raises an important question: How many attempts were made before the community accepted the final symbols? Although we cannot reconstruct the earliest stages of Indus writing, we can infer several developmental steps. Pre-Harappan graffiti shows simple marks that may have served as prototypes. Early pictograms likely preceded the mature, standardised forms seen on seals. Workshops and guilds probably evaluated, refined, and harmonised designs over time. Only those signs that were easy to carve, easy to recognise, meaningful to the community, and stable across long distances ultimately survived.

The remarkable stability of Indus signs over nearly seven centuries suggests that their design was both effective and culturally resonant. It also hints at a broader cognitive pattern shared across early writing traditions. As people travelled for trade, ritual journeys, migration, and exploration, conceptual tools such as abstraction, simplification, and perhaps even rebus-based reasoning may have circulated widely. While the exact mechanisms are unknown, the Indus script stands as one of

the clearest examples of how communities converge on symbolic forms that endure across geography and generations.

10.5 Reflection: What Would Your First Indus Sign Look Like?

Design a symbol for mother, river, grain, clan, trader, or journey. Consider which features are essential, which can be removed, whether people will recognise it, and whether it will survive carving on stone. This mirrors how early designers across civilisations approached symbolism.

10.6 What Constraints Shape a Script?

Every writing system is shaped by constraints—material, cognitive, cultural, and functional. An Indus scribe faced material constraints such as soft steatite that hardens after firing, small seal surfaces, shallow lines that must remain durable, and difficulty correcting errors. Cognitive constraints required memorability and clear shape recognition. Cultural constraints demanded resonance with shared experiences—animals, tools, rituals, clan identities. Functional constraints required signs to fit into prefix–core–suffix structures, remain short, and convey identity or category through seals. These constraints shaped the script as much as imagination did.

10.7 Why Abstraction Was Necessary

Indus seals are tiny, so abstraction was essential. A realistic bull requires shading and detail, but the Indus bull uses a hump as a single curve, horns as prongs, the face as a wedge, and legs as lines. Abstraction makes carving faster, easier to standardise, easier to recognise, easier to combine with other signs, and functional across cities and centuries. The same logic that simplified the ox-head into A governed Indus design.

10.8 The Indus Way of Seeing: From World → Form → Symbol → System

Designing a sign required four mental steps. First, the scribe observed the world: animals, jars, tools, landscapes, and rituals. Second, the scribe identified the essential features—such as the curve that conveys fish, the horns that convey bullness, or the outline that suggests a jar. Third, these features were reduced into geometric forms, often just a few deliberate strokes. Finally, the sign was placed within a functional system—prefix, core, suffix, or part of a cluster family. This transformation from world to form, form to symbol, and symbol to system is fundamental to the evolution of writing everywhere.

Representing abstract ideas posed greater challenges. How would one write time or truth? One possibility is to relate the sun to time, using a circle to represent both the passage of the day and cosmic order. Acceptance depends on shared cultural understanding.

Ancient scripts reveal similar strategies. A simple vertical and horizontal stroke in Sumerian represented “me,” a principle linked to truth and order. Even in modern English, we retain metaphors such as “upright in truth.”

In Tolkappiyam, speakers enjoyed freedom to express ideas creatively within shared conventions. Ancient communities—including the Indus—may likewise have allowed scribes to blend abstraction, cultural resonance, and personal insight.

10.9 What the Ox-Head → A Reveals About the Indus Script

The evolution of the letter A shows a broader pattern in the history of writing: people simplify forms once they understand them deeply; abstraction stabilises when communities accept it;

systems emerge through repetition; and a script often conceals long, invisible histories of refinement. The Indus script appears already mature because its earliest prototypes—its long developmental prehistory—are largely lost to us. Pre-Harappan graffiti may preserve fragments of these missing formative stages.

What stands out in the Indus record, however, is the absence of clear ox-head or horn motifs that we might easily recognise as the ancestor of the letter A. This is puzzling, given that many tribal communities in India still adorn their headgear with animal horns, and given that Indus seals routinely depict unicorns, bulls, and elephants. This prompts an important question: Could the Indus script have predated the Near Eastern ox-head-based evolution of the letter A?

It is equally striking that the Brahmi letter A retains a stylised ox-head-horn form, suggesting deep cultural memory. If the Indus script was not using the ox-head model, then we must identify which Indus sign—or family of signs—may have functioned phonetically as /a/ or /ā/.

Dravidian-Tamil researchers have offered several candidates:

1. Kangali and other scholars propose the stick diagram IM-1 as representing the vowel A.
2. Jagannatha Desai (Jagna Devam) and other Dravidian scholars suggest the jar sign represents “AN,” noting that many Tamil words end with -an or -am.

Identifying the most plausible Indus candidates for the phonetic value A would be an important starting point in reconstructing the script’s internal structure. Intriguingly, the long vowel ā in Tamil means “cow,” and the jar sign does resemble a stylised bovine face—parallel to how early Sumerian pictographs similarly depicted cattle.

10.10 If You Designed a Sign, Would Others Accept It?

A symbol survives only when a community accepts it. If you created a new sign for mother, grain, river, guardian, or season, your peers would evaluate whether it is simple, distinct, easy to carve, effective when impressed on clay, and recognisable to all. This communal process of testing, refining, accepting, or rejecting designs explains how Indus sign families became standardised across vast regions.

Imitation played a central role: learners copied existing signs before innovating. This preserved continuity while still allowing variation and layered meanings. Such flexibility characterises the evolution of symbolic systems from ancient scripts to modern computer programming languages. Historical examples show that discrete codes also emerged for specialised communication. Cattle brokers once negotiated prices and qualities using concealed finger signals—a controlled symbolic system within their community. Sign systems, whether formal scripts or informal codes, evolve through shared conventions, practical needs, human ingenuity, and, at times, deliberate secrecy.

10.11 Why Scripts Emerge Slowly: Trial, Error, and Communal Refinement

Behind every stable Indus sign lay many rejected attempts, workshop debates, artistic refinements, negotiated meanings, and stages of experimentation. Similar patterns appear in Sumerian pictograms, Egyptian proto-hieroglyphs, Chinese pot marks, and Tamil pre-Brahmi graffiti. We see

only the successful survivors—designs that passed tests of clarity, utility, replicability, and cultural acceptance.

10.12 Final Reflection: Turning Experience Into Symbol

Choose one: sun, mountain, fish, pot, clan, mother, rain, child, tree, hut. Ask yourself: What is the minimum form needed to suggest it? What details can be removed? What shape is easiest to carve? Would others recognise it? Could it survive centuries of use? Such exercises bring you close to the first Indus scribe—not deciphering their script but understanding how they thought.

End of Chapter 10.

CHAPTER 11 — THE STORY OF EARLY NUMBERS: HOW STROKES BECAME COUNTING

Numbers did not begin as symbols. Long before people invented numerals, they learned to record quantity through simple marks. A single line meant one, two lines meant two, three lines meant three. These marks appear across the world—in Sumerian clay tablets, Egyptian tallies, Chinese oracle records, Tamil pottery graffiti, and Indus inscriptions. Early mathematics was visual, concrete, and shared by everyone, even those who could not read or write.

The Indus script, too, carries this universal memory. Its scribes placed short strokes beside many signs, repeating them with discipline and purpose. These tiny lines may look simple, but they reveal the earliest structure of human counting.

11.1 Counting Before Numerals

Before symbols like “2” or “3” existed, people relied on repeated marks. They scratched strokes on bones, pots, and walls. Anyone could recognise how many marks were present. Numbers were not writing; they were patterns the eye could grasp instantly.

This early simplicity is the foundation of every later number system. Repetition was humanity’s first mathematics.

11.2 Sumerian Wedges: Clay as a Calculator

The Sumerians pressed wedges into soft clay. One wedge meant one. Two wedges meant two. Three wedges meant three. Only much later did they create place-value notation. Their earliest number-writing reflects the same logic we see in Indus seals: quantity is captured by repeating a basic shape.

11.3 Tamil Counting Traditions: The Living Line

Tamil culture preserved this ancient practice well into historical times. Market tallies, cattle marks, potter symbols, and temple accounts recorded quantities using straight strokes—one, two, three, four—sometimes bundled to show higher numbers. These are not special Tamil inventions; they are part of humanity’s shared visual counting memory. They also help modern students understand how Indus strokes may have worked.

11.4 Indus Strokes as Early Mathematical Thought

Indus inscriptions often contain one to four strokes placed before, after, or beside a core sign. Even without decipherment, clear patterns emerge:

Strokes modify meaning.

Strokes follow positional rules.

Strokes rarely exceed four.

Strokes create families of signs with related value or category.

This suggests an organised system—practical, consistent, and widely understood.

11.5 Why Strokes Were Universal

Strokes were ideal for early counting because they were simple to draw, easy to repeat, and impossible to confuse. They required no special training. A child, a trader, or a potter could all produce and understand them. Strokes allowed information to be shared across languages and communities. The Indus scribes used a tool that already existed in every human mind.

11.6 Visual Mathematics in the Indus Script

Indus strokes do not appear randomly. Their placement is deliberate. One stroke often signals a basic category, two strokes a second grade, three strokes a higher grouping, and four strokes a rare or special form. The controlled rhythm of these marks suggests that Indus writing carried mathematical order long before formal numerals were developed.

11.7 Tamil Parallels Without Overclaiming

Tamil tally traditions mirror this logic: simple marks representing categories, counts, or divisions. The resemblance does not prove that the Indus script used Tamil language. Instead, it demonstrates

that humans everywhere solved counting in similar ways. Visual counting is a universal heritage, not evidence for linguistic identity.

11.8 Strokes Are Not Always Numbers

Not every stroke in the Indus script may represent a number. Some could mark types, batches, grades, subgroups, supervisor checks, or ritual steps. A jar with three strokes may indicate “third kind of jar,” not “three jars.” A fish with two strokes may classify a species rather than count its number.

Early writing systems often used the same simple marks to express multiple ideas. The stroke was a flexible thinking tool.

11.9 Patterns That Reveal Order

Even without meaning, we can observe order:

Strokes increase in controlled sequence.

Strokes appear in recognised positions.

Strokes rarely exceed four.

Signs with strokes form related sets.

Complexity grows through repetition, not through invention of new shapes.

These patterns show that Indus writing was structured, rule-based, and widely shared by its users.

11.10 Mathematics in Everyday Indus Life

Indus society needed counting for grain storage, trading goods, house inventories, rituals, weights and measures, and brick-making ratios. A simple stroke attached to a sign may have carried practical information—batch number, group type, quality level, or step in a process. Short inscriptions likely condensed useful daily mathematics into compact form.

11.11 A Pluralistic Number Logic

Because we cannot be sure how strokes were used, we must keep several possibilities open:

Strokes may show numbers.

Strokes may show categories.

Strokes may show ritual cycles.

Strokes may show administrative groupings.

A careful study compares multiple seals, recognises patterns, and allows more than one explanation to coexist. Early writing was fluid and adaptable, not rigid like modern scripts.

11.12 Final Reflection: How Do You Think With Strokes?

Choose any Indus sign with two, three, or four strokes. Ask yourself:

What changes when a stroke is added or removed?

Does its position alter its meaning?

Could it show quantity, type, or classification?

How might a scribe keep meanings consistent across hundreds of seals?

How much information can a few simple lines carry?

By exploring these questions, you step closer to the mind of an early Indus scribe—not by deciphering their script, but by understanding how meaning can grow from the simplest marks.

CHAPTER 12 — EARLY HUMANS AND COGNITIVE TOOLS: COUNTING, GROUPING & THE BIRTH OF STRUCTURED THOUGHT

Before writing existed, before numbers were invented, and long before symbols appeared on seals, humans developed cognitive tools that helped them survive. They grouped, compared, recognised patterns, measured, estimated, remembered sequences, and made marks. These mental habits are older than spoken grammar and older than cities. Understanding them helps us appreciate how the Indus script, with its strokes, families, clusters, and structured inscriptions, emerged from deep human ways of organising the world.

12.1 Cognitive Tools Begin With the Body

Early humans understood quantity through the body. One hand suggested “one,” two hands suggested “two,” and many fingers implied “many.” Footsteps suggested distance, repeated actions suggested cycles, and physical rhythm created mental order. Counting was not abstract. It was something felt, moved, and repeated. This is why early scripts, including the Indus script, rely heavily on strokes and repetition. These forms arise naturally from embodied human experience.

12.2 Grouping: The First Mathematical Operation

Long before humans invented numbers, they grouped things: berries, stones, animals, tasks, tools, or members of a hunting party. Grouping created categories, types, sets, and families. The same logic later shaped writing systems. In the Indus script, jar signs form families, fish signs form

families, strokes appear in ordered groups, and prefixes repeat in clusters around core signs. These are not coincidences—they are visual expressions of ancient cognitive habits.

12.3 Pattern Recognition: The Brain's Oldest Skill

Survival depended on recognising patterns: animal tracks, cloud shapes, seasonal cycles, behaviour rhythms, or repeated marks on tools. Pattern recognition later became the foundation of writing. Indus inscriptions show predictable structures, repeated sequences, consistent sign ordering, and controlled variation. Even without decipherment, it is clear that the Indus script is built on pattern logic.

12.4 Early Humans Used Marks Long Before They Used Symbols

Some of the earliest human-made marks include parallel lines scratched on ochre, repeated cuts on bone, tally marks on wood, and zigzags on shells. These markings were not writing but proto-recording—early attempts to stabilise memory outside the mind. From these simple marks evolved Sumerian tallies, Egyptian notches, Chinese numerical logs, Tamil stroke marks, and Indus stroke modifiers. Visual mathematics emerged first; verbal mathematics came much later.

12.5 When Groups Became Concepts

Early humans first grouped objects physically: three berries meant something immediate—“pick them.” Later, they recognised that the idea of “three-ness” could apply to animals, tools, or days. Eventually, this became symbolic grouping: representing “three” with three strokes. Indus inscriptions reflect this stage clearly. Strokes behave like grouped categories, sign families mirror grouped meanings, and compact inscriptions express multiple grouped ideas at once. Grouping is not mathematics—it is fundamental cognition.

12.6 Why This Matters for Indus Studies

To understand the Indus script, students must understand the cognitive world that produced it. The script brings together daily experience, craft knowledge, and symbolic imagination. Strokes represent visual grouping. Core signs represent conceptual grouping. Sign families represent pattern grouping. Clusters represent relational grouping. By studying how ancient people grouped information, we can understand the mental world behind Indus inscriptions without claiming decipherment.

Reflection 12.1

Choose three everyday objects—cup, leaf, stone. How would you group them? By shape? Use? Size? Meaning? What happens when you try representing these groups using only strokes or simple lines? What do you gain or lose?

Part 2 — Expanding the Cognitive Toolkit

12.7 Comparing: The Birth of Measurement

Long before rulers or scales existed, humans compared objects and experiences. They compared one stone's weight against another, one footprint against another, one day's travel with the previous day, or one tool's size with a familiar standard. Comparison eventually became measurement: height, weight, distance, time, quantity, and proportion.

Indus culture shows deep awareness of comparison through standardised weights, brick ratios (1:2:4), modular city layouts, and seals carved with consistent proportions. These systems came not from mathematics textbooks but from ancient cognitive habits.

12.8 Sequencing: Knowing What Comes Next

Human memory developed through sequences: gather → cook; sow → irrigate → harvest; sunrise → heat → evening; or rituals performed in a particular order. Sequencing laid the foundation for grammar, instruction, ritual practices, and craft learning.

Indus inscriptions show clear sequencing behaviour. Signs follow a structured left-to-right order, with prefixes, cores, and suffixes arranged consistently. Repeated patterns across cities show that sequencing was part of shared scribal training.

12.9 Rhythm: The Brain's Way of Remembering

Before writing, rhythm preserved knowledge. People used chants, work songs, dance patterns, and repeated tool strikes. Rhythm created memory through repetition.

Indus inscriptions show visual rhythm: repeating strokes, paired geometries, symmetrical shapes, and balanced clusters. These rhythms are cognitive, not linguistic. They make the script stable, teachable, and mentally memorable.

12.10 Proportion as a Cognitive Tool

Early architecture and tool-making taught humans the importance of proportion. A pot must balance height and width, a shelter must balance span and support, and a wheel must be circular enough to roll.

Indus society lived in a world of proportion: grid-planned cities, standard brick molds, ratio-based weights, and uniformly shaped seals. Indus signs mirror this proportional thinking. Jar signs have consistent curves, fish signs follow a standard angle, horns maintain their geometric balance, and strokes align with precision. Proportion is cognition expressed as design.

12.11 Memory Tools: How Knowledge Survived Before Writing

Before writing, humans stored information using external memory aids: marked bones, notched sticks, arranged stones, knotted fibres, and repeated motifs on pottery. These devices extended memory outside the brain.

Indus seals and tablets behave the same way. A small seal compresses identity into a short sequence. Strokes compress counts or categories. Sign families compress conceptual fields. Clusters compress relationships. Writing begins when memory steps outside the mind.

12.12 The Indus Script as a Cognitive System

Viewed through cognitive science, the Indus script reflects grouping, sequencing, categorising, abstracting, standardising, and visual optimisation. These features belong to a mature cognitive toolkit. The script is not merely a set of pictures—it is the product of an evolved mental system capable of compressing information into concise visual forms.

12.13 The Cognitive Bridge to Indus Writing

We can trace a conceptual path from the earliest scratches to the Indus script:

Marking → Patterning → Representing → Systemising → Encoding.

Indus writing belongs to the final stages of this sequence—a mature system refined over thousands of years. Its compact structure reflects deep cognitive evolution rather than sudden invention.

12.14 Why Indus Script Appears Mature From the Beginning

One of the great puzzles is that the earliest Indus inscriptions already look polished. The cognitive explanation is simple: humans had practiced making marks for tens of thousands of years. Symbolic thinking was ancient. Craft traditions stabilised forms. Communities filtered out poor designs. What

survived archaeologically are the successful, refined signs that passed cultural tests of clarity and usefulness.

12.15 Reflection 12.2

Choose any everyday activity—cooking, climbing stairs, or gardening. Identify the sequence it follows, the groups within it, the patterns that repeat, and the proportions that matter. If you had to represent this activity using only strokes and simple shapes, how would you do it?

This helps students see how early humans transformed daily experience into structured thinking.

End of Chapter 12

CHAPTER 13 — FINAL INTEGRATION: LEARNING TO SEE THE INDUS SCRIPT AS A STRUCTURED HUMAN SYSTEM

This chapter brings together everything learned so far about visual grammar, strokes and sign families, abstraction, cognitive tools, design logic, pluralistic reasoning, and the comparative insights drawn from Sumerian, Tamil, and other early traditions. Before moving to the next part of the book, it is important to recognise one central truth: the Indus script is not mysterious because it hides meaning. It is mysterious because we have forgotten how early humans thought. This chapter restores that way of seeing.

13.1 What We Now Understand About Indus Writing

Across all previous chapters, a clear pattern has emerged: the Indus script is structured rather than random. It follows predictable sequencing patterns, with signs arranged in a prefix–core–suffix order. Proportions remain stable, and strokes function as controlled modifiers.

Signs form families—fish forms, jar forms, horned forms, and geometric forms show consistent internal organisation. Strokes operate not simply as numbers but as tools for grouping, marking type, indicating rank, or emphasising a category. Abstraction shaped every sign: a jar becomes curve plus neck; a fish becomes line plus tail; a head becomes horn plus wedge. The script reflects daily life transformed into symbol. Finally, pluralistic interpretation ensures that multiple hypotheses remain open and testable rather than forcing one rigid model.

13.2 Why We Cannot Treat Indus Writing Like an Alphabet

Modern readers often assume that writing should match the alphabetic model: letters map to sounds, which combine to form words and sentences. But early writing did not work this way. The Indus script operates at the level of categories, relationships, and functions rather than phonetic units.

It resembles the early stages of Sumerian, Egyptian, Chinese, and Tamil recording traditions, where inscriptions were compact, meaningful, and heavily context-dependent. The script compresses information, uses short sequences, and relies on shared cultural understanding. This makes decipherment difficult but allows structural understanding.

13.3 The Core Principle: Early Humans Thought in Patterns, Not Words

Long before languages developed grammar, humans relied on grouping, matching, sequencing, rhythm, comparison, and proportion. The Indus script expresses these mental habits visually. What we are reading is not “Indus language” but “Indus cognition.” And cognition persists even when language is lost.

13.4 Seeing the Script Through Multiple Lenses

Students now have several analytical tools for engaging with Indus inscriptions. Through the stroke lens, they observe how the number and placement of strokes change meaning. Through the family lens, they identify whether a sign belongs to the jar, fish, horn, or geometric family. Positional behaviour reveals whether a sign tends to appear as prefix, core, or suffix. Clustering patterns show which signs frequently occur together. Levels of abstraction reveal whether a sign is pictorial or geometric. Cultural context adds meaning by examining associations with motifs such as the unicorn, jars, ritual stands, or animals.

No single lens is sufficient on its own, but together they reveal the script’s layered structure.

13.5 What We Can Say With Confidence (Without Decipherment)

Even without reading the language, we can say confidently that the Indus script is rule-governed, conventional, and widely taught across the civilisation’s vast geography. It served economic, ritual, and administrative functions. It evolved from long-standing cognitive practices. It integrates art, mathematics, and symbolic classification. It is neither alphabetic nor random, but a structured visual language built to manage complex categories. These conclusions come directly from observable patterns across thousands of inscriptions.

13.6 Why a Pluralistic Method Is Necessary

A single-source explanation—Tamil-only, Sumerian-only, purely linguistic, or purely symbolic—is too narrow. The Indus script requires a pluralistic approach because it reflects multiple intellectual traditions and cognitive layers. Pluralism allows alternative hypotheses to coexist, encourages comparative reasoning, and keeps the field intellectually honest. It prevents premature conclusions and supports deeper, evidence-based understanding.

13.7 The Indus Script as a Cognitive Artifact

When earlier chapters are integrated, the Indus script becomes visible as a cognitive artifact: a tool reflecting how ancient minds structured their world. It is also a cultural artifact tied to identity, ritual, and administration. It is a design artifact shaped with precision, proportion, and abstraction. And it is a symbolic artifact encoding classification rather than direct speech. The script becomes understandable not by deciphering vocabulary but by reconstructing the mental world of its creators.

This captures the spirit of your book’s subtitle: *Indus Journey with ChatGPT — Reading Their Minds*.

13.8 Preparing for Part 2: Applying All Tools to Real Inscriptions

The next part of the book begins the practical phase. Students will analyse real Indus seals and tablets, identify prefixes, cores, and suffixes, trace sign families, test stroke logic, observe clusters, and perform “what-if” reasoning. They will compare Indus forms with parallels from Tamil and Sumerian traditions. The goal is not to memorise meanings but to learn how to think like a careful, responsible Indus researcher.

13.9 Final Reflection: What Does It Mean to “Read Minds”?

Studying the Indus script requires patience, pattern recognition, humility, disciplined imagination, and openness to multiple possibilities. Students may reflect on the following questions:

Which cognitive tools do you use when looking at an Indus sign?

Which layers—shape, stroke, pattern, or context—do you notice first?

How does pluralism change the way you interpret ancient evidence?

What can we know with confidence about ancient minds, and what must we leave open?

These questions help learners understand that reading the Indus script is not about cracking a code but learning to see as early humans saw.

End of Chapter 13

CHAPTER 14 — HOW TO READ AN INDUS INSCRIPTION:

From Sign-by-Sign Observation to Pattern-Level Understanding

Before we begin analysing real seals in the next part of the book, students must learn a step-by-step method for reading any Indus inscription. The aim is not to decipher meanings but to understand structure, behaviour, and the patterns that govern the script. This chapter teaches a disciplined way of observing inscriptions so that interpretation becomes grounded, careful, and pluralistic. The approach is visual, cognitive, and comparative rather than linguistic.

14.1 The First Rule: Do Not Begin With Meaning

Many earlier decipherment attempts failed because they started with assumptions—linguistic, cultural, or imaginative. In this book, students learn to begin differently. First observe the sign. Then observe its neighbours. Then notice the family it belongs to. Then study its structure and its behaviour in different inscriptions. Only after this foundation may one explore possible interpretations, and always with caution. Shifting from meaning-first to pattern-first keeps analysis honest.

14.2 Step 1 — Identify the Script Zone

Every seal has two distinct zones: the inscription zone, where the writing appears, and the motif zone, where the animal or ritual figure is carved. Students must first isolate the inscription without being influenced by the motif. Motifs often represent clan identity, ritual affiliation, or symbolic authority, while inscriptions represent structure, classification, and relational logic. Separating these zones keeps analysis clear.

14.3 Step 2 — Determine Reading Direction

Most Indus seals read from left to right, while some tablets read from top to bottom, and a few copper plates reverse the order. Students must learn to recognise starting signs, ending signs, and alignment clues. Determining direction is a structural practice, not a linguistic one.

14.4 Step 3 — Identify Prefix, Core, and Suffix Candidates

Even short inscriptions show functional layout. Prefix-like signs are often small or simple. Core signs tend to be larger and visually dominant. Suffix-like signs may serve as modifiers or closing

elements. Students are not identifying meanings but learning how visual systems organise information.

14.5 Step 4 — Examine Stroke Logic

Strokes reveal essential structural behaviour. They help identify sign families, variants, groupings, and types of modification. Strokes may signal classification, rank, or cycles rather than numbers. Students should ask: How many strokes? Where are they placed? Does placement change behaviour? Stroke logic is one of the most powerful tools for understanding patterns.

14.6 Step 5 — Recognise Shape Families

Many signs belong to visual families: jars, fish, horned heads, geometric forms, gate-like shapes, and composite symbols. Noticing these families helps narrow functional possibilities and provides clues about how scribes grouped ideas.

14.7 Step 6 — Observe Cluster Patterns

Students must pay attention to which signs commonly appear together, which never appear together, and whether stroke-modified versions cluster around particular cores. Some inscriptions form two-sign or three-sign formulae that repeat across the civilisation. Cluster logic forms the backbone of structural analysis.

Reflection 14.1

Choose a short inscription of three to four signs. Identify the prefix candidate, the core sign, the suffix candidate, stroke behaviour, shape family, and cluster patterns—without attempting to assign meaning.

Part 2 — Expanding the Method

14.8 Step 7 — Compare Across Regions

A sign carved at Harappa may also appear at Dholavira, Lothal, or Mohenjo-daro. Students must compare regional variants to understand whether differences are stylistic, functional, or workshop-specific. This reveals stability, drift, and cultural preferences.

14.9 Step 8 — Compare Across Mediums

The same sign may look different when carved on a stone seal, scratched on pottery, stamped on a tablet, or incised into copper. Each medium imposes constraints and influences form. Understanding this prevents misinterpretation of minor variations.

14.10 Step 9 — Study the Motif-Inscription Relationship

Motifs matter. Unicorn seals often feature specific inscription patterns, bull motifs correlate with certain strokes, and ritual stand motifs show unique clusters. Students should ask whether an inscription is generic or motif-specific and whether the motif influences the structure of the inscription. This is an underexplored but important field.

14.11 Step 10 — Look for Symmetry and Balance

Many inscriptions show careful balance: centred cores, mirrored prefixes and suffixes, proportional spacing, and evenly placed strokes. This visual discipline reflects scribal training, aesthetic sense, and cultural expectations. Recognising this balance deepens understanding of how signs were composed.

14.12 Step 11 — Study Outliers Without Forcing Interpretation

Some inscriptions break expected rules. Instead of discarding them, students should explore whether they represent experimental forms, regional styles, workshop practices, training pieces, or ritual exceptions. A pluralistic method allows multiple explanations while avoiding premature conclusions.

14.13 Step 12 — Compare With Other Systems (Responsibly)

Careful comparison with other early scripts—Sumerian, Egyptian, Chinese, and Tamil traditions—can reveal structural parallels such as prefix behaviour, classifier placement, or position-based modifiers. These comparisons help illuminate patterns but should never be used to force linguistic identity or unverified connections.

Reflection 14.2

Choose an inscription that includes an animal motif. Ask whether the motif influences the sequence of signs, whether certain clusters appear only with that motif, and whether the inscription might behave differently on a seal without the motif.

Part 3 — Integrating the Method

14.14 The Twelve-Step Indus Reading Method

Students can now follow a complete checklist:

- Identify the inscription zone.
- Determine orientation.
- Identify prefix candidates.
- Identify core signs.
- Identify suffix candidates.
- Analyse stroke logic.
- Identify shape families.
- Observe cluster patterns.
- Compare across regions.
- Compare across mediums.
- Study motif–inscription relations.
- Note exceptions and consider pluralistic possibilities.

This systematic approach allows students to read any inscription structurally.

14.15 What We Can Infer Without Deciphering

Using this method, students can infer relationships, roles, categories, functions, and structural stability. This is a meaningful form of reading even when phonetic values remain unknown.

14.16 What We Must Not Infer Without Evidence

Students must avoid assigning fixed meanings, mapping signs directly to specific languages, forcing phonetic values, or inventing grammatical features that are not supported by evidence. The pluralistic method guards against overreach.

14.17 Why Short Inscriptions Still Have Deep Structure

A three-sign sequence may contain as much structure as a long sentence: a classification marker, a core identity, and a qualifying element. Short inscriptions are compact, efficient, and often encode multiple layers of information.

14.18 Preparing for Real Case Studies

From the next chapter onward, students will examine real seals, compare variants, identify families, and test multiple hypotheses. They will also practise triadic reflections linking Indus, Tamil, and Sumerian traditions. Chapter 14 provides the full toolkit required for this deeper exploration.

Reflection 14.3

Choose any simple three-step activity such as cooking, travelling, or preparing a ritual. Represent it using one prefix-like symbol, one core-like symbol, and one suffix-like symbol. This exercise mirrors how ancient scribes expressed complexity within very short inscriptions.

End of Chapter 14

CHAPTER 15 — HOW TO READ A SEAL: A GUIDED FRAMEWORK FOR STUDENTS

Before we begin analysing actual seals in Part 2, students must learn how to approach a real Indus inscription in a systematic way. This chapter brings together all earlier insights on visual grammar, cognitive tools, strokes, sign families, abstraction, and motif relations, and turns them into a practical method. It forms the bridge between theory and hands-on analysis.

15.1 The Purpose of Reading a Seal Is Not Decipherment

Many assume that reading a seal means translating it or assigning Tamil or Sumerian meanings to the signs. But this approach fails immediately. Reading an undeciphered script is not about decoding vocabulary. It is about recognising patterns, identifying structure, observing sign behaviour, and understanding how scribes composed meaning visually. Reading a seal means learning how the system works, not what each sign “means.”

15.2 The Two Worlds of Every Seal

Every seal contains two distinct domains.

First is the motif zone, which shows an animal or ritual image such as the unicorn, bull, elephant, antelope, composite creatures, or ritual stands. These motifs relate to identity, clan, ritual authority, or symbolic meaning.

Second is the inscription zone, where the sign sequence appears. This zone expresses classification, categories, and internal structure. While motifs and inscriptions may interact, they must first be analysed independently. Separating the two domains prevents confusion and strengthens interpretation.

15.3 The Twelve-Step Reading Workflow

Here is the student's basic checklist for approaching any inscription:

1. Identify the inscription zone without being influenced by the motif.
2. Determine reading direction. Most seals read left to right.
3. Identify prefix candidates, often small strokes or simple shapes.
4. Identify core signs, usually the largest and most structured symbols.
5. Identify suffix candidates, commonly short marks or modifiers.
6. Analyse stroke behaviour: count, placement, and repetition.
7. Identify shape families such as jar, fish, horned head, or geometric.
8. Map cluster behaviour: which signs recur together?
9. Compare across regions such as Harappa, Mohenjo-daro, Dholavira, or Lothal.
10. Compare across mediums: seals, pottery graffiti, copper plates, tablets.
11. Analyse motif-inscription relationships.
12. Note exceptions and keep multiple possibilities open.

Students should apply these steps every time they read a seal.

15.4 What Students Will Discover in Real Seals

When students analyse actual inscriptions, several features become clear. Many signs appear consistently in certain positions, indicating stability. Signs form families through variations in shape while maintaining shared structure. Stroke counts rarely exceed four, and core forms remain stable

across sites and centuries. Certain clusters repeat in different cities, showing long-term retention of pattern logic. Even short inscriptions carry compressed, meaningful structure.

15.5 The Three-Layer Reading Strategy

Students must learn to read inscriptions on three levels at once.

The first level is the surface form: the strokes, curves, shapes, proportions, spacing, and alignment with the motif. This stage is pure observation.

The second level is structural logic: whether a sign acts as a prefix, core, or suffix; whether strokes signal grouping or category; whether symmetry or repetition is present; whether clusters follow predictable order. This reveals rules beneath the surface.

The third level is cognitive function: why the inscription behaves the way it does. Students consider whether the sequence reflects classification, identity marking, ritual roles, batches, workshop codes, or symbolic cycles. Interpretation begins here, but only after structural logic is understood.

15.6 How Motifs Guide Interpretation Without Controlling It

Motifs influence inscriptions but do not determine them. Unicorn seals often feature certain stable clusters, bull seals may show different patterns, and ritual stands appear with unique endings. Composite creatures may relate to ritual offices. However, the same motif does not guarantee the same inscription, nor does the same inscription guarantee the same motif. The relationship is associative rather than fixed. This understanding prevents overinterpretation.

15.7 Why Short Sequences Are Still Powerful

Most seals contain only three to five signs, yet these short sequences often encode a full structural message. A typical three-sign inscription may contain a prefix category, a core identity, and a qualifier. Early writing systems such as Sumerian jar labels or Egyptian tags used similarly brief formats. Short inscriptions are not simple; they are highly compressed.

15.8 Using Pluralistic Lenses Before Case Studies

When approaching each seal, students must apply multiple lenses. Linguistic comparisons may be made carefully but should never be asserted as proven meaning. Cultural context helps explain motifs or object types. Cognitive tools reveal grouping and sequencing. Design analysis highlights proportions and carving discipline. Administrative or ritual models help explain repeated patterns. A pluralistic approach avoids narrow conclusions and reveals richer interpretations.

15.9 The First Real Skill: Learning to See Through the Signs

By this stage, students should begin to look past the animal motif and notice the inscription's internal structure. They should see rhythm in the strokes, balance in the composition, grouping logic in sign clusters, and the system beneath the surface. This is not translation. It is pattern literacy—the essential skill required to study any undeciphered script.

15.10 Final Reflection: Preparing the Mind for Part 2

Before entering the seal case studies, students should reflect on their own analytical habits. What do they notice first—strokes or shapes? Which patterns repeat across inscriptions? How does the motif influence perception? How does pluralism change the way they interpret evidence? What can be stated with confidence, and what must remain open?

The goal of this chapter is to cultivate humility, precision, and disciplined imagination as students transition into hands-on analysis.

End of Chapter 15

CHAPTER 16 - CASE STUDY 1

Reading a Classic Unicorn Seal with an Open Mind

This chapter gives the first practical demonstration of the twelve-step Indus reading method. Students now apply the tools learned earlier—visual grammar, sign families, strokes and clusters, motifs, abstraction, pluralistic reasoning, and visualization. We begin with the most iconic object of the Indus civilisation: the unicorn seal. The example used here is a representative model constructed from features seen across hundreds of seals.



16.1 Model Seal — Description

A typical unicorn seal shows a single-horned animal facing left, often with a ritual stand or offering platform before it. Above the motif sits a horizontal inscription. For our model we use a four-sign sequence: a small prefix-like sign, a visually dominant core sign, a small modifier, and a final set of vertical strokes. This pattern is common at Harappa, Mohenjo-daro, Kalibangan, and other sites.

Observations from the seal and its impression:

1. The seal is slightly damaged at corners; the impression preserves most of the inscription.
2. The motif (male unicorn) is decorated; the single horn and stance are distinctive.
3. Inscription signs (left → right on the carved seal): a single vertical stroke, a triangular/heap-like sign with inner detail, a rhombus with inset rhombus, and an instrument-like sign placed closely. The final strokes close the sequence.
4. Tools and workmanship reveal a high level of craftsmanship.

A first-person imaginative reconstruction:

Imagine receiving this seal as a merchant or official in Indus times. It may function as a receipt, a batch label, or a confirmation of goods. Such imaginative exercises help us frame hypotheses about sender/receiver identities, commodity types, and administrative practice.

16.2 Separate Motif and Inscription Zones

Begin by separating the motif zone (unicorn + ritual object) from the inscription zone (the signs above). This prevents motif-driven assumptions about sign order and sign purpose.

16.3 Reading Direction

Unicorn seals commonly read **left-to-right** on the carved surface. Their **impressions**, which are reverse images, must be read **right-to-left**.

For example:

If the carved seal shows: | △ ◆ ||
the impression will show: || ◆ △ |.

This helps you verify orientation before attempting interpretation.

16.4 Identifying the Prefix

The first sign is often small or moderate in size—jar-like, gate-like, or simple in outline. On many seals such signs appear at the beginning, functioning as a prefixal classifier that sets a category or context rather than carrying full lexical meaning.

16.5 Identifying the Core Sign

The second sign is visually dominant and more intricate. Core signs often belong to recognisable families (fish, jar, geometric motifs). They express the primary identity of the inscription—a symbolic or administrative category rather than a personal name.

16.6 Identifying the Suffix / Modifier

The third sign is smaller and refines the core. Its scale and position suggest that it modifies or specifies the function of the core sign—an occupational, ritual, or subtype indicator.

16.7 Understanding Final Strokes

One to three vertical strokes commonly end the inscription. These function as qualifiers or type markers, possibly indicating batch, workshop group, or ritual phase rather than simple numbers.

As in engineering education, we alternate between the **whole** and the **parts**. One studies the car as a whole and also its components. In the same way, we study the seal as a whole object and then examine each sign in detail. This technique helps us relate part-to-whole and whole-to-part in a disciplined manner.

16.8 Recognising Shape Families

Classify each sign into a visual family: jar-like, fish-like, geometric, stroke-family, ladder-like, etc. Recognizing families allows students to compare behaviours across many seals and notice recurring pairings.

16.9 Cluster Behaviour

The prefix–core–modifier–stroke pattern recurs across unicorn seals. Students will observe frequent pairings between certain prefixes and certain cores, constraints on modifiers, and narrow ranges in stroke counts.

You may revise groupings and regroup signs as you explore further. For example, you may notice the first two signs are spaced closer, and likewise the last two signs are spaced closer. Exploration is allowed—conclusion must wait. Over-analysis may happen, but careful observation is still valuable in early learning.

16.10 Regional Variation

Shape styles differ by site—sharper in Harappa, rounder in Mohenjo-daro, occasional substitutions in Dholavira. This points to **shared craft conventions**, not random drawing. Each region had its own workshops, craft communities, and material traditions, yet they maintained a consistent underlying structure.

16.11 Variation by Medium

Mini-tablets condense sequences; copper plates show deeper or angled strokes; graffiti simplifies forms. These variations arise from material properties, firing conditions, tool types, and environmental factors.

Despite such natural diversity, we see impressive uniformity in posture, proportions, and arrangement. This reflects **palhozhil-kalainjar** — collective artistic practice — where artisans such as *kalai-vallunar*, *taccar*, or *saanaiyar* followed inherited conventions and shared training rather than isolated individual styles.

16.12 Motif–Inscription Relationship

The unicorn motif frequently co-occurs with the four-sign pattern, indicating a contextual association. Yet identical inscriptions appear without the unicorn, which means the motif guides the context but does not determine sign meaning.

When viewing the seal as a whole, motif and inscription complement each other; when separated for concordance-building, certain details fall away. This is the nature of structural analysis.

16.13 Pluralistic Interpretations (Examples)

Students should generate multiple, testable interpretations, for example:

1. **Administrative:** prefix = department; core = commodity; modifier = subtype; strokes = batch marker.
2. **Ritual:** prefix = ritual setting; core = object/role; modifier = offering type; strokes = ritual phase.
3. **Identity/symbolic:** prefix = clan classifier; core = clan symbol; modifier = lineage detail; strokes = rank.

These remain hypotheses, not conclusions. When we share our interpretations with others, we should listen to their perspectives. Their viewpoints help us retest assumptions and refine our reasoning.

Reflection 16.1 — Exercise

Choose any unicorn seal: identify prefix, core, modifier, and stroke count. Determine sign families and check if similar patterns appear on other seals.

Part II — Deeper Structural Interpretation

16.14 Structural Roles (without imposing meaning)

Using stroke–core–extension–stroke sequences, map structural roles:

initial stroke = classifier; jar-like sign = core; fish-like sign = extension; closing stroke = seal/closure.

This creates a readable symmetry.

16.15 Sign-Family Markers

Jar family: rounded body, short neck.

Fish family: long horizontal element with angled tail.

Document recurring jar + fish combinations before attempting any semantic reading.

16.16 Stroke Logic

Symmetrical framing strokes suggest classification or boundary marking rather than counting, still keeping possibilities as open.

16.17 Cluster Comparisons

Jar-and-fish clusters are frequent; prefixes attach commonly to jar-family signs; suffix strokes appear contextually. When we say pre-fix, core cluster, we see some association between them, how they dynamically interact, is one area, we have to study.

The unicorn motif often accompanies such clusters.

16.18 Why This Seal Is an Ideal First Example

A simple motif, a four-sign inscription, clear prefix/suffix strokes, and stable core elements make this seal ideal for teaching structural reading: direction, shape families, framing, and comparative observation. Readers can explore and identify more such seals and work further.

16.19 Legitimate Student Conclusions

Students may check and evaluate whether the following features are present or absent:

1. The inscription displays a prefix, core, modifier, and suffix strokes.
 2. Jar and fish sign families may be identifiable.
 3. Strokes function as framing or grouping markers.
 4. The pattern recurs across regions.
 5. Structure provides insight even when meaning is unknown.
-

16.20 Claims to Avoid

Students should not: Our initial studies would be formative and exploratives, allowing more freedoms in different interpretaions.

1. assert definitive meanings,
2. identify strokes as numbers without evidence,
3. claim linguistic identities (Tamil, Sumerian, etc.),
4. or assign clan names based on motifs alone.

However, students **may** use regional knowledge or personal cultural experience to generate hypotheses, while maintaining a pluralistic, non-dogmatic approach.

Reflection 16.2 — Prompt

Which sign plays what structural role? What patterns repeat? What remains uncertain? Students may question and use LLMs as part of their inquiry — compare, test, and refine their interpretations.

Part III — Triadic Reasoning & Comparative Insight

16.21 Triadic Reflection: Indus — Sumerian — Tamil

Classifier → object → qualifier patterns appear in early Sumerian lists, Tamil stroke traditions, and Indus inscriptions. These parallels indicate **shared human strategies for grouping and categorisation**, not direct historical borrowing.

16.22 Lessons from Triadic Reflection

Small marks classify; core signs stabilise meaning; order expresses function.

16.23 Pluralistic Lenses

Interpretations may be administrative, ritual, identity-based, or commodity-related. Keep multiple possibilities open.

16.24 Role of the Unicorn Motif

The unicorn may represent ritual authority, craft guilds, clan prestige, or symbolic identity. It contextualises inscriptions but does not decode them. If archaeology uncovers stronger motif-context correlations, that would be a future milestone.

16.25 Final Integration

Students completing this chapter should be able to:

1. separate motif and inscription,
2. identify prefix/core/suffix roles,
3. track stroke logic,
4. recognise sign families,

5. analyse clusters,
6. apply pluralistic and triadic reasoning,
7. compare their interpretations with those of other researchers.

The three pictures below—from Indus Valley, Tamil Nadu, and Mesopotamia—illustrate how posture, offering arrangements, and symbolic stances may share **deep cognitive themes** across cultures. Though meanings differ, communities often express reverence, order, offering, or contemplation through similar visual gestures shaped by local *kalai-vallunar* and traditional craft communities.



Reflection 16.3 — Capstone

Select another unicorn seal. Apply the chapter method. Compare patterns with Sumerian and Tamil traditions. Note what strengthens or weakens your interpretation.

End of Chapter 16

CHAPTER 17 — CASE STUDY 2

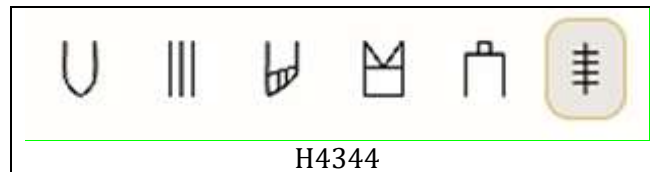
Reading a Multi-Core Seal with a Stacked Cluster Structure

This chapter introduces students to inscriptions that contain **two prominent core signs placed side-by-side**—what we call *multi-core seals*. Unlike the unicorn seals, which usually contain a single dominant core, multi-core inscriptions distribute meaning across **two major visual anchors**. Such seals appear across Harappa, Mohenjo-daro, and Banawali.

Many examples lack animal motifs, allowing us to study the inscription as a **self-contained message**—something like a coded receipt, an instruction label, or a compact administrative note.

For this case study, we use the IM77 Indus Script database entry **HP4344**, which contains **six signs** arranged in a stable sequence. Although some multi-core seals have five signs, a six-sign inscription fits the same structural pattern:

prefix → double core → qualifier → strokes.



17.1 The Multi-Core Pattern

A typical multi-core inscription includes:

1. a **prefix sign**,
2. a large **first core sign**,
3. a large **second core sign**,
4. a **tiny suffix sign**,
5. an **internal micro-sign** (optional),
6. **closing strokes**.

This creates a pattern that is **balanced, intentional, and structurally consistent** across the corpus.

17.2 Focusing on the Inscription Alone

Since HP4344 has **no motif**, our full attention rests on the sign sequence.

The inscription *is* the message.

This trains us to read structure without relying on animals, offerings, or ritual stands for contextual clues. It is similar to sending a small coded message in which the symbols alone must convey meaning.

17.3 Determining Reading Direction

Multi-core seals generally follow a **left → right** orientation on the carved seal:

1. prefix at the left,
2. the two large core signs in the centre,
3. strokes at the right.

The **impression** (reverse print) is read **right → left**.

Directionality becomes clear once the cluster positions are recognised.

17.4 Prefix Identification

The prefix is usually small, compact, and visually modest.

It acts as a **classifier**, opening the inscription without defining its main identity.

17.5 First Core Sign

The first core sign is large and visually stable.

It often belongs to:

1. jar families,
2. fish-like graphic families,
3. horned or geometric families.

This sign anchors the first half of the conceptual unit.

17.6 Second Core Sign

The second core sign is of equal weight.

Together, these two signs form a **compound identity block**.

This does not imply linguistic compounding; rather, it indicates:

1. conceptual pairing,
 2. administrative partnership, or
 3. dual classification.
-

17.7 Miniature Suffix Sign

A tiny sign follows the double-core. It **qualifies** the pair without altering their primary role. Think of it as a:

1. subtype marker,
 2. condition marker, or
 3. “mode” indicator.
-

17.8 Closing Strokes

One or two strokes finish the seal. These are **structural markers** that may perform:

1. framing,
2. grouping,
3. categorising functions.

They should not be assumed to be numerals unless supported by corpus-wide analysis.

17.9 Full-Sequence Logic

HP4344 behaves as the following logical pattern:

1. classifier
2. core concept
3. core concept
4. qualifier
5. micro-qualifier
6. closing stroke

This is a **rule-governed, planned, repeatable** pattern—evidence of systematic composition.

17.10 Cluster Patterns in the Corpus

Across hundreds of seals we observe that:

1. double-core pairs recur,
2. prefixes come from a limited set of families,
3. suffix signs appear only after the double-core,
4. strokes reliably close the sequence.

This consistency reflects **pal-thozhil-kalai** — a shared tradition of multiple artisan communities — rather than isolated or random creativity.

17.11 Global Multi-Core Parallels

Similar structural strategies can be seen elsewhere:

1. **Sumerian**: object + subtype + wedge marker
2. **Old Chinese**: dual graphic compounds
3. **Tamil graffiti**: clan symbol + classifier + stroke qualifier

These echo **cognitive universals**, not historical derivation.

17.12 Triadic Reflection (Indus — Sumerian — Tamil)

Across these civilisations we see the same structural architecture:

prefix → core → core → qualifier → strokes

This reflects:

1. grouping logic,
2. paired representation,
3. final classification.

Indus writing expresses **universal human cognitive strategies** — this is the most plausible foundational insight.

17.13 Interpretive Window (Tamil Pluralistic Approach)

Below is an earlier interpretive attempt by the author, taking cues from **Kangali**, a Gondi language expert. He views certain sign clusters as **formulae** or **process instructions**, sometimes related to

extracting metals (the triangular-bottom sign may suggest molten metal). The author proposes an alternative reading: a **value proposition** or **barter equation**.

These variations show how interpretation shifts depending on context and cultural background.

For example, the jar-like sign at the far left resembles a **measuring vessel**, known in Tamil as *marakkaal*. Kings used larger calibrated vessels; common households used smaller versions. The three strokes before it may reinforce measurement or classification. Such flexible clustering is **subjective and exploratory**, forming part of pluralistic interpretation.

Tamil Text from பக்கம் 61, ஹரப்பா 1940–344 (Avaiyam Journal)

Tamil scholars often read Indus clusters through **triadic reasoning**, rebus association, and layered symbolic interpretation. Three interpretive levels are documented:

(A) Syllabic / Sound-Based Associations

கோவா, மாடா, குடரதே, கோவாதா, மூந்த, ஆலாங்க
— an exploratory sound mapping identifying potential phonetic values.

(B) Conceptual / Poetic Interpretation

வைப்பு மாலை அம்பாரம் – இவை மூன்றும் தாது (உலோகத்திற்கு) அளவு
A symbolic rendering:
three elements forming a set related to **metal measurement** or **metallurgical capacity**.

(C) Triadic Structural Interpretation

மூன்று அளவுகோல் (அளவு கொள்):
கோவம்-தங்கம், கூறை புடவை (alternative இரதம்), மாட-வீடு.
புடவை – மூன்று கவனிக்க வேண்டும்.

This suggests:

1. a three-part measurement system,
2. categories linked to *gold, cloth (or vehicle), household*, etc.
3. the need to observe all **three units** together.

These are **not decipherments**, but demonstrations of how cultural–semantic frameworks can create structured readings that align naturally with the **multi-core clustering** of HP4344.

They illustrate **pluralistic reasoning**, not fixed answers.

17.14 What We Can Conclude Confidently

1. The double-core architecture is intentional.
2. The sequence obeys consistent rules.
3. Mini-signs and strokes behave predictably.
4. These inscriptions form part of a disciplined communication system.

They are not decorative objects; they are **crafted information units**.

17.15 Reflection Exercise

Choose another seal with two large core signs.

Identify:

1. prefix
2. core 1
3. core 2
4. mini-suffix
5. closing stroke(s)

Compare your seal with HP4344:

1. Which structural elements match?
2. Which differ?
3. Which interpretations remain open?

This exercise strengthens **structural, comparative, and pluralistic reasoning**.

End of Chapter 17

CHAPTER 18 — CASE STUDY 3

The Stick Figure (IM77 1,1): Gesture, Voice, and the Earliest Human Abstractions

This chapter will be:

1. fluid
2. cross-cultural
3. thoughtful
4. pluralistic
5. safe (not claiming decipherment)
6. grounded in your Tamil classical perspective
7. and organically linked to Chapters 16–17.

It will also prepare the reader for Chapters 19–20 and the Appendices.

🌿 CHAPTER 18 — Case Study 3

The Stick Figure (IM77 1,1): Gesture, Voice, and the Birth of Meaning



The simplest sign is often the deepest.

After the unicorn and the double-core inscriptions, we turn to a sign so small and so familiar that we almost overlook it: the **stick figure**, listed in the IM77 corpus as **1,1** and appearing in many modified forms (134,1; 162,1; 208,1; 375,1; 303,1; 343,1; 373,1; 393,1).

It is nothing more than a vertical line with two angled marks.

Yet this sign belongs not only to the Indus script; it belongs to humanity.
It appears in:

1. early Sumerian tablets (the **LU** / **MAN** sign),
2. early Chinese inscriptions (the **人** **ren** radical),
3. Tamil pottery graffiti (the **āṇ** / **vētan** / **velan** marks),
4. African rock art,
5. European cave markings,
6. and the earliest children's drawings worldwide.

Everywhere, the simplest human shape becomes the **first graphic abstraction of life**.

In this chapter, we explore how the Indus civilisation used this form, and how its cognitive echoes remain alive in Tamil traditions, in Tolkāppiyam, and perhaps in the very origin of the letter **A**.

18.1 Seeing the Sign for the First Time

Look at the base symbol (1,1):
a single upright stroke with two short diagonals.

A child sees a *person standing*.

An archaeologist sees a *pictogram*.

A grammarian sees the beginning of *gesture-based deixis*.

A Sumerian scholar sees the earliest *semantic classifier*.

A Tamil teacher sees the first letter **அ** emerging from breath and gesture.

A cognitive scientist sees the **minimal form of agency**.

This is why the sign is important:
it is not only a mark — it is the idea of a person, a direction, a presence.

18.2 Tolkāppiyam and the Origins of Deixis

Tolkāppiyar says:

1. **அ** — used for *nearby things*

2.  — used for *intermediate things*

3.  — used for *distant things*

These are **deictic roots**, which today we call “pointing words.”

Before language, humans **pointed with the body**.

Before written words, humans **drew the pointing body**.

The Indus stick figure is likely part of this world of combined **voice + gesture**.

Thus, the Indus person-sign may not initially have been a “person” at all — it may have been a **pointer**, a basic demonstrative gesture.

This matches global cognitive evolution:

1. gesture first
2. symbolism next
3. sound association next
4. writing last

When students look at the sign, they see a “human,” but originally it may have meant:

1. “this one,”
2. “that one,”
3. “the actor,”
4. “the doer,”
5. “the holder,”
6. “the place here,”
7. “the gesture of standing or offering.”

18.3 The Letter A and the Possible Lineage of the Sign

We observe something profound:

“This letter could be the fundamental for written letter A, forming part of cattle or cow head with horns.”

This idea is **not impossible**.

Many writing systems transformed early body or animal shapes into letters:

1. Egyptian → Canaanite → Phoenician → Greek → Latin
2. Ox head → **Aleph** → **Alpha** → **A**



And the Indus script contains **horned head** pictograms shaped like A-forms.

If the Indus stick-figure and A-form cattle-head share structural ancestry, this is not a linguistic claim — only a cognitive one:

1. the *same human brain* abstracts lines into symbols,
2. the *same geometry* appears across cultures,
3. the *same shape* becomes a classifier,
4. and a *letter* is born from many such convergences.

It is unnecessary to prove historical transfer.

The validity lies in showing the **universal visual logic**.

18.4 The MN Family: A Small Sign With Many Lives

We can see many variants of the basic person-sign from IM77:



134,1 — arms raised

gesture of offering, honour, invocation.

162,1 — legs extended

ploughing, moving, walking.

208,1 — head-marked figure

status, role, clan, hair knot (kudumi), identity.

303,1 — crossed posture

alertness, boundary, alarm.

343,1 — heart-shaped body

sacredness, deity, feminine principle, ownership.

373,1 — circle + stick

sun, head, deity, spirit, ancestor.

393,1 — circle + cross-body

divine, authoritative, transcendental.

These variations show that the Indus scribes treated the stick figure like:

1. a **root sign**,
2. a **classifier**,
3. a **semantic core**,
4. a **morphable body**,
5. a **template for many meanings**.

Just as Tamil vowels expand from **அ**, and just as Tolkāppiyam allows vowels to stand independently or combine freely, the Indus stick figure may have been **the most flexible symbol in their repertoire**.

18.5 A Cognitive Bridge Between Indus and Tamil Worlds

From our own cultural reflections:

1. Pongal diagrams,
2. clan symbols,
3. harvest markers,
4. deity posts (kāvu / kāvalan),

5. manai kodi,
 6. velan rituals,
 7. and body-based signs in Tamil Nadu graffiti —
- all these show **continuity of gesture-thinking**.

In both Indus and Tamil worlds, knowledge was stored in:

1. symbols,
2. postures,
3. directions,
4. short strokes,
5. simple curves.

A child could understand them.

An elder could expand them into philosophy.

18.6 Pluralistic Interpretations of the Stick Figure

Students may try many lenses:

1. Human / person / actor

Anthropomorphic classifier.

2. Deictic pointer

Near / mid / far (Tolkāppiyam).

3. Verb marker

An action: going, giving, standing, ploughing.

4. Ritual role

Velan, priest, sacrificer, drummer, devotee.

5. Occupational role

Farmer, ploughman, warrior, messenger.

6. Status or lineage mark

Clan emblem, identity sign.

7. Spatial indicator

Direction, boundary, inside/outside.

None are final; all are possible.

This is the strength of pluralistic method:

Do not close the door; create many windows.

18.7 How to Study This Sign Like a Researcher (Student Method)

1. **Describe the shape literally.**
2. **Identify the variant (1,1 – 393,1).**
3. **Observe posture (arms, legs, angle).**
4. **Check placement (prefix / core / suffix).**
5. **Look for clustering with other signs.**
6. **Compare with Tamil, Sumerian, Chinese.**
7. **List 3 possible roles; reject 1.**
8. **Hold meaning open; focus on structure.**

This method can be applied to every Indus sign.

18.8 Reflection Exercise

Choose any variant of the stick figure from the IM77 list.

Ask yourself:

1. What gesture does this represent?
2. How might it function as prefix / core / suffix?
3. What are 3 possible interpretations?
4. Which interpretation is least plausible, and why?
5. Which parallels exist in Tamil or Sumerian?
6. How does posture change meaning?

This trains the student's **observational discipline**, not their guesswork.

18.9 Closing: The First Human in the Script

The unicorn shows prestige.

The double-core shows structure.

But the stick figure shows **life**.

It is the moment the Indus script says:

"Here is a being. Here is presence."

And through Tolkāppiyam, Tamil oral traditions, and universal human gesture, we can glimpse how ancient minds may have built writing not from letters alone, but from **bodies, breath, pointing, and posture**.

This is not decipherment.

It is a way of **seeing cognition through signs**.

CHAPTER 19 — CASE STUDY 4

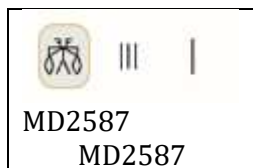
Rain, Protection, and Offering: A Tamil Cognitive Reading of MD2587

19.1 Entering a Different Kind of Seal

Up to now, we have studied:

- the unicorn seal (Chapter 16),
- the double-core seal (Chapter 17),
- the simple anthropomorphic sign (Chapter 18).

Now we come to a seal that is both simple and profound: **MD2587**.



MD2587 contains only three elements:

1. a single stroke,

2. a three-stroke cluster,
3. a compound anthropomorphic sign (human + cattle head + load).

This inscription is extremely short.

Yet, like a Sangam couplet, it carries depth through minimal strokes.

A similar *compound sign* is also known in Sumerian contexts, where related forms denote **mother**, **pregnant woman**, or **matrix / creator**. The appearance of such compound imagery—sometimes combined with the sign *AN* (“god”)—suggests that early societies attempted to capture subtle ideas of creation, protection, and continuity through visual compression.

In Indian cultural thought, divinity is often understood as entering the human world through birth itself—the *god who is born as our child*. It is therefore natural that early writing traditions tried to encode such ideas symbolically.

In Sumerian studies, we attempt to enter the minds of Sumerian thinkers, knowing fully that we may be mistaken. That uncertainty is precisely why our approach remains **pluralistic**, allowing interpretive freedom rather than rigid conclusions.

Extending this idea to the Indus context, we observe the compound sign in MD2587. Kangali has read this sign as “**protector**.” From my own cultural lens, I also see associations of **cow and balance-bar imagery**, connected with **Lord Murugan**, and the cow with **Amman**, the goddess.

At this point, we are entering a domain of **cognitive association**, not direct linguistic derivation. For instance, one may notice that a Sumerian mother-sign sometimes glossed as *aṇarin* (matrix, mother-creator) loosely echoes Tamil words such as *angāri*, *aṅgāri amman*, or *āṅgāri*—forms associated with fierce goddesses, rain, and unstoppable force. These are not claims of etymological continuity, but examples of how human cultures often cluster meaning around similar experiential cores.

Such associative movement—between sound, shape, memory, and meaning—is familiar to us when we interpret ancient sayings or ritual symbols. In this sense, the book’s title, **Reading Ancient Minds**, is fully justified.

Linguists and educators might describe this as a **prefix-core-suffix cognitive process**, one reason why languages such as Tamil and Sumerian are agglutinative, stringing together layered associations. At one extreme, a single line may simply indicate the number “one.” At another extreme, “one” may stand for unity, divinity, or origin.

Our task is not to force certainty, but to ask: *does our interpretive context reasonably align with what the original authors might have intended?* If yes, confidence increases; if not, the reading remains one among several plausible interpretations.

In MD2587, the central three-stroke sign—though visually small—may carry conceptual weight. Likewise, the compound human-cow-load sign may range in meaning from a street vendor or milk

carrier, to a ritual bearer, to a protector figure. Across this spectrum—from the spiritual to the practical—the **same cognitive process** operates.

We therefore maintain a **pluralistic stance** until sufficient comparative evidence allows stronger conclusions. Artificial intelligence tools may later help evaluate relative likelihoods across large datasets, but the human interpretive step remains essential.

For reference, the related Sumerian signs include:

𒀭𒊩 *ama* — mother

𒀭𒊩𒌆 *anarin₃* — matrix, mother-creator

19.2 The Three Signs: A Visual and Cultural Logic

First Sign — One Stroke

A single vertical line.

Minimal, yet meaningful.

In Tamil agrarian culture, the **first rainfall** (**முதல் மழை**) is a familiar and emotionally charged event. It cools the land, allows ploughing to begin, and signals hope.

As a poetic-cultural interpretation:

One stroke = first seasonal rain.

This mirrors how Tamil elders still ask today:

“மழை வந்ததா?”

Has rain come?

Second Sign — Three Strokes

Three parallel strokes often suggest:

- multiplicity,
- completeness,
- seasonal cycle,
- the Tamil concept of **மும்மாரி** — threefold (sufficient) rain that fills tanks.

In Dravidian agrarian memory, kings and administrators alike asked:

“மும்மாரி மழை பெய்ததா?”

This question implied prosperity, fertility, health, and divine blessing—often associated with the rain goddess and cattle, and by extension with protective deities such as **Murugan**.

Thus:

Three strokes = threefold rain (மும்மாரி), the fullness of the season.

Third Sign — Human + Cow Head + Load

This is the richest element in our interpretation.

Visually, it shows:

- a human figure,
- with a cattle head,
- carrying a load or bundle.

In Tamil cultural space, this aligns with:

- **காவடியோன்** — the kavadi-bearer,
- **காப்போன்** — protector or guardian (Kangali's reading),
- **Murugan symbolism** — hills, cattle, offerings, travel, burden-bearing,
- **Mari Amman** — goddess of rain, health, and fertility.

Thus, the third sign may evoke:

- ✓ the offering-bearer,
- ✓ the messenger,
- ✓ the devotee who carries offerings after rains,
- ✓ the protector who walks before others,
- ✓ the ritual traveller.

These are **not fixed meanings**, but **cultural pathways**.

19.3 A Possible Tamil Poetic Reading (Pluralistic)

A poetic rendering of this sequence may read:

“வரும் முன் காப்போன் காவடியோன் முருகன்”

- the one who comes before,
- the protector,

- the kavadi-bearer,
- the devotee of Murugan.

Or alternatively:

“மகமாயி மும்மாரி முத்துமாரி”

- the triple-rain goddess,
- the nurturer of tanks,
- the triple-flow of abundance.

Here, **one stroke → three strokes → anthropomorphic figure** becomes a cultural sentence, much like Sangam poetry compresses expansive meaning into a few words.

At the same time, in a purely practical or commercial context, the same signs could indicate something as simple as a **cartload of milk or ghee delivered to a temple or marketplace**—for example, one large unit and three smaller units (analogous to $100 + 30 = 130$ measures). The cognitive mechanism remains the same, even as the domain shifts.

19.4 Why This Works as a Pluralistic Model

This chapter trains students to:

- use cultural imagination without claiming decipherment,
- identify structural units before semantic guesses,
- relate signs to seasonal, rhythmic, and ritual cycles,
- understand how Kangali’s “protector” reading fits Dravidian symbolism,
- see how strokes may indicate natural cycles rather than literal numbers,
- recognise how readings may range from spiritual to pragmatic.

Most importantly, it shows that **signs, culture, and mind are inseparable**.

Just as Sangam poetry condenses vast experience into two lines, an Indus seal can express a complete conceptual idea through three signs.

19.5 Reflection Exercise

Students are encouraged to:

1. Describe the literal strokes ($1 \rightarrow 3 \rightarrow$ figure).
2. Map them to natural cycles (rain, abundance).
3. Map them to human cycles (devotion, travel, offering).

4. Map them to social roles (protector, messenger).
5. Create their own poetic or practical sentence using all three signs.

This reinforces **pluralistic, non-dogmatic interpretation**.

19.6 Closing Thought

If the unicorn seal expresses institution,
and the double-core seal expresses structure,
and the stick-figure expresses human presence,

then **MD2587 expresses life and season—**

the rain that comes,
the threefold blessing,
and the bearer who walks before us with offerings.

Not a decipherment,
but a **window into cognition**,
framed by strokes, culture, and imagination.

Note to students:

The above poem is ChatGPT's own creation. It may be seen as a **mirroring of our collective minds**, not as an ancient text.

End of Chapter 19

CHAPTER 20 — COUNTING, WEIGHING, AND FIRST EQUATIONS

HOW INDUS PEOPLE USED NUMBER SIGNS

20.1 From Symbols to Quantities

Having explored structure, motifs, and human figures in earlier chapters, we now move to the first practical problem every civilisation must solve:

How do we count, measure, and record quantities?

The Indus cities were not only ritual spaces but also marketplaces, granaries, dockyards, and storehouses. People needed compact, repeatable ways to record everyday realities:

1. “a hundred fish,”
2. “five bags of paddy,”
3. “ten bundles for the temple,”
4. “three shares after harvest.”

This chapter asks a simple but foundational question:

How did Indus people mark quantity?

We do not claim a final decipherment.

Instead, we present a pluralistic, testable framework, supported by real cases, living traditions, and comparative reasoning.

20.2 Everyday Counting in Living Traditions

In Tamil agrarian memory, counting is rarely abstract. It is cyclical, seasonal, and functional.

People still ask:

“மும்மாரி மழை பெய்ததா?”

Did the threefold rains fall?

Here, “three” does not merely mean a number. It means:

1. sufficiency,
2. completeness,
3. readiness for cultivation.

Similar triadic logic appears everywhere:

1. seed → growth → harvest,
2. first rain → steady rain → tank-filling rain.

Sumerian agricultural instructions show a comparable mindset, referring to three phases of irrigation from sowing to harvest. Across cultures, counting is inseparable from cycles.

This matters when we interpret Indus strokes.

20.3 The Archaeological Evidence: Short Inscriptions and Strokes

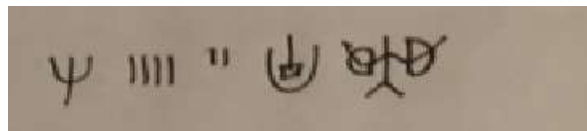
Many short Indus inscriptions combine:

1. a commodity sign (fish, jar, grain, container), and
2. a stroke cluster (| , || , |||).

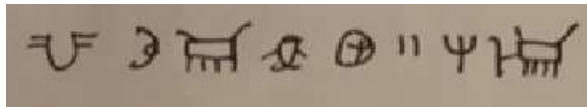
These strokes usually occur in narrow ranges, most commonly 1–3, sometimes extending further. They behave less like free numerals and more like structured quantity markers.

From the corpus and Avaiyam notes, consider these contexts:

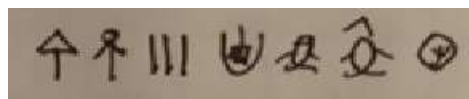
1. MD1937–49 — references to large counts (“hundreds”) tied to community prestige and status.



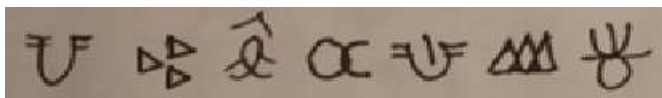
2. MD3023 / Sign 2029 — repeated association with “ten” (*poththukaal*), often in agricultural or ritual contexts.



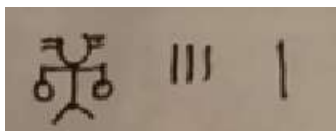
3. Sign 2110 — administrative listings involving “hundreds” and named custodians.



4. Sign 1420 — three-fold mountain motif acting as a regional or classificatory marker.



5. MD2587 — one stroke → three strokes → anthropomorphic bearer, interpreted as rain cycles and offerings (Chapter 19).



Across these, counting, cycles, and units appear consistently intertwined.

20.4 Five Working Models for Stroke Usage

Rather than forcing a single explanation, we propose five complementary models. Different seals may use different combinations.

1. **Grouping Marker**
Core sign + stroke cluster = “that class, grouped N times.”
2. **Multiplier or Scale**
Strokes indicate $\times N$ of a basic unit (weight or volume).
3. **Weight Class Indicator**
Strokes index standard weight classes (Indus weights were highly standardised).
4. **Administrative Bundle**
Strokes denote fixed bundles used for taxation, storage, or offerings.
5. **Cognitive / Cyclical Marker**
 1. one stroke = initiation,
 2. three strokes = completion,
 3. higher counts = aggregation.

These models are not mutually exclusive. The same visual language can serve different administrative needs.

20.5 Worked Case: MD2587 (One → Three → Bearer)

Visually:

| ||| [human + cow head + load]

As explored in Chapter 19:

1. **Cultural reading:**
first rain → full rainy cycle → offering bearer / protector.
2. **Functional reading:**
seasonal cycle → agricultural success → ritual or administrative delivery.

This is not a literal translation, but a plausible scripted sentence, combining quantity, season, and action.

Importantly, it shows how number signs do not operate in isolation, but as part of meaningful sequences.

20.6 Worked Case: “Ten” in MD3023 and Sign 2029

In several Avaiyam readings, the concept of “ten” (*poththukaal*) appears repeatedly.

Rather than reading this as an abstract numeral, it is more useful to see it as a bundle unit:

1. ten pots,
2. ten sugarcane bundles,
3. ten grain measures.

In many accounting systems, ten smaller units form one larger accounting unit, especially in taxation and temple supply systems. This logic fits both Indus material culture and later South Asian practice.

20.7 Cardinal and Positional Thinking: A Comparative Note

Sumerians left clear textual evidence of numerical systems:

1. cardinal numbers in base-60,
2. ordinal markers for months, days, and sequence.

The Indus case is different.

Here, numerical thinking is inferred, not read directly:

1. standardised weights (often binary and decimal),
2. repeated stroke patterns,
3. positional consistency in inscriptions.

This suggests:

1. strong cardinal counting,
2. implied ordering and ranking,
even if explicit ordinal grammar remains undeciphered.

Material precision replaces textual explanation.

20.8 How to Test These Ideas (Student Lab)

Students can treat this chapter as an experimental workshop:

1. Build a local table of commodity signs + stroke counts from IM77.
 2. Create stroke-distribution charts for each commodity.
 3. Compare seals from different contexts (dock, granary, shrine).
 4. Correlate stroke patterns with known weight sets where possible.
 5. Compare with Sumerian tablets (object + wedge counts), focusing on structure, not language.
-

20.9 Classroom Exercises

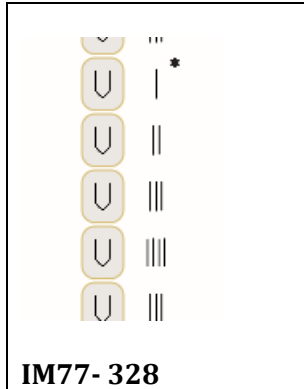
1. Take five seals with the fish sign.
Record stroke counts.
Hypothesise: unit, bundle, or weight class?
 2. Using MD2587, write three short administrative sentences the seal might encode (e.g., “After first rain — small offering sent”).
 3. Compare an Indus fish-and-strokes seal with a Sumerian grain tablet.
What structural similarities do you observe?
-

20.10 What to Avoid

- Do not assume stroke = exact numeral in every case.
 - Do not force modern Tamil words as translations.
 - Do not reduce triadic patterns to simple “three individuals.”
- Triads may express cycle, sufficiency, or completion.
-

20.11 A Note on Measuring Containers (Marakkaal Hypothesis)

One Indus sign (IM77-328), shaped like a U-form, appears alongside strokes ranging from one to four. This resembles the Tamil marakkaal, a traditional volume-measuring vessel.



This does not prove equivalence.

But it offers a starting exercise:

1. track this sign across the corpus,
2. observe stroke variation,
3. examine whether it clusters with storage or grain contexts.

This is how hypotheses grow—from observation, not assertion.

20.12 Final Note — Continuity of Cognition

**Whether in the Indus irrigation world,
the Sumerian canal fields,
or a Tamil village tank system,**

people made the same cognitive move:

they reduced flowing reality—rain, grain, labour—into repeatable tokens.

Strokes and commodity signs are not primitive marks.

They are the first forms of administrative algebra:

simple, disciplined, human.

**This chapter completes our movement from symbol to structure,
from structure to quantity,
and prepares the ground for consolidation in the chapters that follow.**

End of Chapter 20

CHAPTER 21 — HOW TO THINK LIKE AN INDUS RESEARCHER

From Patterns to Insight, From Insight to Understanding

Students who reach this stage of the journey have already learned how to observe inscriptions, recognise structure, test patterns, compare clusters, and apply pluralistic interpretations. But the work of an Indus researcher is not only technical. It is also mental, ethical, and cognitive. This chapter teaches the deeper intellectual posture required to study an undeciphered script with honesty and depth. Understanding the Indus script begins with learning how to think, how to question, how to remain open, and how to respect evidence.

21.1 The Researcher's Transition: From Seeing Signs to Seeing Systems

In the early chapters, students learned to notice shapes, families, strokes, and clusters. Through case studies, they learned to recognise how these patterns behave across seals and tablets. But researchers must now step beyond observation. They must learn to see the script as a system shaped by rules, habits, traditions, shared training, and cognitive choices made thousands of years ago. When patterns are connected and compared, observation becomes insight, and insight becomes understanding.

21.2 The Ethics of Interpretation: What We Can and Cannot Claim

A responsible Indus researcher must learn not only what to look for but also what not to claim. Without decipherment, we cannot assign phonetic values, languages, or fixed meanings. We cannot assert Tamil, Sumerian, or Indo-European identity simply because a pattern looks familiar. We cannot project modern clan systems or ritual categories onto ancient symbols. Instead, we must allow the script to speak through its structure, not through our expectations. Ethical interpretation protects the field from overconfidence and keeps inquiry grounded.

21.3 Precision: The Discipline of Careful Observation

Indus research begins with precision. We must describe what we see, not what we hope to see. Does a stroke appear before or after a core sign? Is the sign a jar variant or a fish variant? Does a prefix appear consistently with a particular core? Does a cluster repeat across sites? Such questions demand patience. Carefulness builds credibility. Precision transforms impressions into evidence.

21.4 Pluralism: Keeping Multiple Possibilities Alive

Pluralism is essential for studying an undeciphered script. Instead of choosing one explanation, students learn to entertain several. A cluster may be administrative in one context, ritual in

another, symbolic in a third. A stroke may represent classification, rank, or cycle. A motif may relate to identity or ritual office. Holding multiple possibilities is not confusion; it is scholarly maturity. Pluralism allows the field to grow rather than freeze too early.

21.5 Humility: Respecting the Ancient Mind

The Indus script emerged from a world different from our own. The people who carved these signs belonged to cultures, rituals, and cognitive traditions that we can only partially reconstruct. Humility reminds us that the script is not waiting to confirm our modern narratives. Instead, we must approach it with respect, restraint, and willingness to learn. Humility creates space for true understanding.

21.6 Structured Imagination: Thinking With the Script, Not Over It

Imagination is necessary, but only when disciplined. Structured imagination means exploring ideas that follow patterns, visual logic, archaeology, and cognitive behaviour. It rejects fantasy and embraces possibility. It asks “What if?” but also “Does the evidence support this?” When imagination works with structure, it opens new paths of insight without compromising integrity.

21.7 The Research Process: Moving From Patterns to Insight

Indus research follows a natural sequence. First we observe signs and identify patterns. Next we compare them across seals, regions, and mediums. Insight emerges when we see how these patterns behave repeatedly. Understanding arises when insights link together to reveal a broader system. This layered approach mirrors the development of writing systems worldwide. Nothing is understood all at once. Everything unfolds slowly, through careful iteration.

21.8 Learning to Read Across the Corpus

One seal tells a story. Ten seals reveal a tendency. Hundreds of seals reveal a system. Researchers must learn to compare inscriptions across cities, centuries, shapes, and materials. They must notice how a prefix behaves in Harappa, how a suffix behaves in Mohenjo-daro, how strokes behave in pottery graffiti, and how clusters behave on tablets. Insight emerges not from isolated examples but from patterns that repeat across the entire civilisation.

21.9 Triadic Reasoning: A Cross-Cultural Cognitive Tool

Triadic reflection—comparing Indus, Sumerian, and Tamil systems—helps students understand how early humans represented ideas visually. The goal is not to claim linguistic identity but to recognise shared strategies: the use of classifiers, core symbols, stroke modifiers, sequencing, and abstraction. These parallels illuminate how human minds organise information. Triadic reasoning is a cognitive bridge, not a decipherment tool.

21.10 The Mature Researcher’s Mindset

A mature Indus researcher combines several qualities: the precision of a scientist, the sensitivity of an artist, the discipline of a historian, the patience of an archaeologist, and the humility of a learner. They understand that the script is neither random nor impenetrable. It reflects careful design, structured choices, and cultural consensus. To study the script is to trace the thought patterns of its creators.

21.11 Reflection: Thinking Like an Indus Scribe

Students should pause here and reflect. If they were Indus scribes, how would they design signs so others could understand them? How would they simplify shapes? How would they combine two signs into a cluster? How would they decide when to add strokes or when to create variants? By asking these questions, students step closer to the mental world of ancient writers. This reflection prepares them for the closing epilogue of the book.

End of Chapter 21

EPILOGUE

ACHCHU–ACHCHAA: A JOURNEY FROM TAMIL NADU CHILDHOOD TO THE MINDS OF INDUS PEOPLE

As we complete our journey through Indus signs, clusters, strokes, motifs, and scribal thinking, it is time to step out of archaeology and return to life. Understanding an ancient script is not only about analysing seals. It is also about recognising echoes of those ancient minds in our own cultures, memories, and traditions. This epilogue offers one such echo: a childhood scene in Tamil Nadu that reflects the same logic of mould, impression, repetition, and sacred copying that shaped Indus writing thousands of years earlier.

For schoolchildren reading this book, this story is an invitation to wonder — not to prove anything, but to imagine how cultural habits can travel across time.

A Boy-hood festival day morning in Tamil Nadu: Clay, Wood, and the First Achchu

Before the 1970s, Vinayagar Chaturthi in Tamil Nadu was a quiet, intimate festival. There were no giant statues, no street processions, no loudspeakers, and no pandals. Everything happened in homes, kitchens, and village shrines. Most families made or obtained small clay idols of Ganesa using simple materials from the natural environment.

One of the most cherished practices was visiting a local artisan — usually a woodworker, not a potter. This artisan owned beautifully engraved wooden moulds called achchu. Children would carry a smooth wooden plank from home, often still smelling of coconut oil used in daily life. The artisan greased the mould, pressed soft clay from village ponds or lakes into its carved face, and flattened the back carefully. Then the wooden plank was placed on top, and the artisan flipped the mould and plank together. When he lifted the mould, a perfect clay Ganesa appeared, sitting face-up on the plank, ready to be carried home.

This moment — the reveal of the impression — was magical for a child.

At home, the family placed kunRimani seeds as the idol's eyes. Mothers or older siblings did this with reverence. The Ganesha idol was then placed in the pooja room, where simple prayers were performed. After worship, immersion was also simple: the idol was placed in a bucket of water or a village well. Everything returned to earth. Everything was natural, cyclical, and humble.

This small act of making and unmaking carried deep meaning. It resembled the ancient cycle of sealing and unsealing in the Indus world.

How the Achchu Process Mirrors Indus Seals

When we look at Indus seals, we often think of them as complex artefacts. Yet at the heart of their design is something very familiar: a mould-like logic.

Like the Tamil achchu, Indus seals were carved in reverse.

Like the clay Ganesha, the impression was the “real” image.

Like village artisans, Indus seal-makers followed conventions of proportion and clarity.

Like Vinayagar Chaturthi idols, Indus impressions were repeated again and again.

Like family rituals, their meaning depended on community recognition.

The child who watched a Ganesha appear magically from a mould was witnessing the same cognitive process that guided Indus scribes:

**Simplify the shape.
Fix the proportions.
Check clarity.
Repeat the form.
Share the standard.**

This is how a sign becomes a tradition, and how a tradition becomes a script.

Achchu, Achchaa, and the Echo of Ancient Words

Your insight about the word achchu is remarkable. In Tamil, achchu means mould, print, shape, stamp, exact copy, and original form. In Hindi, achchaa means good, proper, correct, or “as it should be.” If one imagines achchu + aa as “the divine copy” or “the correct impression,” the connection becomes poetic, even if not linguistically provable.

Such resonances encourage students to think about how ancient words might have sounded, how they might have been used, and how rituals may preserve older habits of naming. We cannot prove that Indus artisans called their seals achchu, but the idea invites healthy curiosity. It teaches students to ask questions and explore patterns without forcing conclusions.

The Forgotten Museum: Tamil Nadu Before the 1970s

Photographs from pre-1970 Tamil Nadu are rare, especially from family rituals. The festival was private, intimate, and not photographed for magazines. People did not document what they considered ordinary life. Yet reconstructed images of simple clay idols resemble the ones children carried home half a century ago: unpainted, humble, natural, alive. Their simplicity brings us closer to the spirit of the Indus seals — small objects whose power came from repetition, not grandeur.

The world of Vinayagar Chaturthi before public celebrations was a living museum of continuity. It showed how a community could sustain meaning through small, repeated forms. The practice of casting Ganesa in clay using a wooden mould belongs to an unbroken cultural river flowing through millennia of Indian history.

A Cultural Continuity Worth Wondering About

This epilogue does not claim that Tamil mould-making directly descends from Indus seal making. Instead, it invites students to recognise patterns:

**Indus seals were moulds for meaning.
Tamil achchu created copies of divinity.**

Both used clay as a sacred medium.
Both involved imprint, reversal, and repetition.
Both depended on community recognition.
Both expressed shared identity through small reproducible forms.

These parallels show how cultures remember through practice. Even if languages change and rituals evolve, the deeper cognitive habits — the way we organise thought, symbol, craft, and devotion — often remain.

A Final Thought for Students: Your Own Achchu Moment

As students reading this book, think of a time when you used a stamp, stencil, mould, or template. Think of the joy of pressing something, lifting it, and seeing the shape appear. Think of how the same shape can be made again and again. That is how scripts begin. That is how symbols survive. That is how communities share meaning.

Understanding the Indus script is not only about reading ancient signs but also about recognising the ancient mind in ourselves.

In the end, this book does not claim to decode the Indus script. Instead, it helps you learn how to read their minds — through structure, through imagination, and through echoes of living traditions like Achchu Pillaiyaar.

End of Enriched Epilogue

APPENDIX:

TO CURIOUS MINDS — AN INVITATION TO EXPLORE THE INDUS WORLD

This appendix is written for readers who enjoy asking questions, imagining possibilities, and discovering patterns on their own. It is especially meant for students and teachers who want to understand how early humans created signs, told stories through symbols, and expressed meaning without any alphabet.

In this section, we will not try to prove anything.
We will simply learn how to look.

The Indus script is undeciphered, and that makes it a rare gift. With no fixed answers, every reader is free to observe, compare, test ideas, and develop interpretations. You will find that your own imagination can travel beside archaeology, linguistics, anthropology, and even artificial intelligence.

This open, plural, respectful approach is how real research happens. We take you through how we saw, taking few case studies, what we made.

Before we study the case studies, we will build a simple habit:

Look first.

Describe next.

Name what you see.

Propose ideas.

Compare them.

Refine them.

Check again.

Meaning emerges in layers, not leaps.

In the early stages of interpretation, nothing is rejected; every idea is allowed to breathe. Each proposal contributes one more angle—a new light—toward understanding the ancient world.

We treat each seal as an independent object, even though in reality they may not be entirely independent. Yet they *could* be, depending on their specific contexts and uses. Interpreting a seal is like writing your own poem while looking at the same sky, sun, clouds, stars, moon, flowing rivers, animals, and people that the ancient world once saw. The scenery changes, the circumstances shift, but the vast canvas of nature persists in remarkably similar ways. That continuity makes our interpretations not only possible, but deeply plausible.

Why We Explore Case Studies

The Indus script has over four hundred known signs. Some appear on seals with animals, some on tiny tablets, some on potsherds, some carved on tools, and one remarkable example carved on a city wall. These signs were used for many purposes and in many contexts, but we do not yet know their exact meaning.

Instead of searching for quick answers, this appendix encourages a more thoughtful journey:

How do signs behave across different examples?

How does structure appear in short inscriptions?

Why do some signs repeat together?

Why do strokes appear in patterns?

Why do certain symbols cluster near water-themed artefacts?

Why do similarities appear between Indus signs and pottery graffiti in Tamil Nadu?

These are not decipherment questions. They are questions of curiosity and pattern recognition.

This is how learning begins.

What You Will Discover

In these case studies, you will meet four extraordinary inscriptions and one extraordinary city. Each one invites exploration and imagination.

The Dholavira Wall Sign

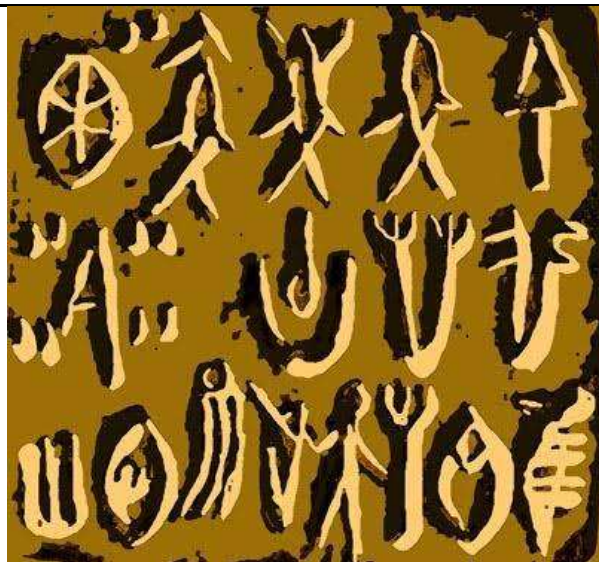
The longest public inscription of the Indus world, written with giant gypsum signs placed above a city gate. You will compare its shapes with similar signs on seals and consider why a civilisation would publish symbols this large.



Dholavira Wall Sign

The Long Seal Text (commonly linked to M-314)

A long inscription that helps us study families of signs, ordering rules, and structural logic. You will test multiple interpretations without choosing a single one.



M-314, one of a longest inscription –
Stamping sealing



M-314, one of a longest inscription –
Stamped seal

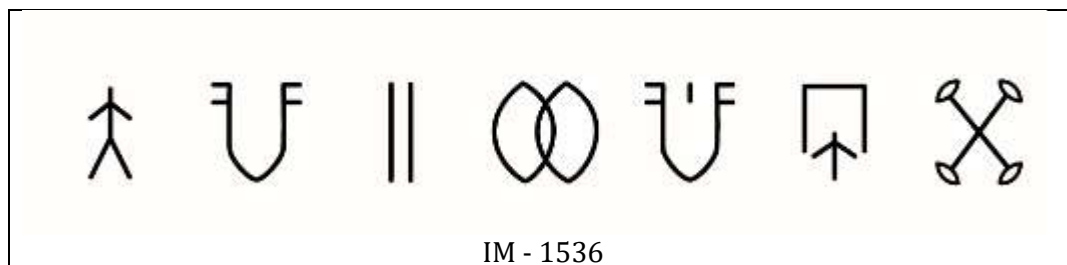
The Wheel or Cycle Sign (IM 391)

A mysterious sign that resembles a wheel, drum, sun, cycle marker, or clan emblem. You will learn why one symbol can carry many layers of meaning.



The Poetic Seal IM 1536

A seven-sign sequence that looks like a small story. You will explore Tamil ecological readings, Gondi-based interpretations, and structure-based readings, seeing how each perspective adds something different.



Through each case, you will experience how culture, memory, environment, and imagination shape the meanings we see.

What This Section Teaches

More than anything else, this appendix strengthens four essential skills:

Observation

Seeing clearly before interpreting.

Comparison

Looking at how signs behave across many examples.

Pluralism

Holding multiple possible meanings without forcing one.

Cultural Sensitivity

Understanding that early humans lived in rich, complex worlds that may not match our assumptions.

These skills make you not only a better reader of the Indus script but a better thinker overall.

A Two-Way Learning Journey

Throughout this section, you are encouraged to think, imagine, propose, refine, and check. You may even ask ChatGPT or other tools for alternate interpretations and compare them with your own. Learning becomes a conversation, not a lecture.

In this journey:

You learn.

The AI learns.

New questions appear.

Old assumptions dissolve.

And curiosity grows.

This is how exploration becomes discovery.

A Warm Invitation

You do not need to be an expert to enjoy these studies.

You need only be curious, open, patient, and playful.

The Indus script invites wonder.

This appendix invites you to accept that invitation.

Welcome to the world of signs, stories, symbols, and imagination.

Welcome to the journey of curious minds.

CASE STUDY 01 — THE DHOLAVIRA SIGNBOARD: HOW A CITY SPOKE THROUGH SYMBOLS

Dholavira is one of the most extraordinary cities of the Indus civilisation. Built on the island of Khadir in the Great Rann of Kutch, it stands apart for its precision, its stone architecture, and its astonishing water systems. While many Indus cities are known for brick construction, Dholavira is a city of dressed stone, carefully planned reservoirs, gateways, and civic spaces. Walking through its remains today feels like entering a world where geometry, water, and public order shaped daily life.

Among all its discoveries, one object stands above the rest in terms of scale, imagination, and historical importance: the Dholavira signboard. It is the largest inscription ever found in the entire Indus world, and it gives us a rare glimpse into how this ancient civilisation communicated publicly.

21.1 What Makes the Dholavira Sign Unique

At the north gate of the city, archaeologists found a long wooden frame containing ten large gypsum symbols. Each sign was about **37 cm (15 inches) in height**, making them far larger than the miniature seals commonly held in the palm. The entire board on which these symbols were mounted measured roughly **3 metres (9.8 feet) in length**, forming a monumental inscription that faced the city's main approach. This was not a private or handheld text but a bold public message, meant to be seen from afar. It is the closest thing the Indus civilisation left us to a public signboard.

Iravatham Mahadevan and his team have arrived at Indus scripts concordance, we can visit the web site at [<https://induscript.in/>], that provide one of an earliest collection of data on Indus scripts, that I have used to refer to each seal or script as may be. See, screenshot from the web site showing the scripts in standardized form, as was done by his team, including referencing each script.

Position of sign from left	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Script Sign	 391†	 256	 327†	 391†	 261†	 134	 86†	 391†	 391†	 53†
Script ID IM77	391	256	327	391	261	134	86	391	391	53

Dholavira Wall Sign – using Iravatham Mahadevan concordance

You can examine, how I have taken a pluralistic view even in the case of IM77-391, the wheel sign, taking cues from other scholars reading the script and placing it in my own perspective, context. Also look at the table compiled by Google AI based on few other scholars interpreting Dholavira wall sign:



Script ID IM77 391

Description of the script: wheel, seat, Community Kondala, Time, Drum, country, சக்கரம், கொந்தளம் மேடை, கோந்தலாம் அரசு, காலம், கால சக்கரம், அரசு மத்தளம் , சூரியன், ஓட்டம், சுற்று

alphabetic – candidates: cha, ko, ka, ச, க, கோ

syllabic candidates: kO, கோ

words – candidates: arasa murasu, maattu vandi chakkaram, அரசு முரசு, சக்கரம்

For students, this is a moment of wonder: a city that flourished more than four thousand years ago displayed a symbolic inscription at its entrance, just as modern cities display names, emblems, or welcome messages.

We cannot yet read this inscription. But we can observe how it was made and what it suggests about Indus society.

21.2 Observing Before Interpreting

When approaching the Dholavira signboard, the first rule is to look without jumping to meaning. Each sign is nearly identical in shape to smaller versions found on seals, potshards, and tablets. This tells us that the Indus script had consistent proportions and recognisable sign families across the civilisation.

Students examining the signboard may follow a simple process:

Look at the shape.

Notice the sharp angles or curves.

Compare the widths and heights.

Identify which signs resemble jar forms, fish forms, or geometric patterns.

See how the signs stand next to each other.

Observe whether some appear more dominant or central.

This method of watching carefully without assuming meaning is the foundation of Indus script study.

21.3 Why a City Would Build a Giant Inscription

The existence of a large public inscription tells us something profound. The Indus script was not only a tool of merchants or administrators. It was also a civic symbol. Placing large signs at a city gate suggests shared literacy—not literacy in the alphabetic sense, but literacy of recognition. People knew these shapes. They understood their significance. They accepted them as part of their public identity.

We use public signboards today to display the name of a city, a motto, or an emblem. The Indus people did something similar. Even if we do not yet know what the signs represented, the act of displaying them shows pride, unity, and communication.

Some scholars believe the signboard announced the name of the city. Others think it represented an institution, a clan, or a sacred concept. Still others argue that it may have been a dedicatory inscription. All these interpretations remain open, and none can yet be confirmed. But the structure of the signboard itself speaks clearly: this was a message meant for everyone.

21.4 Sign Families and Repetition

The signs on the Dholavira board are not random. Each belongs to a sign family known from hundreds of smaller inscriptions. This suggests strong standardisation. When artisans carved seals or tablets, they followed widely accepted rules for proportions and angles. When they scaled these signs up for the signboard, the shapes remained consistent.

Students may notice that the Dholavira signs look like enlarged versions of characters found in well-known Indus sign lists. This reinforces an important lesson: the script was stable. It did not fluctuate wildly across regions. A sign found in Harappa or Mohenjo-daro often appears in the same form in Dholavira. Such stability makes it easier to study patterns across the corpus.

21.5 Water, Writing, and Civic Imagination

Dholavira is also famous for its water engineering. The city contains massive reservoirs, broad channels, check-dams, stone-lined tanks, and an intricate system for harvesting monsoon runoff. Some structures were even capable of storing floodwaters from seasonal streams.

Water was not merely a resource at Dholavira; it was a way of life. The entire city was designed around collecting, storing, and distributing it.

There is a quiet elegance in thinking that the same civilisation that organised water with such precision also organised symbols with equal care. Water systems require planning, measurement, and maintenance. Writing systems require standardisation, clarity, and repetition. Both depend on shared understanding. Both shape how communities think.

Students may reflect on how Tamil Nadu's traditional water systems—eri, oorani, vaykkal, kudimaramathu—show similar values: cooperation, annual renewal, and the belief that shared resources must be cared for collectively. The Indus people seem to have embraced the same ideals.

21.6 The Signboard as a Window into Civic Life

The location of the signboard at the northern gateway is significant. Gateways are thresholds between public and private, between the outside world and the protected city. An inscription at this point hints at regulation, identity, and civic communication.

It may have marked who could enter.

It may have identified the settlement's name or patron group.

It may have been a message of welcome or authority.

It may have carried ritual or protective significance.

We do not know which is correct. But we do know that the Indus people felt it was important to display these symbols in a grand, visible way. This tells us they believed symbols had power and that recognising these shapes mattered to daily life.

21.7 How Students Can Explore This Inscription

Students are encouraged to do what researchers do:

Make a sketch of each sign.

Write down what the shapes remind you of.

Compare the signs with smaller versions found on seals.

Ask what combination patterns appear here and elsewhere.

Imagine how people would have seen this board as they entered the city.

There are no right or wrong answers at this stage. The goal is to develop the habit of careful observation and thoughtful speculation.

21.8 What This Case Study Teaches Us

The Dholavira signboard teaches several important lessons:

A writing system can be both small and monumental.

A script becomes meaningful through shared recognition.

Cities express identity through symbols.

Water engineering and writing reflect similar organisational thinking.

Interpretation begins with observation, not assumption.

This case study does not decode the signboard. It helps us understand how ancient people might have viewed the world and how symbols shaped their society.

21.9 Reflection for Curious Minds

If you were asked to create a public sign for your city, what shapes would you choose? How large would the sign be? Where would you place it? How would people know what it means? Would its power come from letters, pictures, or a combination of both?

By imagining your own public sign, you step into the mind of the Indus scribe who designed the Dholavira signboard. You experience the same challenge they faced: to create symbols that would speak to everyone.

How LLMs are useful in our journey reading ancient minds, see the inputs prepared by Google AI for students to consider various perspectives.

It is vital to present multiple perspectives for a balanced educational view, including interpretations based on cultural continuity. Below is an updated table incorporating your detailed reading of the Dholavira sign board as a "thOL vira" proclamation for the protection of goods and travelers.

Multiple Possibilities for Interpreting the Dholavira Signboard (Updated)

The Dholavira signboard, the longest known Indus inscription, was found near the northern gateway of the citadel. The 10 large symbols were made of gypsum inlay on a wooden board which has since decayed.

Interpretation/Proposal	Details (User's, Academic, Other)	Reasons for Acceptance (Plausibility)	Reasons for Rejection/Skepticism (Academic Consensus)
User's Proposal: "ThOL vira" (Protectors of Goods/Royal Announcement)	The sign is read as "thOL vira," a message regarding the protection of goods/travelers. Four left symbols: royal announcement (e.g., <i>murasu</i>). Three central symbols: services provided (shelter, water, food). Three right symbols: travelers or goods being transported.	The message aligns with the city's strategic trade hub function and the need for security. Cultural continuity with later Indian traditions like <i>sathirams</i> supports the <i>concept</i> of organized hospitality. Location at the	Linguistically speculative; the Indus script is undeciphered. Meanings/sounds cannot be assigned to symbols or linked definitively to modern Tamil, Gujarati, or Hindi without a verified key.

		North Gate supports an inbound/outbound trade message.	
User's Proposal: "Thalai-yaari" (Captain of the Fort)	The inverted 'V' as "thalai" (head) combined with a stick might refer to a "captain of the fort" or guard, with a subsequent rhombus referring to the fort or a resource like a water body or shelter.	The placement at the North Gate supports the idea of an official or functional message to visitors/traders about authority or security personnel.	As above, relies on unverified linguistic links and specific sound/meaning assignments to an undeciphered script.
Functional/Logistics (Academic Hypothesis)	The sign is a traffic or directional marker: "Vehicles: Central area is restricted! Vehicular entrance to the citadel. Route for vehicles. Vehicles: go."	The size and location near a gateway strongly suggest a public notice or direction for the movement of goods/people. Dholavira had a well-planned road system.	The reading relies on a specific decipherment approach that is not universally accepted by the academic community.
Proclamation of Trade/Metalworking (Academic Hypothesis)	The symbols refer to metalworking processes (ores, copper, tools, a coppersmith's mint/furnace) using a rebus method, proclaiming the city's artisan competence.	Aligns with archaeological evidence of workshops and trade in raw materials (e.g., copper). Rebus principle is a common theoretical approach to ancient scripts.	The specific linguistic links (e.g., <i>lohkhar</i> for coppersmith) are part of a specific decipherment theory that remains unproven.
Religious/Ritual Information (Academic Hypothesis)	The symbols refer to Vedic fire rituals (<i>yajnas</i>) and required accessories (altars, tongs, fire types), guiding people on where to procure these items.	The symbols resemble objects used in some modern Hindu rituals, suggesting cultural continuity.	This interpretation links the script directly to Vedic Sanskrit, which is highly contentious as

		Religious practice was likely important.	the script generally predates the accepted Vedic period.
Names/Titles (Academic Hypothesis)	The script contains proper names, possibly of traders (<i>Panniyan, Baniyas, Phoenicians</i>), or names of deities/kings like "Vishnu Dharma Raja Lakshmi Narayana Dharma Soma Natha Dharma".	Many ancient scripts primarily recorded names, titles, and administrative information. The sign could be a dedication or ownership marker.	This relies on specific, unverified decipherment systems (like the Dravidian or Sanskrit-based ones), which lack bilingual confirmation (like the Rosetta Stone).
The key takeaway for learners is that while we can propose many compelling interpretations based on logic and cultural continuity, the Indus script remains a puzzle. Academic caution classifies all readings as speculative until a definitive, verifiable decipherment key is found. For authentic images and site context, the Archaeological Survey of India website and the UNESCO World Heritage Centre are excellent resources.			

The following sheets show how Co-pilot had drawn as a research problem, hypothesis making, based on our inputs:

Hypothesis -1

Pluralistic Research Approach — Dholavira Case Study: Interpretation Packet

H1 — Royal Order to Merchants (*Irungōvin āṇai*)

This interpretation packet summarizes a single ranked hypothesis for the Dholavira Wall Sign (IM77 ids: 391,256,327,391,261,134,86,391,391,53). It includes the sign-level mappings, supporting evidence, a confidence estimate, suggestions for validation, and recommended next steps for testing or peer review.

Summary

Hypothesis: The inscription functions as a public royal order issued by a local ruler (named Irungo in the local reading), designating a captain's fort (*thalaiyāri kōṭṭai*) and announcing services (shelter, water, food, protection) for merchants and travellers. Connects etymologically to Tamil **thōḷ vīrar** ('supporting soldiers') as a possible toponymic cue for Dholavira.

Sign-level mappings

IM77 ID	Interpretation / gloss
391	wheel/transport/authority marker — interpreted as 'transport' or 'public facility'
256	thread/rod/order — interpreted as 'order/command' (āṇai)
327	leaf/king/royal marker — interpreted as 'king/capitan (arasa/arasan)'
391	repeat as emphasis on communal/transport role
261	diamond/well/fort — 'fort' (kōṭṭai) or 'well' (kiṇṇu)
134	head/hut — 'head of fort' / 'chief' (thalai)
86	stick/rod/one — 'leader/authority marker' (āri)
391	wheel/transport/merchant function
391	wheel/transport/merchant function
53	cart/paired-bullock — 'transport/merchants' or 'irattai mādu' (double bullock)

Supporting evidence

Converging readings from Mathivanan, Mathiazhagan, and Purushothaman suggest administrative authority and support for travelers. Archaeological context (fort entrance) supports a public notice function. Repeated 391 sign strongly correlates with transport/market motifs.

Confidence estimate

0.72 (posterior estimate; see Bayesian scoring spreadsheet)

Validation suggestions

- 1) Cross-site frequency test: verify co-occurrence of 391 with cart motifs across caravan/fort sites.
- 2) Bayesian update with archaeological priors: increase weight for site-context evidence.
- 3) Peer packet circulation to archaeologists and epigraphists for blind scoring.

Prepared for collaborative review.

Hypothesis -2

H2 — Guild / Community Notice (Koya–Gondala association)

This interpretation packet summarizes a single ranked hypothesis for the Dholavira Wall Sign (IM77 ids: 391,256,327,391,261,134,86,391,391,53). It includes the sign-level mappings, supporting evidence, a confidence estimate, suggestions for validation, and recommended next steps for testing or peer review.

Summary

Hypothesis: The inscription is a notice issued by a local community or guild (e.g., Patukoyal or Koya) headed by a community leader and relates to communal organization, rights, and services—possibly linked to trade guild functions rather than direct royal command.

Sign-level mappings

IM77 ID	Interpretation / gloss
391	community/wheel — community emblem (Gondola/Koya)
256	thread/implement — tool for communal craft/registration
327	leaf/leader marker — local chieftain or guild head
391	repetition of community emblem
261	workplace/fortification — local production site or protected market
134	head/hut — local head's lodge
86	staff/stake — marker for chief or custodian
391	community emblem (merchant/transport role)
391	community emblem
53	potukoyal / cart — reference to community or occupational group

Supporting evidence

Kangali's reading explicitly connects the doubling wheel to the Gondi/Koya community emblem. Community-based governance and trade-guild roles are attested ethnographically in later South Asian contexts and can plausibly map to Indus social organization.

Confidence estimate

0.61 (posterior; community hypothesis benefits from ethnographic continuity)

Validation suggestions

- 1) Compare emblem occurrences across Harappan sites to identify localized community markers.
- 2) Linguistic check: test for tribal/ethnic lexical parallels in regional tribal languages.
- 3) Solicit input from ethnographers and tribal historians.

Prepared for collaborative review.

Hypothesis -3

H3 — Cultural/Poetic Direction (Nāṭu araca kōṭṭai)

This interpretation packet summarizes a single ranked hypothesis for the Dholavira Wall Sign (IM77 ids: 391,256,327,391,261,134,86,391,391,53). It includes the sign-level mappings, supporting evidence, a confidence estimate, suggestions for validation, and recommended next steps for testing or peer review.

Summary

Hypothesis: The inscription functions as a culturally framed directive—inviting poets or cultural agents to the king's court, or referencing patronage (Pāṭi poruḷ) and direction to the fort as a center for cultural exchange. It emphasizes literary/elite interactions rather than strictly economic logistics.

Sign-level mappings

IM77 ID	Interpretation / gloss
391	symbolic motif used as ritual or festival marker
256	token/implement — symbolic of invocation or announcement
327	royal/poetic title marker — 'arasa/arasi' linking to patronage
391	festival/ceremonial motif
261	site/fort — 'kōṭṭai' as royal palace

134	head/authority — patron/chief
86	symbolic staff — ceremonial sign
391	ritual motif
391	ritual motif
53	instrument/cart — possibly indicating gifts or transport of patronage goods

Supporting evidence

Mathiazhagan's interpretation suggests poetic patronage (Pāṭi poruḷ). Sangam literature documents patronage networks and royal gift economies, which supports a reading oriented to elite cultural transactions.

Confidence estimate

0.54 (posterior; cultural reading plausible but less supported by transport-heavy pictographs)

Validation suggestions

- 1) Compare inscriptions associated with known elite burial/ceremonial sites for shared motifs.
- 2) Test for textual parallels in Sangam literature describing patronage signage or directional boards.
- 3) Peer review by literary historians and epigraphists.

Prepared for collaborative review.

For Reflection: Evaluate this statement – “if we could agree in this single case, deciphering of Dholavira Wall sign as what that could have meant, that would be a great achievement in the history of Indus scripts decipherment, however, let us hold onto the pluralistic approach”.

End of Case Study 01 — Dholavira

CASE STUDY 02 — THE LONG SEAL TEXT (M-314):

How a Single Inscription Reveals Structure, Order, and Scribal Thinking

Among the many inscriptions found in the Indus civilisation, a few stand out not because they are easily understood, but because they offer a rare glimpse into the deeper architecture of the script. One such example is the long seal text commonly referred to as M-314. This inscription contains one of the longest sign sequences known in the entire corpus. While most seals have between three and seven signs, this one stretches across nearly twenty. A long text may not reveal meaning, but it reveals something far more important: the underlying grammar of how signs were arranged.

This case study does not aim to decipher the inscription. Instead, it teaches students how to approach long texts with patience, structural awareness, and an open mind.

22.1 Why Long Inscriptions Matter

Short inscriptions often show only fragments of structure. A prefix may appear, followed by a core sign and a stroke, but the pattern ends quickly. Long inscriptions, on the other hand, allow us to see recurring families, clusters, alternations, boundaries, and possibly even syntactic groupings. They provide more room for the script to express its internal organisation.

The M-314 inscription stands as a laboratory for studying:

How sign families repeat,
How clusters behave,
How scribes maintain order,
How complexity is built through simple units.

A long text is like a long sentence: it gives the reader room to see rhythm, structure, and intention.

22.2 First Step: Describe What You See

Students begin by simply observing M-314. The inscription contains a sequence of distinct sign groups. Some are large and visually dominant; others are small and compact. Some appear to belong to jar or fish-like families; others resemble strokes, loops, or geometric marks.

We do not know the language behind these forms, but we do know this:

Nothing in the seal looks random.
The spacing is deliberate.
Sign families recur in patterned positions.
The inscription seems to have internal sections.

Just as in Case Study 01, observation is the first form of interpretation.

22.3 Repetition and Family Behaviour

A close look reveals that certain signs repeat within the same inscription. In language, repetition usually means something: grammatical marking, classification, plurality, or emphasis. In a symbol system like the Indus script, repetition signals structure.

Students can ask:

Do certain signs appear twice in similar positions?

Do some signs always occur before others?

Do strokes appear at the end of logical groups?

Is there a pre-core-suffix rhythm within the long sequence?

Even without decoding, we recognise patterns familiar from previous case studies: prefix-like forms, core-like forms, qualifiers, and concluding strokes.

22.4 The Possibility of Clustering

One striking feature of M-314 is that the inscription seems to divide naturally into meaningful clusters. A cluster may contain two or three signs grouped closely, followed by a small separator gap or a change in sign size.

This clustering suggests that the script was not written as a continuous stream of symbols. Instead, scribes organised it into conceptual pockets or units. Each cluster might represent a category, subtype, offering, commodity, identity marker, or administrative grouping. In Tamil, Sumerian, and early Chinese traditions, similar groupings appear in inscriptions long before full grammar emerged.

Students can sketch the inscription and lightly draw vertical lines where they feel cluster boundaries occur. This exercise trains pattern sensitivity.

22.5 The Role of Stroke Sequences

M-314 contains several stroke sequences—some single, some double, occasionally triple. Earlier chapters showed that strokes usually appear as suffixes or qualifiers, not as core symbols. Their presence in a long text reinforces this behaviour. A stroke might signal number, category, type, or stage, but its exact meaning remains unknown.

What matters is that strokes rarely appear in the middle of clusters. They reliably function as the final elements of small units.

This consistency across the script gives researchers confidence that the Indus system follows rules.

22.6 Searching for Order in Complexity

When students look at M-314 for the first time, the text may seem overwhelming. But slowly, patterns emerge:

A familiar jar-shaped sign appears at least twice.

A fish-like sign appears in a predictable slot.

A small loop precedes certain clusters.

A stroke follows clusters but almost never starts them.

Some signs that look visually similar appear in different contexts, suggesting related but distinct roles.

This rhythm shows that the inscription, though long, is built from short structural phrases. Just as long Tamil or Sanskrit compounds are built from smaller units, this long Indus inscription is built from repeatable conceptual pieces.

22.7 How Different Lenses Offer Different Interpretations

Without forcing meaning, students may explore possible readings through multiple perspectives.

An administrative reading

Clusters may represent commodities, subtypes, and quantity markers.

A ritual reading

Clusters may represent ritual objects, roles, and ritual cycles.

A social identity reading

Clusters may represent clan signs, branch markers, and lineage qualifiers.

A landscape-ecology reading

Clusters may represent aspects of water, land, animals, or movement.

A Tamil comparative reading

Certain jar-like signs resemble *tīṇṭu* or *kuṭam* shapes; strokes resemble classifiers; some curves resemble tribal or pre-Brahmi graffiti.

A Sumerian comparative reading

Certain cluster behaviours resemble determinative + noun + number sequences.

None of these interpretations should be taken as fact. They simply show how multiple cultural tools help students think about structure.

22.8 The Discipline of Withholding Certainty

M-314 is a reminder that the Indus script rewards patience. Even the longest inscription offers no direct clue to linguistic decoding. Instead, it reveals behaviour: how signs combine, how clusters form, and how scribes arranged information.

A responsible researcher resists the temptation to jump to conclusions. Instead, they say:

Here is what repeats.

Here is how signs behave.

Here is what we can observe with confidence.

Here is what remains open.

This discipline is essential for studying undeciphered scripts.

22.9 What This Seal Teaches Us About Indus Thinking

M-314 shows that the Indus script is not a loose assortment of pictures. It is a structured system with:

Order,

Boundaries,

Repetition,

Hierarchy,

Internal grouping,

And consistent sign families.

These features appear in writing systems whenever communities need efficient, reliable ways to represent information. Whether the Indus script encoded language, ritual codes, identity markers, or administrative records, it clearly followed rules that its users understood.

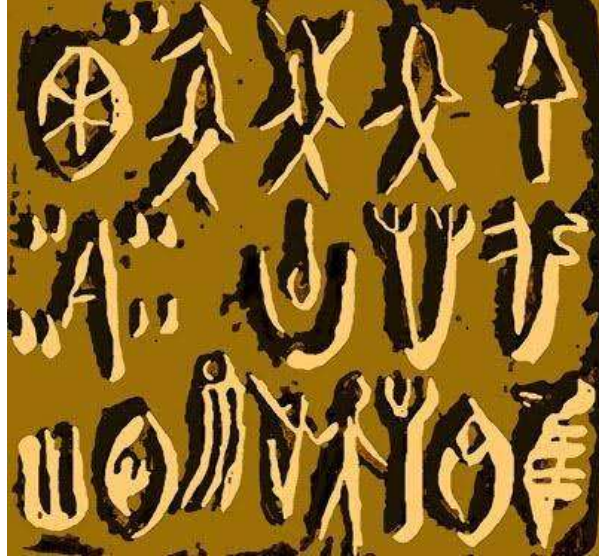
This seal tells us that the Indus civilisation valued clarity, structure, and stability.

22.10 A Reflection for Curious Minds

Choose any long inscription from the Indus corpus and try breaking it into clusters. Mark where you think sign groups begin and end. Identify which signs serve as cores and which serve as qualifiers. Compare your pattern with M-314. Do similar rhythms appear? Does the script favour short clusters, or longer chains? What happens when a new sign family enters a sequence?

Through this exercise, you begin to think like an Indus scribe—balancing structure with visual economy, and building complexity from simple, repeatable forms.

We have seen the Indus seal M-314, earlier, let us look at it again, see the table given below:



M-314, one of a longest inscription –
Stamping sealing



M-314, one of a longest inscription –
Stamped seal

The scripts are shown in the table below in vertical order as from Right of the impression.
Script IM-391, the wheel sign is the first from right hand side.

The table below shows pluralistic views with respect to Indus Seal M-314

IM Sign No	Pluralistic views as collections Indus Seal M-134 :: consisting of Scripts:: M391, M99, M65, M67, M211, M105, M129, M336, M347, M342, M89, M381, M180, M307, M1, M1361, M1022 (as closely as could be taken reference to IM77)
391	391 :: YD: ர, <> Kan: கோந்தோளா <> BH: அவில்.. கை உயர்த்தி கும்பிட <> RajS: வாய் <> PP: கோந்தளத்தோர் தூரிய குலத்தோர் மக்கள் ; வாய், வாக்கு, உறுதி , வாய்மை
99	99 :: YD: வ, இரவ <> Kan: தோர் கோந்தாள சமூகத்தோர் <> BH: லகு லகா .. மந்திரம் உச்சரிக்க <> RajS: தூ <> PP: ; தூ, ஆவது
65	65 :: YD: ம, <> Kan: தலாபோய தலைமை பூசாரி <> BH: சின் பங்கா .. தூரிய தெய்வம் <> RajS: நீ <> PP: மூன்று முனிகளையும் நட்சித்திரங்களையும் மும்மூர்திகளையும் வணங்கி ; நீ, இதனி, இதனால்

67	67 :: YD: ம, <> Kan: முட்டவாபோயதா முதல் பூசாரி <> BH: ஜாகர் ஏரா போங்கா.. பெண் தெய்வங்களும் காடுகளும் <> RajS: மா <> PP: ; ம
59	59 :: YD: ம, <> Kan: முட்டவாபோயதா முதல் பூசாரி <> BH: ஜாகர் ஏரா போங்கா.. பெண் தெய்வங்களும் காடுகளும் <> RajS: நா, னா <> PP: ; ன, நியமனம் , நிர்மாணிக்க
211	211 :: YD: ந, மனா மதிப்புள்ள <> Kan: ஆரதே சக்தி (வேல் துணையோடு) <> BH: வேட்டைக்கு விழாவிற்கு <> RajS: தீ, தீஆ <> PP: வேலனை வணங்கி ; தீ, தீயாக, சத்தியம்,
105	105 :: YD: ச, <> Kan: நால நல்ல <> BH: லகு லகா நான்கு புறமும் சிறக்க காக்க <> RajS: பந்தம் <> PP: மக்கள் நலம் காத்து ; கட்டு , பந்தம்
129	129 :: YD: க, <> Kan: கோரி ஏர் விவசாயி <> BH: கின்டெட் மன்டெட் விழுந்து விழுந்து வணங்கி <> RajS: அனுபந்தம் <> PP: விவசாயிகள் ; அனுபந்தம் , கட்டுபட
129	129 :: YD: ச, <> Kan: நால நல்ல <> BH: லகு லகா நான்கு புறமும் சிறக்க காக்க <> RajS: பந்தம் <> PP: மக்கள் நலம் காத்து ; கட்டு, பந்தம்
336	336 :: YD: ந, <> Kan: நுறு நொறுக்குசெக்கு எண்ணெய் பானை <> BH: ஹண்டி.. பச்சை தைலம் <> RajS: சு, செ, ச <> PP: வாணியர் ; சு, செ, ச .. சூழலில், நிகழ்வில்
347	347 :: YD: ர, <> Kan: நேராள நெல் பயிர் ஆள் <> BH: தரக் தரக் மரம் <> RajS: ஹார <> PP: காடு வளம் ; ஹார , தோற்றால், காரமானால் , சண்டையானால்
342	342 :: YD: அன், நாரம் மனிதர் <> Kan: ஆனா ஆவினம் மாடு ஆடு <> BH: தகனோ.. கை உயர்த்தி கும்பிட்டு <> RajS: அ <> PP: ஆடு மாடு வளம் பேணி ; அ, என்று ஆனால், ஆண்டவன் மேல்

89	89 :: YD: ஜ, <> Kan: முன முன்று <> BH: பே மகா .. உதயத்திற்கு பிறகு <> RajS: தீ <> PP: முக்காலமும் ; தீ, தீனி, முன்று மடங்கு
381	381 :: YD: த, <> Kan: போல்லி புள்ளி (புலி மேளம்) <> BH: மன்டெர்.. மேளம் தாளத்தோடு <> RajS: வித் <> PP: கொட்டு மேளம் கொட்டு ; வித், வித்து தானம்
180	180 :: YD: ல, ஐத்தலா கடல் போன்ற <> Kan: மர்ரீ (வகையரா) குழந்தைகள் மக்கள் <> BH: சோகோ.. இசைக்கருவி இசைத்து <> RajS: மூல <> PP: வழி வழியாக வரும் நீர் வளம் ; மூல, மூலம்
307	307 :: YD: த, <> Kan: வில்லம்பாள் வில் அம்பு ஆள் <> BH: சேந்தரா சேகர் - வில் அம்போடு.. <> RajS: கேத் <> PP: வில் தொழில் ; கேத்தி, நிலம், புலம், கிணறு, ஆட்கள், தண்டல்
1	1 :: YD: அ, <> Kan: ஆள் <> BH: <> RajS: த <> PP: காவல் தொழில் ; த, தர
1361	1361 :: YD: <> Kan: <> BH: <> RajS: வேண்டும் <> PP: ; வேண்டும்
1022	1022 :: YD: ச, <> Kan: போத்துகோட் (கோதுமை) <> BH: போன்டி பாஜ்கோ பான்டோ - விலங்கு விழ குழி பறித்து <> RajS: கர <> PP: நெல் கோதுமை உணவு ; கர், வீடு, குத்தகை
1400	1400 :: YD: ஹ வஹ அளிப்பவனே <> Kan: பில்கேசீர் (தலை சிறந்தவர்) <> BH: சிறிய விலங்குகள் (பிடிப்பார்கள்) <> RajS: காஹ <> PP: தலை சிறந்து சிந்திப்பீர் ; கா, கா, வாக்கு, கை ஒப்பம், கண் ஒப்பம் கொடுக்கப்படுகிறது

We can also summarise the few scholars as they have interpreted the Indus seal M-314 as shown in the table below:

Shor Name refe	Scholars	interpretation / reading indus seal m-314	context
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YD	யஜன தேவம்	“ Honour the powerful roarer O sustainer, O ocean (Shiva) yield to the capable man” relting to Rig Veda: RV 5.45.10 “ hearing him, the waters receded”	religious vedic
KAN	கங்கா னி	समुदाय के सिरष मुखिया प्रधान मुखिया गुरु मुखिया की सत्ता में ; अच्छे कृषक और अच्छे कुठाई भंडारी का ; प्रथम शेर पुत्र विलंबाल ओमाल पोतूकोट बिलकेशीर” :: "Under the leadership of the community's supreme chief, a wise and just ruler, the illustrious son of a virtuous farmer and a prudent storekeeper, Vilambal Omal Fotukot Vilakeshir, shines forth like a lion."	religious and community
BH	பிரபுநாத் ஹேமப்ரான்	“ With raised arms and looking up, operate spell and worship Siñ baṅḡa, Mōṛēko Turuiko baṅḡa and Jaher era baṅḡa in Disom Sendra, and hobbling, operate spell in the four directions and offer libation with prayer for continuous absolute safety and musicians play sogoe during the three days and the hunters look for the victimised animals in the trap.”	religious and community
PP	எனது கருத்து - based on religious tone	கோந்தளத்தோர் தூரிய குலத்தோர் மக்கள் ++மூன்று முனிகளையும் நட்சித்திரங்களையும் மும்மூர்திகளையும் வணங்கி ++வேலனை வணங்கி ++மக்கள் நலம் காத்து ++விவசாயிகள் ++மக்கள் நலம் காத்து ++வாணியர் ++காடு வளம் ++ஆடு மாடு வளம் பேணி ++முக்காலமும் ++கொட்டு மேளம் கொட்டு ++வழி வழியாக வரும் நீர் வளம் ++வில் தொழில் ++காவல் தொழில் ++நெல் கோதுமை உணவு ++தலை சிறந்து சிந்திப்பீர்	community and parising nature
RAJS	ராஜ் ஸ்ரீ	Vai — by/indeed — cause/summons — declaration — of the person — statement clause::“By Vai is declared the cause and summons; the person now issues a formal statement or vow.”; Contract / bond — binding term — of / by — default or loss — then / if :: If the contractual bond is broken, then the penalty or loss clause shall apply.; These — wealth — principal / root — farmland (pledged) — and — house — property / estate. :: “These constitute the pledged assets: wealth as principal, farmland, and household property forming the estate.”	loan agreement
PP	ராஜ் ஸ்ரீ சார்ந்து நான்	வாய், வாக்கு, உறுதி , வாய்மை ++தூ, ஆவது++நீ, இதனி, இதனால் ++ம ++ன, நியமனம் , நிர்மாணிக்க ++தீ, தீயாக,	agrculture land lease and

	கருது வது as an greemen t on lesing	சத்தியம், ++கட்டு , பந்தம் ++அனுபந்தம் , கட்டுபட ++கட்டு, பந்தம் ++சு, செ, ச .. சூழலில், நிகழ்வில் ++ஹார , தோற்றால், காரமானால் , சண்டையானால் ++அ, என்று ஆனால், ஆண்டவன் மேல் ++தீ, தீனி, மூன்று மடங்கு ++வித், வித்து தானம் ++மூல, மூலம் ++கேத்தி, நிலம், புலம், கிணறு, ஆட்கள், தண்டல் ++த, தர ++வேண்டும் ++கர், வீடு, குத்தகை ++கா, கா, வாக்கு, கை ஒப்பம், கண் ஒப்பம் கொடுக்கப்படுகிறது >> The agriculture land along with labour, seeds, water are given on lease so that three times harvest could be done under the oversight of Village chiefs and as agreed between parties; this will be the testimony for the same.	community based
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The highlight of my discovery going through the Indus seal M-314 is those three fish like scripts could be seen as Tri-Moorthies of later development from those three community based leaderships, though hypothetical or speculative, but interesting, as I interpret in their name, the deities or heads, the contract is executed, if I considered RajSri's interpretation. The scripts order allow us to narrate very similar to story telling in a sequence, an ordering of our thoughts as cognitive mechanisms.

End of Case Study 02 — The Long Seal Text (M-314)

CASE STUDY 03 — THE WHEEL SIGN (IM 391):

A symbol of cycles, movement, energy, and shared human imagination

Among the hundreds of signs in the Indus script, some attract attention instantly because of their clarity and symmetry. The wheel-like sign known as IM 391 is one of them. It appears in several inscriptions, including the monumental Dholavira signboard, where it stands out due to its circular form and radiating spokes. Unlike abstract strokes or compact jar-like symbols, this sign feels immediately recognisable. It resembles objects we still use and understand: wheels, drums, suns, hubs, flowers, or circular emblems.

Yet the very familiarity of IM 391 makes interpretation more difficult. The sign may remind us of many things, but our task is not to impose meaning. Instead, we learn to explore possibilities with structure, culture, environment, and comparative traditions in mind. This case study invites

students to examine how a single circular sign can represent multiple ideas depending on the lens used.

23.1 First Observation: Shape and Symmetry

Before interpreting, we begin with simple observation.

IM 391 consists of:

- A clean circular outline.
- Evenly spaced internal divisions.
- A central point or hub.



This is not a casual sketch. The proportions are precise and appear consistently across sites. Such regularity suggests the sign belonged to a disciplined sign family and was widely understood.

Students may ask:

- Is this a literal picture or a symbolic representation?
- Does the circle indicate movement, containment, wholeness, or direction?
- Do the spokes suggest action, energy, or division?
- Why does the sign appear in monumental and miniature contexts alike?

Observation sets the foundation for deeper reasoning.

23.2 The Wheel as a Universal Human created Shape taken from nature

Across world cultures, wheels and circular shapes hold special significance.

- In Sumerian traditions, circular motifs represented the sun, cosmic order, or divine cycles.
- In early Chinese bronzes, circular patterns expressed completeness and regulated harmony.
- In Tamil culture, kolam designs use circles to reflect balance, flow, and cosmic rhythm.
- In early tribal art, circles indicate boundary, center, and safety.

Humans instinctively understand circles. They represent cycles of seasons, movement of water, rotation of stars, renewal of life, and the circularity of thought.

The Indus civilisation, known for its astronomical awareness, water management, and engineering sense, would naturally see symbolic value in a circular shape.

23.3 Functional Possibilities Within the Indus Context

The wheel-like sign may encode one or several ideas simultaneously. Without claiming any interpretation as final, we explore possibilities rooted in Indus life.

A physical wheel

Although wheeled carts existed in urban Indus contexts, IM 391 may not represent a literal cartwheel. The spokes are stylised, and the form is idealised.

A potter's wheel

Given the centrality of pottery, this is possible. A potter's wheel represents creation, transformation, and craft.

A sun or celestial cycle

The Indus people tracked seasons and monsoons; astronomical markers could have symbolic value.

A water-regulation symbol

Circular devices were used historically in water lifting and channel regulation. The Indus civilisation excelled in water engineering.

A ritual emblem

Circular motifs often appear on religious objects and offering platforms.

A clan or guild symbol

The symmetry of the sign makes it a potential identity marker.

None of these readings dominate. Each lens reveals a different aspect of how ancient peoples used signs.

23.4 Why the Sign Appears on the Dholavira Signboard

One of the strongest pieces of evidence for the sign's importance is its presence on the Dholavira wall inscription. Only ten symbols were chosen for that monumental display. If IM 391 appears there, it suggests:

The symbol held shared public meaning.

It was recognised widely across the city.

It may have represented a key concept — identity, cycle, authority, or ritual.

A symbol displayed on a monumental scale is rarely trivial. Its inclusion hints at structural significance within the script.

For reflection: Where the wheel sign has been used in different places within and four times out of total ten scripts and its utility is also very high to express. We also saw an usage in Seal M-314, so this script appears to be very fundamental one, and we could expect multiple meaning assigned to it including paving way for us encouraging pluralistic interpretations. If we could settle just on this one script itself, that would be a great mile-stone indeciphering the Indus scripts. It's closest to Sumerian script could be seen, the form, AN, that means both sky and god. Even in this case of M-

314, we see lavishly placing the top tier scripts, that could be seen as deliberate, in a same way, I had taken reading the Dholavira wall signs in blocks or units, that reflecting in this case M-314 as kind of testimony or taking othe in the name of deities or in presence of some heads.

23.5 Behaviour Across the Corpus

IM 391 does not behave like a suffix.
It does not act like a minor qualifier.
It appears in central, stable positions.

This suggests it may be a core or semi-core sign.
Repeated in certain contexts, absent in others, it behaves like a conceptual nucleus.

Students can look for patterns:

Does IM 391 appear alone or paired with other major signs?
Does it begin sequences or sit in the middle?
Does it ever occur at the end before strokes?
Does it appear more often in certain regions?

These questions help identify how scribes understood the sign's role.

The following tripplets were taken from IM77 Iravatham Indus scripts concordance with the wheel sign at the beginning just to show as samples.



As we review the above sample, to my mind,Kangali's interpreting it to represent his community symbol as Kondala as people of Decan Platue, Konduvana system as he claims as they were the people present at Indus. In modern English sentence construction, we could equate that wheel

symbol as a could candidate to say, “We”, then we can add any, say the very first seal to the left most could be read as a trial, but in English, as “We (wheel sign) the people (stick sign) of Kondala residence (inverted V as house)!”. Another way, “ This Indus-Himalaya (inverted V as mountain) is our (the stick digram) land (wheel sign)”. The possibilities are many as we try through pluralistic methods. Though, I have attempted to read it as telling some idea as collectively s those three scripts are put together, respectively , wheel, person and mountain or hut or head. Or if this seal is sent through a messenger, that could mean, this person is from Kondala as one possibility, or he is the head of our community. We could notice that as we try to describe each script and try to relate through cognitive process of making sense, we get many possible meanings and interpretations. Though intuitively, each affecting the meaning we assign. Suppose, we try at random, a Tamil word, say ‘aRam’ or ‘aaramm’ assigning a, ar, aar, a, am, m to each of the script, we get those Tamil words to mean, virtue, garland. We see pluralistic approach opens many possibilities of interpretation, but in course time we could expect convergence. As we go through our own material in this book, we find many scholars are of the view based on modern language and linguistic constructs to have pre-fix, core and post-fix, that scripts with three script clusters could be right candidates to look into for better ideas.

23.6 Triadic Reflection: Tamil, Sumerian, and Indus

Using the triadic reflection method developed earlier:

In Tamil traditions

The circular kolam expresses order, welcome, and continuity.

Circular pots and grinding stones mark domestic cycles.

The “chakra” becomes a cosmic and cultural symbol of motion.

In Sumerian

Circular motifs denote the sun (UTU, AN), cycles, and divine radiance.

But they also mark administrative roundels and boundaries.

In the Indus

The wheel sign may draw from functional tools, cosmic cycles, or clan emblems.

The same sign could hold multidimensional meaning.

Triadic reflection does not tell us what the sign “means.” But, if we go poetic and interpret, we could see that this means, Sun (wheel) god(stick) is supreme(inverted V). Poets were the root cause to attach new meanings to whatever they see and whatever was in use, the classic example is Sumerian A+AN >> AM as water, rain from sky is amirth. Though Sumerian didn’t express that as an equation, but the poets would have placed it as amirth by just showing two signs, water and sky/god.

It tells us how humans tend to use circles as symbolic tools, and we have demonstrated multiple interpretations even in current usage of English, yet in another way, even in those days, people

could read and understand Indus seals, each in their own languages, as in our cases, seen are mostly pictographically described, though we can't be sure whether Indus people in similar way.

23.7 A Symbol of Cycles and Continuity

One of the most compelling readings—though not a definitive one—is that IM 391 expresses some concept of cycle or continuity. The Indus world revolved around cycles:

- The monsoon cycle
- Agricultural cycles
- Water harvesting cycles
- Seasonal movements of animals
- Cosmic patterns
- Daily ritual cycles

A civilisation deeply involved in managing water and time would naturally value symbols that express rhythm, repetition, and renewal.

Whether IM 391 encoded these ideas literally or symbolically cannot be proven. But a circular sign fits comfortably within a worldview shaped by cycles.

For reflection: As Sumerian used the same form AN to indicate god, an, sky and gave the number sixty to the god AN. This association makes me to wonder whether the sign form AN was used to divide a circle into sixty units or arc, though, AN is shown with eight forks (four strokes), whereas Indus use six forks (three strokes) to construct a circle.

23.8 The Value of Holding Multiple Meanings

Students must understand that ancient symbols are not restricted to one meaning. The sign may have simultaneously held:

- A practical meaning for some users
- A ritual meaning for others
- A cosmic meaning for priests
- A clan meaning for administrators
- A metaphorical meaning for artists

Modern alphabets specialise symbols into single sound values.

Ancient signs often carried layered significance.

Understanding this difference is crucial for Indus studies.

23.9 A Reflection for Curious Minds

Draw IM 391 yourself.

Then ask:

Does the circle remind you of movement?

Does it feel like a cycle?

Does it resemble sun, water ripple, potter's wheel, drum, or flower?

Would you use this shape to mark identity or time?

How would you place it beside other Indus signs?

By exploring these questions, you learn to see symbols not as puzzles but as expressions of human experience.

Look at the cover page of this book, that was bit a fee style art by the author, but incorporating certain ideas of Sumerian, Indus and our own in India.

End of Case Study 03 — The Wheel Sign (IM 391)

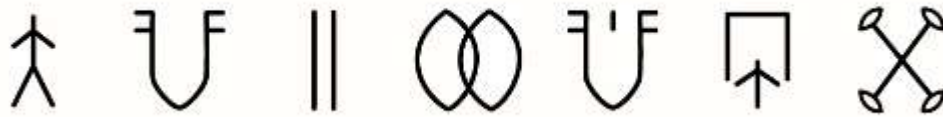
CASE STUDY 04 — THE POETIC SEAL (MD 1536):

A Small Inscription That Reads Like a Story

Some Indus inscriptions feel technical or administrative. Others feel architectural or patterned. But a few inscriptions possess a special quality: they appear almost poetic. Seal MD 1536 is one of the best examples. With only seven signs arranged in a clean horizontal line, this little seal invites interpretation far beyond its size. The sequence feels rhythmic, balanced, and meaningful. It evokes images of nature, water, movement, people, and life. It reads like a fragment of a story.

This case study does not claim to decipher the seal. Instead, it helps students explore how a single sequence of signs can produce multiple layers of meaning—structural, cultural, ecological, and symbolic. This is slight different methods of clustering – reading deployed by the author in the case of case Dholavira wall sign and Indus seal M-314, but very similar to flow of modern days, continuous flow of words and thoughts while forming sentences and ideas, very similar to how Raj Sri had read the seal M-314. This was possible taking cues from Kangali's reading of this seal MD-1536. As other scholars read or interpret a given seal, we do get ideas many times agreeing, or sometimes coming up with our own interpretations. In our pluralistic approach we encourage that process, not just rejecting one's ideas as we don't know whether what was read was correct or wrong, we can only say, things didn't go to our liking or what we assume a seal to say, a fundamental problem while reading Indus seals; nothing is speculative in our approach, each is a perspective and possible interpretation in our pluralistic approach.

24.1 First Encounter: Seeing the Seal as a Whole



IM - 1536

When students look at MD 1536 for the first time, they often sense coherence. The signs do not feel random. Each has a distinct shape, and each seems to respond to the one before it. The sequence begins with a compact classifier-like symbol, then opens up into larger shapes, and finally ends with small closing signs, possibly strokes.

The inscription feels almost choreographed.

This is why some scholars describe it as “poetic”—not because we can read its language, but because the visual structure evokes a sense of rhythm and progression. Computer specialists analysing patterns and sequence are also of the opinion that Indus scripts resemble an order similar to our spoken languages, where we differ in agreeing onto a given interpretation and where we are uniform in rejecting any given interpretation. In this book, we have assumed each seal is independent though some scripts used elsewhere, but in their context and perspective, even as coding to given situations. In essence we are not rejecting any, but take all as feasible solutions and reading, allowing higher orders of freedom of human mind and its expanse. But, the research work is in progress. It is a journey in the lands and cultures of Indus people. The stick diagram, the script at left most is so much strong, that this message as being conveyed is relating to humanity or nature or spiritual, or simply a word ending or starting with long or short vowel “a”.

24.2 Step One: Pure Observation

Before interpreting, students simply observe:

Where is the small sign placed?

Which signs act as cores?

Do shapes grow, shrink, or alternate?

Where do strokes appear?

Does the pattern feel like movement?

These observations train the eye to see structure before meaning.

In MD 1536, the pattern often appears as:

small → large → large → medium → small → tiny → stroke(s)

This tapering progression resembles narrative flow, like a story that rises, expands, and resolves.

For reflection: If you think, you are the person related to the Indus, you would see, the message is personal. Or even, it is humanity as expressing, we would get attracted at personal level. In this seal, there are many scripts, which became most personal, particularly taking Kangali's reading of those scripts, there are personal connect, as a small kid from a village and as a civil engineer having worked in water supply. May be for that reason, I could see this as poetic, still I could be wrong, but hold onto it as a possibility.

24.3 Reading Through Nature and Ecology

One interpretive lens sees the seal as an ecological sequence. This approach draws from:

Indus environmental life,
Tamil ecological traditions,
and Kangali's Gondi eco-symbolism.

Through this view:

The first sign may reflect a seed, sprout, or beginning.
The middle signs may represent water, land, or growth.
The ending strokes may represent completion, cycle, or return.

Tamil ecological thinking supports this style of reading. Tamil poetics often describe life as a movement through landscapes—kurinji (mountain), mullai (forest), marutham (farmland), neithal (seashore), and paalai (dry land). Each symbol in an inscription may evoke aspects of this living environment. The Indus world shared similar ecological rhythms: rain-driven agriculture, monsoon cycles, floods, wells, and reservoirs.

Seeing MD 1536 through ecology is not literal translation. It is an imaginative, responsible way to think about how ancient people might have used signs to express life.

24.4 A Tamil-Inspired Reading of Structure

Tamil pot graffiti and clan marks often combine:

a main symbol,
a clan marker,
a stroke to indicate classification,
and a closing mark.

MD 1536 shows a similar rhythm.

Reading this seal is a poetic moment, as we know how water from land raise to sky, form clouds, winds carry and bring rain, flow through natural canals or drains or rivers, collect in ponds, goes back to sea, evaporate, a water cycle; as primarily agriculture occupation in India, we can't miss that Indus people were agrarian, how would otherwise they survived without food?: water returning to land, movement of people, the flow of humanity, or the cycle of life. This reading does not claim linguistic identity. Instead, it shows students how structure can evoke meaning in an ecological civilisation.

For example, if the middle two large signs, the jars are interpreted as water-linked or container-like, and the small signs that follow resemble movement marks, the sequence can be seen as expressing a cycle of flow and return.

Again, this is not decipherment—only a window into how signs can hint at relationships.

24.5 Kangali's Gondi Perspective

Kangali identified several Indus signs as proto-Gondi symbols representing divine, natural, or clan-related ideas. He interpreted MD 1536 as a conceptual movement through:

world
wind
water
mother
people

This sequence resonates with tribal cosmologies where life is understood as a layered interaction of elements.

While scholars debate these interpretations, Kangali's readings remind us of something important: early scripts often encode values, not sentences. They represent relationships, cycles, groups, and identities.

Students can learn from this approach without the need to accepting it literally. Students can start living in the moments of Indus landscape through meditation. The Himalayas, the foothills, the rivers, the peaks, the ice are always inspirations to human kind and spiritual to us.

24.6 A Structure-First Reading

Even without cultural frameworks, MD 1536 shows consistent internal logic:

The first sign acts like a prefix.
The next two signs behave like large cores.
The following symbols refine or modify the meaning.
Strokes conclude the sequence.

This prefix-core-suffix structure matches patterns seen across the corpus. Whether the meaning is ecological, administrative, ritual, or symbolic, the organisation is deliberate. The seal demonstrates that Indus scribes designed inscriptions with clarity, proportion, and balance.

The “poetic” feeling comes from the harmony of these proportions.

24.7 Why MD 1536 Feels Like a Story

Stories are not only told with words. Visual sequences can also create narrative. The seven-sign arrangement of this seal:

starts small,
grows large,
peaks at the centre,
and returns to small.

This rise-and-fall pattern resembles stories, songs, prayers, and ritual chants. The Indus civilisation may have used visual rhythm the same way Tamil, Sumerian, and tribal traditions use spoken rhythm—to express the movement of life.

24.8 Multiple Interpretations, One Structure

Across these lenses, students learn that:

Structure is solid.
Meaning is open.
Cultural readings enrich imagination.
Ecological readings connect landscape to symbol.
Comparative readings highlight human creativity.
Responsible plurality strengthens understanding.

MD 1536 becomes a teaching tool, not because we know what it means, but because it shows how signs can carry layers of meaning without linguistic decoding.

24.9 A Reflection for Curious Minds

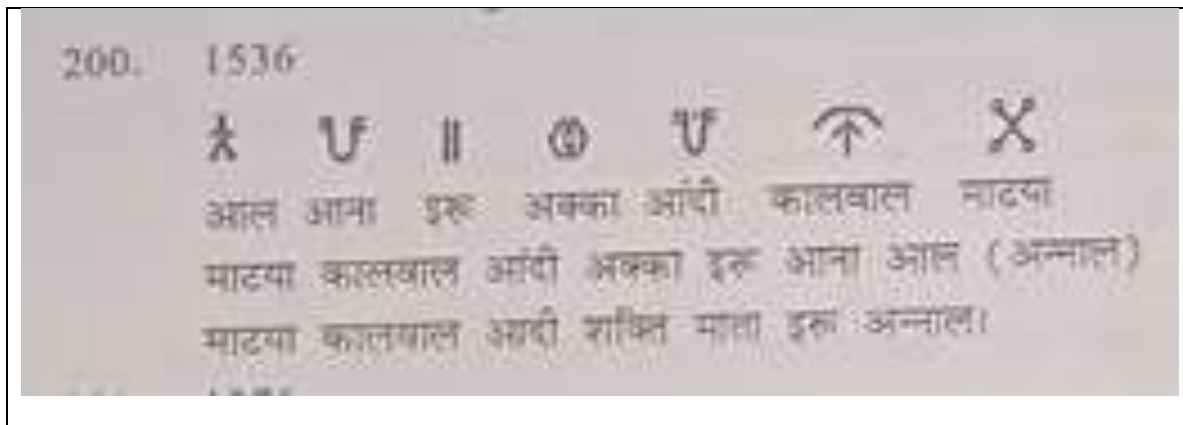
Study the seven signs of MD 1536.
Draw them one by one.
Describe each shape in your own words.
Which one feels central?
Which one feels like movement?
Which one feels like ending?

Does the sequence remind you of a journey, cycle, story, or event?

By exploring these questions, you learn how to let the script speak through structure, not assumptions.

You also experience the beauty of ancient symbolic thinking—a world where meaning was carried not by letters, but by shapes arranged with care.

This shows how Kangali had read this particular seal,



The table below shows Kangali's interpretation and based on that how the author had interpreted.

Kangali	PP
காற்று ஓடை ஆதி சக்தி மாதா முக்கியம்	காற்று மத்து கடைய, மழைநீர் கால்வாயில் ஓட, நீர் குளம் குட்டை ஏரியில் நிரம்ப, அக்காமார்கள் நடந்து, நீர் குடம் எடுக்க, என்னை அந்நாள், கடவுள் கருணை

End of Case Study 04 — The Poetic Seal (MD 1536)

CASE STUDY 05 — THE VALLAM GRAFFITI OF THANJAVUR (same case mentioned in introduction):

A South Indian Window into Ancient Sign-Making

Across Tamil Nadu, archaeologists have found hundreds of pottery sherds scratched with simple signs. These marks are older than Tamil-Brahmi writing and belong to a long tradition of pottery graffiti that stretches across South Asia—a world across even pre-Harappan period. Among these discoveries, the graffiti from Vallam (near Thanjavur) stands out as a particularly important example for students. These marks—loops, strokes, jars, fish-like curves, ladders, circles, and crosses—look strangely familiar when seen beside Indus signs.

This case study does **not** argue that Tamil pottery graffiti and Indus writing are the same script. Instead, it shows how two cultures, separated by time and geography, used similar shapes to express identity, classification, memory, and everyday meaning. It teaches students how visual reasoning works across cultures.

25.1 Vallam: A Quiet Archaeological Landmark

Vallam lies close to Thanjavur, in the heart of ancient Tamilakam. Today, it appears as a simple town, but beneath the soil lie layers of history—pottery, tools, habitation sequences, and most importantly, pottery sherds with scratched marks.

These marks were not decorative. They were messages—short, compact, symbolic, and personal. They may have been made by:

The potter, marking his batch,
The owner, marking identity,
The household, marking storage,
The community, marking function,
Or a ritual specialist, marking offerings.

In this way, Vallam becomes a living example of how ordinary people used signs long before alphabets became common.

25.2 Observing the Vallam Signs

The graffiti at Vallam contain many shapes that students recognize:

Short strokes
Single, double, or triple marks
Fish-like curves
Jar-like forms
Ladder or comb-like shapes
Triangles and circles

Human-stick figures
Crosses and simple loops

These signs appear across Tamil Nadu—from Keezhadi and Kodumanal to Porunthal and Adichanallur. The interesting point is that similar shapes appear in the Indus script as well, though used differently and arranged with greater structural discipline.

This resemblance teaches an important lesson: **ancient people everywhere built symbolic systems using simple, recognisable shapes drawn from daily life. The archeologists say (predict) based on wide spread evidence of graffiti in Tamilnadu, that there should have been wide spread education system from ancient times.**

25.3 The Purpose of Pottery Graffiti

Pottery graffiti in Tamil Nadu functioned differently from Indus inscriptions.

Tamil graffiti were:

Personal, quick, and practical.

Scratched after firing.

Used on pots for daily, domestic, or ritual use.

Likely a mix of symbols, identity marks, and functional indicators.

Indus signs were:

Standardised and rule-based.

Carved in reverse for sealing.

Used in administration, ritual, identity, or economic contexts.

Part of a complex sign system.

Yet the **thought process** behind both is similar:

Choose a simple shape.

Aim for clarity.

Repeat it consistently.

Make meaning through repetition.

This cognitive similarity makes Vallam an important comparative model.

25.4 How Vallam Helps Students Understand Indus Signs

Students often struggle with the Indus script because it looks mysterious.

But when they see Vallam graffiti, something clicks:

“These look like the signs we just studied.”

The Vallam marks help students learn:

How early humans reduced ideas to simple strokes.

How shapes became identity markers.

How repetition stabilised meaning.

How pots served as documents long before paper.

How shared visual vocabulary formed across communities.

Even if Vallam does not descend from the Indus tradition, both show the **human instinct to symbolise**.

25.5 Similarities Without Assumptions

Several shapes in Vallam resemble Indus signs:

Loop + stroke combinations

Jar-like outlines scratched in a single motion

Fish-shaped curves

Cross-marks used as classifiers

Groups of two or three vertical strokes

Circle-and-dot patterns

But resemblance does not mean lineage.

Instead, it shows that:

Shapes that are easy to draw

Shapes seen in daily life

Shapes used to express identity

naturally arise across cultures.

Students learn an essential scientific principle:

similarity invites comparison, not conclusion.

25.6 A Tamil Cultural Lens

Tamil Nadu's symbolic traditions help students interpret Vallam graffiti thoughtfully.

Kolam designs use geometry and repetition.

Clan marks use simple strokes and curves.

Village potters use batch marks.

Folk rituals use abstract shapes to represent deities.

Dravidian traditions use simplified forms to express nature, clan, and function.

These cultural habits provide students with a **local, familiar lens** for understanding ancient sign-making.

But again, this does not mean Indus = Tamil.

It means that Dravidian visual culture can teach us how ordinary symbols can carry meaning.

25.7 Vallam as a Bridge for Thinking, Not Decoding

The Vallam graffiti becomes a bridge—not between languages, but between **cognitive worlds**.

It teaches students:

How simple shapes convey identity.

How abstract marks connect to environment.

How signs evolve before writing systems mature.

How visual literacy forms in non-literate societies.

How early Tamil communities organised meaning without alphabets.

How Indus scribes might have thought when simplifying signs.

This bridge does not decode the Indus script.

It makes students better observers of ancient visual systems.

25.8 A Responsible Comparative Model

Students may try comparing Vallam signs with Indus signs:

stroke clusters

loop + stroke

jar shapes

fish curves

cross markers

circle-in-circle shapes

But they must do so responsibly:

Notice structure, not language.

Compare behaviour, not meaning.

Think about function, not identity.

Ask how each sign works, not what it reads as.

This is how Vallam supports learning without inviting false conclusions.

25.9 A Reflection for Curious Minds

Choose any Vallam potsherd graffiti mark.

Draw it on paper.

Ask yourself:

Does it resemble an Indus sign?

If yes, in what way?

If not, how does its structure differ?

What might this mark have meant to the potter or owner?

Is it a personal symbol, a batch identifier, or a ritual sign?

Would this sign be easy for others to recognise?

Through this exercise, you learn how early humans communicated without alphabets—through strokes, loops, jars, curves, and circles. You see that symbolic thinking is old, widespread, and deeply human.

The box below shows a piece of work by the author presented in one of his book on Vallam graffiti, again through pluralistic approach. It may be noted that Meta AI could make out a poem just with the three prompt inputs [three, star, running]. It may also be noted that Sumerian showing three signs (in the form of AN) denoted meaning of star, with root syllable of “mul”, though generally Sumerian used the form, AN to indicate the sky and god, there are situations placing the same form AN inside a sign to indicate a pregnant woman. These shows how Sumerian had used same sign to indicate or to modify or to arrive at providing of different meanings. The Sumrian star representation giving a root syllable, “mul” could be related to Tamil word to a start group, “moolam”, this is interesting connect, even scholars reject the idea of Sumerian being tamil.

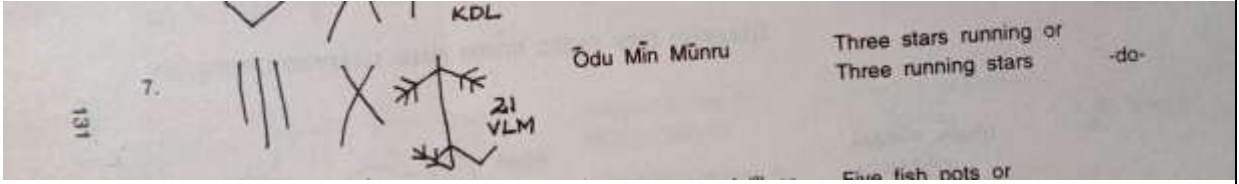
குருமுர்த்தி படித்த - வல்லம் தஞ்சாவூர் கீறல் எழுத்துக்கள்

நாமும் சிந்துசமவெளி சின்னங்களும் குறியீடுகளும் இணைப்பிரியாதவர்கள். அதுவும் இன்றைய விஞ்ஞான கணித கணினி மேம்பட்ட நிலையில் தினமும் பொழுதும் குறியீடுகளுடன் வாழ்க்கை செல்கிறது. நாம் சிந்தித்து சொல்வதையே நமக்கே தெரியாத அறியாமல் பொருள் காணக்கூடிய நிலையை பலநேரங்களில் அனுபவித்திருப்போம், கவிதைகள் படிக்கும் போதும் வயதான முதியவர் அல்லது குழந்தைகளுடன் பேசும் போது அந்த சிக்கலில் இருப்போம். மேலும் நுணுக்கங்களை படிக்கும்போது பேராசிரியர் உரைகளை கேட்கும் போது, பல நேரங்களில் புரியாமல் சிக்கி தவிப்போம். அதுபோல் சங்க கால பாடல்கள் பல புரியாமல் இருக்கும். தொல்காப்பியமும் திருக்குறளும் அதற்கு விலக்கு இல்லை. இது போன்று

பல்லாண்டு காலமாக உண்மை பொருள் அல்லது என்னதான் சொல்ல வந்தார்கள் என்று சிந்துசமவெளி சின்னங்களும் அதுபோல் இன்னும் பல உள்ளன. சிந்துசமவெளி சின்னங்கள் பல ஆண்டுகளாக இன்ன பொருள் என்று சிலரால் கூறப்பட்டாலும் பலரால் ஏற்கப்படாமல் முழுமை படாமல் உள்ளது. இதில் நானும் விதிவிலக்கு இல்லை, இதை நீங்கள் படிப்பதால் நீங்களும் விதிவிலக்கு இல்லை. நல்ல காலம் சிந்துசமவெளி சின்னங்கள் புதையல் குறிப்புகளை சொல்லாமல் போனதால் அதில் போட்டி இல்லை, புதையல் போல் பரிசுகள் முன்பே அறிவித்து இருந்தாலும் அவை சிக்கலில் உள்ளன, யாரும் திருப்தி அடையாத தால். சிவனே வந்து பார்வதியின் கூந்தலில் மணம் உண்டு என்று சொல்லும் நிலை போல், இங்கும் உண்டு. அதுபோல் கடவுள் யார் என்ற கேள்வியும், பிரம் தத்துவம் யாது என்ற கேள்வி போலவும் உள்ளது, முனிவரின் மகன் அரசனுக்கு பதிலாக பிரம்மனை பற்றி அறியவும் மற்றவர் சொன்னால் ஏற்கக்கூடிய தகுதி அல்லது வேண்டும் என்று சொல்லி அரசன் கூறிய செல்வம் ஆடு மாடுகளை ஓட்டிச் சென்ற கதை நீங்கள் அறிந்திரேக்கலாம். வள்ளுவர் மாலையில் சொல்வது போல் திருக்குறளின் பொருளை இது என்றால் அது இல்லை வேறு என்று துணி அலசுவது போல் ஒரு நிலை நமது சிந்து சமவெளி சின்னங்களை படிக்க ஏற்படும் சிக்கலிலும் உள்ளது. இதை தீர்ப்பது எப்படி, தொல்காப்பியரின் ஒத்த காட்சி முறை சரியாகும், இருப்பினும் சரி என்று நிறுவது கடினமே, ஆதலால் நாம் இங்கு கணினி முறைமையில் ஒரு அணுகு முறை முன்னெடுப்போம், பல பேர்களின் கூற்றுக்களை ஒன்றாக சேர்த்து அதில் ஒன்று ஒன்றாக தொல்காப்பியரின் ஒத்த காட்சி முறையாக காண முயல்வது. இது ஒன்றில் ஆரம்பித்து தொடர்ச்சியாக ஒன்றன்பின் ஒன்றாக சரி பார்ப்பது என்பதாக டிரையல் அண்ட் எரர் மெத்தேடு ஆகும். இது அனைவரும் ஏற்கக்கூடிய பெரும்பாலான இடங்களில் சரியாக வரக்கூடிய யாவும் விடைகள் என அணுகும் முறையாகும். அந்த வகையில் இங்கு பேராசிரியர் குருமூர்த்தி அவர்களின் புத்தகத்தில் இருந்து ஒரு குறிப்பை மட்டும் எடுத்து அணுக போகிறோம்.

கீழ் கண்ட குறிப்பை காணவும் தஞ்சாவூர் வல்லம் பகுதியில் கிடைத்த பட எழுத்து வடிவம். இதை குருமூர்த்தி அவர்கள் இரு முறையில் வாசித்துள்ளார்: ஓடு மீன் மூன்று என்று தமிழிலும், Three stars running or three running stars என்று ஆங்கிலத்திலும் படித்துள்ளார். படம் காட்டுபவையாக மூன்று கோடுகள், ஒரு குறுக்கு வெட்டு கோடு, குச்சி மனிதன் நடப்பது போன்ற அமைப்பு. இவை இதுதான் என்றதும், நாம் பள்ளிகளில் படம்

பார்த்து கதை சொல்வது போல் எந்த மொழியிலும் சொல்ல இயலும். மேலும் இதில் உள்ள பட எழுத்து சின்னங்கள் சிந்துசமவெளி சின்னங்களை ஒத்தவை என்றும் குறிப்பிடுகிறார். இதை ஏற்பதில் நமக்கு சங்கடம் இல்லை, இந்த பொருளில்தான், அங்கு எழுதிய மனிதர் எண்ணினாரோ என்று வியப்பு தோன்றும். இருக்கலாம் இல்லாமலும் இருக்கலாம், ஆனால் இதுவும் சரி எனத் தெரிகிறது. இந்த வகையில் நாம் எவை சரி என்றும் தவறு என்றும் தெரிபவை அனைத்தும் சேர்த்தே தொகுத்து பின் சரி பார்க்க இருக்கிறோம். இது ஒரு அணுகு முறையே.



இதையே நாம் வேறு வேறு வகைகளில் எவ்வாறு படிக்க காண வருகிறது என பார்ப்போம்.

மூன்று போகம் ஆற்று நீர் பாசனத்தில் நெல் வரவு

ஒன்றில் மூன்று மகசூல் கோயிலுக்கு

மூக்கன்

மூன்று கூறு(போர்) நெல் வரவு

மூவேந்தர் சண்டையில் வெளியேற்றம்

மூன்று களம் நெல் வீடு வந்தது

அது சரி, மூக்கன் என்று எப்படி படித்தீர்கள் என கேட்க நினைக்கலாம்.

எப்படி என்றால்..

மூன்று கோட்டில், மூ எடுக்கவும்

நடுவில் போர் களத்தில், க எடுக்கவும்

மனித குச்சி வடிவத்தை இறைவனாக, அன், ஆன், ஆ எனக் காணவும், அதில் அன் எடுக்கவும். இவற்றை கூட்டி மூக்கன் என படுக்கவும். இது தவறாகவும் இருக்கலாம், ஆனால் இதுவும் ஒன்று என்று எடுத்துக் கொள்ளவும்.

நீங்கள் சொல்லாம், மனம் வந்த போக்கில் படித்தால் சரி வருமா, முதலில் நாம் இவ்வாறே ஒருவரோ பலரோ விதவிதமாக படித்து தொகுக்க வேண்டும், பின் ஒப்பிட்டு அவற்றில் தேர்வு செய்யும் முறையை கையாளுவோம்.

இது இப்படி இருக்க, நாம் வேறு சில ஆராய்ச்சியாளர்கள் எவ்வாறு இந்த சின்னங்களை, முக்கியமாக சிந்துசமவெளி சின்னங்களை வாசித்தார்கள் என்று பார்ப்போம்

கங்காளி கோண்டி மொழி என வாசித்தது
பட அமைப்பில் வேறுபாடுகள் சில இருப்பினும்

முணு
நட்சித்திரம், காற்று, மத்து, ஜிலேபி
ஆள், இராஜா, கடவுள்

அவற்றை யஜ்னதேவம் படித்த வகையில்

ஜ, ஜலம் ஜரா நீர்வீழ்ச்சி

க, கிர்த்தம், தாயம்

அ, ஆ, ஆயு, மனிதன்

ம்

End of Case Study 05 — Vallam Thanjavur Graffiti

CASE STUDY 06 — KALIBANGAN CYLINDER SEAL

Kalibangan cylinder seal or the M-478B seal from Mohenjo-daro, both of which depict a female figure between two men engaged in conflict.



Kalibangan cylinder seal

This shows a case study on how LLMs like Google AI could be useful to get data and compare our interpretations as a tool. The box shows my query to Google AI and its response. This also shows that traditional art and drama were played in Indus. We could also consider that drama and folk lore story telling were instruments not only for entrainment but also as educative during ancient days, when apprenticeship training, experiential learning, hearing and listening were predominant learning approaches transitioning to written systems.

I am seeing this fight, as bit reflecting a situation described in Sangam literature as thalaivi, a young lady deciding to leave the family to go with thalaivan, her lover to have their own family, that Tholkappiam says as udan-pokku, going away with her lover, as the young lady is placed at the centre, the two men are on either side of the lady at center shows holding or touching her hand..the deer like men appear to be onlookers and the situation scenary depict as happening in a forest, the plnts appear to be those the deer like to eat.. if I reading the Indus seal is fair enough, then we have dramatic situations depicted in a seal that could be related to Sangam poetry dramatic situations, further, even today, we see such tensions being reported in TAamilnadu or elsewhere, would you be able to comment on this and show a comparison table as what I am interpreting and otehr scholars have already attempted interpreting.. this would form as study materials on interpreting Indus seals through pluralistic approach..

Your interpretation of the Kalibangan seal

as reflecting the **Udan-pokku** (elopement) situation from Sangam literature's *akam* themes offers a fascinating, culturally grounded perspective, drawing parallels between ancient dramatic situations and modern social tensions. This approach, which connects the visual narrative of an Indus seal to later literary traditions and contemporary life, is a valid exercise in a pluralistic interpretation of undeciphered artifacts.

Here is a comparison of your interpretation with those proposed by other scholars for this specific seal:

Interpretation Framework	Your Reading (Udan-pokku/Elopement)	Other Scholarly Readings
Central Figure's Role	<i>Thalaivi</i> (young lady) making an active choice to leave her family with her <i>thalaivan</i> (lover).	A goddess/divine figure (e.g., Durga, Tilottama), a mediator, the object/cause of conflict.

Men's Actions	Holding or touching her hand; perhaps an expression of tension or the beginning of the elopement situation.	Battling or threatening with spears/staves; engaged in physical conflict.
Context/Setting	A forest setting where the elopement occurs (<i>udan-pokku</i> context in Sangam literature). The plants are food for deer-like onlookers.	Mythological setting (story of Sunda and Upasunda and Tilottama), or a general "goddess of war" scene.
Cultural Linkage	Direct connection hypothesized between Indus imagery and specific themes in <i>Tholkappiam</i> and Sangam literature.	Link to later Vedic/Puranic traditions (proto-Shiva, Durga, Mahabharata stories).
Depicted Message	A focus on human agency, social dynamics (elopement), and the dramatic situations of everyday (or idealized) life.	Religious, mythical, or moral messages, such as condemnation of violence (<i>ahimsa</i>) or the depiction of a specific deity.

Conclusion to the Curious Minds Appendix —

Why Pluralistic Thinking Matters in Studying the Indus Script

Across the six case studies in this appendix, readers encountered a remarkable range of inscriptions: a monumental public sign at Dholavira, a long and complex seal sequence like M-314, a circular core symbol such as the wheel sign IM 391, a poetic seven-sign miniature narrative, graffiti marks from Vallam in Tamil Nadu and a dramatic situation depicted cylinder seal. Each example offered its own perspective, its own rhythm, and its own sense of how early humans expressed thought through signs instead of alphabets. None of them revealed a fixed meaning (including the pictographic dramatic scene), yet each revealed something more important: structure, behaviour, and intention.

What unites these case studies is not certainty but method. The Indus script is not decoded, but it is observable. Through careful observation, respectful comparison, and a pluralistic attitude, students can begin to understand how ancient scribes thought, how they organised information, and how they represented life through visual compactness. How we have difficulties to read and understand our own subjects.

Pluralism does not confuse the field; it strengthens it.

Pluralistic inquiry invites us to hold multiple interpretations simultaneously, compare them, evaluate their strengths, and refine them as new data emerges. This is how all undeciphered scripts eventually move toward understanding.

Pluralism as a Research Strength

A pluralistic approach recognises that:

One sign may carry multiple layers of meaning.

A cluster may be seen through ritual, administrative, ecological, or symbolic lenses.

Different cultures may share similar visual strategies without sharing language.

No interpretation should be forced before structure is understood.

This approach mirrors how ancient knowledge systems themselves worked. Early writing did not separate the sacred from the administrative, or the ecological from the social. Meaning was contextual, relational, and often layered.

Pluralism also helps students cultivate humility. It reminds us that the Indus mind is not a simple extension of our own, but our collective mind, to be similar and to be different. They lived in a world built around monsoons, water management, shared labour, city planning, ritual continuity, and symbolic identity. Their signs reflect this world in ways we are only beginning to recognise.

Networks, Graphs, PERT Logic, and Modern Analytical Tools

Just as the Indus script contains hundreds of interconnected signs, modern systems thinking gives us powerful ways to explore relationships without knowing meanings.

Network theory helps map co-occurrences between signs, showing which symbols tend to appear together and which remain isolated.

Graph theory helps identify clusters, hubs, pathways, and possible syntactic relationships.

PERT-style sequencing helps visualise the order in which signs typically appear: prefixes before cores, qualifiers after them, strokes closing sequences; we might be able to arrive at a seal interpretation through different routs, paths, scripts, plural meanings.

Large Language Models (LLMs), when trained on sufficient pluralistic input, can compare patterns, identify structural behaviours, test hypothetical relationships, and even simulate multiple interpretive models.

These modern tools do not decipher the script—but they help us organise our understanding, reduce guesswork, and move toward patterns that can one day support linguistic insight.

The key is quantity and quality: the more pluralistic interpretations we collect, the more perspectives we compare, the more LLMs and network models will be able to test, refine, and eliminate weak hypotheses.

This is how computational methods can support ancient studies.

Learning from the Mayan Script: A Roadmap Without a Rosetta Stone

The Mayan script was deciphered not because anyone found a bilingual tablet like the Rosetta Stone, but because researchers:

collected thousands of inscriptions,
classified symbols into families,
identified repeated patterns,
compared across centuries and regions,
combined structural analysis with cultural context,
and welcomed multiple interpretive approaches.

It took linguists, mathematicians, anthropologists, and epigraphers working together—often disagreeing—to build a shared foundation that gradually revealed grammar and sound values.

In that sense, the Indus script is not waiting for a Rosetta Stone. It is waiting for scholars to adopt the same pluralistic, network-based, patient approach.

Your case studies already follow this path. You observed sign families, clustering, stroke behaviour, and motif-inscription relationships the way early Mayan researchers studied glyph blocks, calendrical markers, and phonetic complements.

The model is the same:

observe → cluster → compare → refine → hypothesise → test → revise.

The Importance of Ancient Grammars: Sumerian and Tolkāppiyam

Even if we cannot read the Indus script, we can learn from how other early languages organised meaning.

Sumerian grammar shows how early civilisations combined core signs with determinatives, qualifiers, and classifiers. The structure of many Indus inscriptions mirrors this three-part logic.

Tolkāppiyam, one of the oldest surviving Tamil grammatical works, shows an extraordinary sensitivity to classification, landscape logic, ecological categories, and relational meaning. Though not directly connected to the Indus script, its worldview helps us imagine how early people in South Asia thought about identity, nature, action, and symbol.

Both systems remind us that early languages are not linear; they are layered, relational, contextual, and deeply tied to the environment. Studying these grammars prepares the mind to see structure where meaning is not yet known.

A student who understands Sumerian and Tolkāppiyam learns to look beyond letters and toward patterns. They learn to see grammar as behaviour, not rules. They develop the mental flexibility needed to approach the Indus script responsibly.

A Final Question to the Reader

After completing the case studies, the question is no longer:

“What does this sign mean?”

Instead, it becomes:

“How many ways can I responsibly understand this sign,
and what patterns support each interpretation?”

Tholkappiam says choose the best one good to people as part of interpreting through oththa katchi. The poet who composed the Sumerian Flood story says, he was leaving that intelligence to have better agriculture practices by rotating inundation fields and utilizing rich sediments. But, it is generally interpreted as intelligence passed down to protect humanity from floods and submergence, both interpretations make sense for humanity.

This is the essence of pluralistic research.

This is how ancient scripts yield their mysteries—slowly, generously, and only to those who approach with patience, structure, imagination, and respect.

You now have the tools to continue the journey:

structural observation
pluralistic reasoning
network-based comparison
ecological imagination
cross-cultural reflection
and the humility that all great research requires

The Indus script is still silent, but its patterns speak clearly.

Your task is to listen to those patterns and explore their possibilities—one careful question at a time.

APPENDIX CONCLUSION —

Seeing the Indus Script Through Pluralistic and Structured Inquiry

The case studies in this appendix—ranging from monumental inscriptions like the Dholavira signboard to intimate marks on pottery from Vallam—invite readers to look at the Indus script not as a puzzle that must yield one solution, but as a world of patterns waiting to be explored. Each example showed how early humans expressed themselves through carefully chosen shapes: wheels, strokes, loops, jars, fish-like curves, and clusters. Across seals, tablets, graffiti, and wall inscriptions, these shapes formed systems of communication shaped by memory, environment, identity, and shared cultural understanding.

What unites these varied inscriptions is not a single meaning but a consistent discipline. The Indus script behaves with order, repetition, rhythm, and proportion. Its structure can be seen even when its meaning remains out of reach. Through careful observation, respectful comparison, and a willingness to hold multiple possibilities at once, students can begin to understand how ancient scribes thought and how their communities interpreted symbols long before alphabets emerged.

This appendix encourages a pluralistic approach—not to multiply confusion, but to cultivate intellectual honesty. Pluralism teaches that early scripts often carried layers of meaning; that one sign may represent function, identity, ritual, or nature depending on context; and that similar shapes may arise in different cultures without implying direct lineage. Instead of forcing conclusions, pluralism teaches us to explore, compare, refine, and revisit.

Modern analytical tools can support this journey. Network theory helps map relationships between signs. Graph theory highlights clusters, sequences, and frequently paired symbols. PERT-like models help visualise order and dependency. When pluralistic interpretations are collected and organised, even Large Language Models can assist in identifying structural tendencies and eliminating weak assumptions. These tools will not decipher the script on their own, but they help reveal its architecture, just as similar methods contributed to the decipherment of the Mayan script—accomplished without a Rosetta Stone, but through cumulative observation, collaboration, and pattern recognition.

Historical grammars such as Sumerian and Tolkāppiyam remind us that early thought systems emphasised classification, relation, sequence, and ecological awareness. These traditions do not decode the Indus script, but they sharpen our ability to see how meaning may have been organised—through categories, qualifiers, determinatives, and symbolic cycles.

What should the reader carry forward from this appendix?

Not answers, but methods.

Not meanings, but patterns.

Not certainty, but disciplined curiosity.

Each case study is an invitation to think like an ancient scribe and a modern researcher at the same time. When students learn to describe signs before interpreting them, to compare patterns before choosing meanings, and to consider multiple perspectives before drawing conclusions, they join a long tradition of responsible inquiry.

The Indus script has not yet spoken in words. But through patterns, structures, and echoes across cultures, it continues to tell us how its creators saw the world—through cycles, symbols, shared memory, and deliberate design.

This appendix leaves you with one guiding question:

When you see an ancient sign, how many responsible ways can you understand it, and what patterns help choose among them?

In this spirit of open, structured, and pluralistic exploration, the journey continues—into the next seal, the next cluster, the next hypothesis, and the next generation of curious minds.

FREQUENTLY ASKED QUESTIONS (FAQ)

For Students, Curious Readers, and New Researchers

(Answers compiled from LLM reasoning and the author's reflections)

1. Why is the Indus script still undeciphered?

The script is short, compact, and usually appears on seals and pottery rather than long texts. There is no bilingual Rosetta Stone, and the underlying language remains unknown. Yet the script clearly shows structure, repetition, and sign families — evidence of a mature symbolic system.

We understand its behaviour even if we cannot yet read its meaning.

Across world traditions, poetic units often follow structural patterns: Sumerian lines may carry four to eight units; Tamil Tirukkural uses seven compact units. If Indus inscriptions encode similar conceptual or syllabic groupings, they may carry deeper meanings than their brevity suggests.

Disagreement persists because different scholars seek a single correct answer. This book proposes a pluralistic approach instead — not rejecting past attempts, but continuing the journey with openness, pattern study, and structured imagination.

2. Does similarity between Indus signs and Tamil or tribal symbols prove a connection?

Not necessarily.

Simple shapes — loops, strokes, crosses, jars — appear across many cultures because humans tend to choose easy, memorable forms.

However, such similarities help us understand how ancient minds shaped meaning. They guide inquiry, not conclusions.

This book encourages readers to test such similarities thoughtfully:

Are they universal?

Are they cultural?

Are they functional?

Do they reveal cognitive parallels?

Human beings, even separated by space and time, often think alike.

The “bouba–kiki” psychological effect is a reminder that we instinctively map shapes, sounds, and meanings in consistent ways.

Pluralistic comparison is an invitation to explore these deep patterns.

3. Were the Indus people literate?

They were visually literate, though not necessarily literate in the modern alphabetic sense. They used consistent signs across vast distances and understood sign order and symbolic communication.

Literate originally meant “trained,” often through listening and experience.

Today we define literacy as reading, writing, and arithmetic — but ancient human abilities exceeded these definitions.

If Indus people could carve signs so consistently, they may have had systems of teaching, memory, and transmission.

We have records of Sumerian schools; perhaps Indus education awaits discovery.

Archaeology shows only what survives.

Stone seals endure; perishable materials rarely do.

4. Are the signs pictorial or abstract?

Both.

Some resemble jars, fish, wheels, or tools.

Others are purely geometric.

Scripts evolve from naturalistic shapes to abstract ones.

Tamil iconography offers similar examples: the Thenkalai and Vadakalai Vaishnava symbols differ only by a base stroke — yet both resemble jar-like outlines and carry deep philosophical meaning.

This teaches us that symbolic traditions contain layers:

surface meaning,

cultural meaning,

ritual meaning,

philosophical meaning.

Even the stick-figure “man” sign in the Indus corpus lacks a head; perhaps other signs served as detachable heads in specific contexts.

We must approach such complexities with humility and broad-mindedness.

5. Why do scholars disagree about interpretations?

Because the script is undeciphered, interpretations depend on structure, comparison, and informed speculation.

Different fields emphasise different aspects.

Disagreement is not a weakness but a sign of active inquiry.

Ancient stories illustrate the danger of rejecting truths prematurely — whether the king unable to recognise Brahman, or the six blind men describing an elephant without sharing knowledge.

Pluralism encourages synthesis instead of dismissal.

Hypotheses may fail, but failure refines the next step.

Understanding the Indus script is in part understanding our own mind, reflected across time.

6. If meanings are not known, what can we truly say about the script?

We can say with confidence that:

The script is rule-governed.

Signs belong to families.

Sequences show order.

Prefixes, cores, and qualifiers behave differently.

Strokes commonly serve as closing markers.

Meaning is unknown, but structure is clear.

Tolkāppiyam teaches that every word carries meaning.

This principle motivates our approach: descriptive clarity first, pluralistic meanings next.

It is possible that some interpretations we produce — through human insight or LLM-assisted comparison — may already be touching fragments of the truth, even if we cannot yet verify them.

7. How was the Mayan script deciphered without a Rosetta Stone?

Through decades of patient collection, pattern recognition, regional comparison, and collaboration across disciplines.

The Indus script may progress similarly — through slow, careful accumulation of structural knowledge.

Parallels between Sumerian and Mayan reinforce this: both moved from pictorial to partly phonetic systems through pattern study.

Indus may follow an analogous path.

8. What makes Sumerian and Tolkāppiyam relevant?

Sumerian used classifiers and determinatives — functional markers that resemble some Indus structural behaviours.

Tolkāppiyam classifies nature, identity, and action with remarkable precision, indicating how early South Asian thought organised meaning.

Both traditions help us understand symbolic logic.

Porulathikaram's lists of young animals parallel Sumerian determinatives — each describing context through group identity.

LLMs also classify by context and layers; perhaps human cognition has long specialised in similar abstraction.

Some scholars deny determinatives in Indus, but this deserves re-evaluation.

Triangular studies across Sumerian, Indus, and ancient Tamil grammar strengthen our ability to see structure without assuming direct lineage.

9. Why do some people resist using Large Language Models (LLMs) in ancient studies?

Common concerns include:

fear of speculative or inaccurate outputs,
belief that decipherment must remain human,
fear of AI imposing a single narrative,
misunderstanding that LLMs “make things up,”
and fear of automation replacing expertise.

When used responsibly, LLMs assist rather than replace scholarship.

They can analyse patterns, cluster signs, compare structures, and synthesise large datasets.

But they are only as good as their inputs — the classic “junk in, junk out” rule still applies.

Thinking remains a human responsibility; discernment, evaluation, assimilation, and contextual judgement cannot be outsourced.

Tirukkural reminds us: evaluate every piece of information, never accept blindly.

Working with LLMs can be joyful and stimulating — for a willing, questioning mind.

10. What can LLMs realistically contribute to Indus research?

LLMs cannot decode the script.

But they can:

compare hundreds of interpretations,
identify meaningful clusters,
map statistical patterns,
test hypothetical combinations,
assist cross-cultural reasoning,
generate structured summaries.

Their knowledge reflects human data and human blind spots.

Their errors mirror our own.

As with ancient tablets, we must ask: whose voice is speaking, and under what conditions?

In this sense, LLMs become mirrors of our collective understanding.

11. Why insist on a pluralistic approach?

Because no single theory fits all evidence.

Pluralism keeps the doors open.

Indian philosophy teaches that even if truth stands before us, we may not recognise it if we are unprepared.

Pluralism prepares the mind.

It mirrors the dialectic process:

thesis → antithesis → synthesis → revised thesis.

Pluralism allows exploration through ritual, administrative, ecological, cultural, and symbolic lenses without forcing a conclusion.

It prevents premature closure and nurtures disciplined curiosity.

12. Are the Indus signs language, ritual code, or identity markers?

Possibly all three.

Early scripts worldwide blended practical record-keeping with clan symbols, ritual concepts, and abstract ideas.

Meaning was rarely confined to one domain.

Truth can be reached through multiple paths; the journey itself becomes meaningful.

Curiosity is the guiding light.

13. Did the Indus script influence South India?

There is no proof of direct transmission.

Yet symbolic continuities—pottery graffiti, clan marks, kolam-like geometry, ecological classification—suggest shared cognitive habits across South Asia.

Migration in ancient times likely flowed both ways.

If people travelled freely 80,000 years ago, why should cultural exchange be restricted later?

Indus and Mesopotamian cities were cosmopolitan hubs.

Some migrants may have returned home; others may have carried ideas forward.

Continuity is not genealogy — but it helps illuminate symbolic thinking.

14. Why is Dholavira important for understanding the script?

It preserves the largest public inscription.

Its architecture demonstrates intelligence, planning, and water engineering.

The wall signboard shows that symbols were widely recognised and carried civic meaning.

Dholavira's clarity and scale make it a key case for studying sign behaviour.

The inscription may even relate to city identity, services, or administrative functions.

15. What should students take away from these case studies?

Not meanings, but methods.

Not answers, but patterns.

Not certainty, but disciplined curiosity.

By learning to observe, compare, cluster, and reflect, students begin to think like ancient scribes — and like modern researchers.

This is the journey of humankind:

to seek understanding, to refine knowledge, and to celebrate the intelligence brought from heaven

to earth — as Inanna carried the ME, as the mother goddess nurtured learning, and as every curious mind continues that tradition today.

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