

VOLUME 6 ISSUE 7

SCIENCE MAGAZINE

PARAM



CONTENT

How understanding actually works	4-7
Language before words	8-11
When Paris was Trapped	12-15
Before James Bond There was Chanakya	16-19

MASTHEAD

Editor in Chief

Ganesh Prasad

Executive Editor

Anupama Harish

**Researchers
and Writers**

*Bhavana Umesh
Anupama Harish
Vinod Gowda
Riya Pradhan
Aparna Agarwal*

Visual Designers

*Jaden G T
Vinod Gowda*

EDITOR'S NOTE

We are currently living in an era in which most of us have access to establish communication with anyone in any corner of the world. It is indeed remarkable considering that the first telephone call happened barely a century and a half ago. The telephone is by far the most iconic invention that started off a new world order.

Having all the means to communicate digitally, we may slowly be losing the skill for the original way to communicate which is to simply strike a conversation with other humans. It is a cliché statement but people are increasingly feeling disconnected and surprisingly lonely in the most digitally connected times ever. Is communication only a means to send and receive information? Communication is what shaped us and most importantly what sets us apart from every other being on the planet.

The evolution of communication has no doubt been spectacular in the past century. This edition is all about that and more. Read on..

How Understanding Actually Works

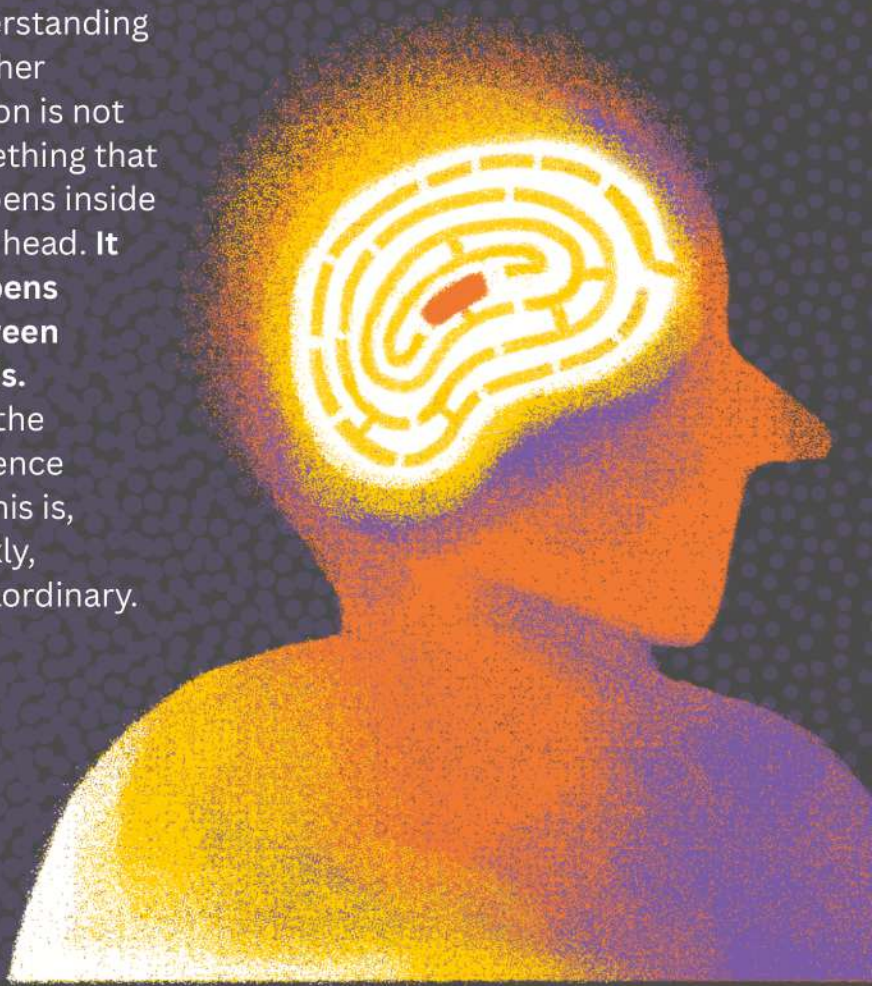
People often ask me what the **most surprising thing in science is**. I used to say it was something about black holes, or CRISPR, or the age of the universe.

Now I say it's this: we still barely understand what happens when **two people have a conversation**.

Not the mechanics of it — we've mapped those reasonably well. What I mean is **the deeper fact of it**.

That understanding another person is not something that happens inside your head. **It happens between heads.**

And the evidence for this is, frankly, extraordinary.

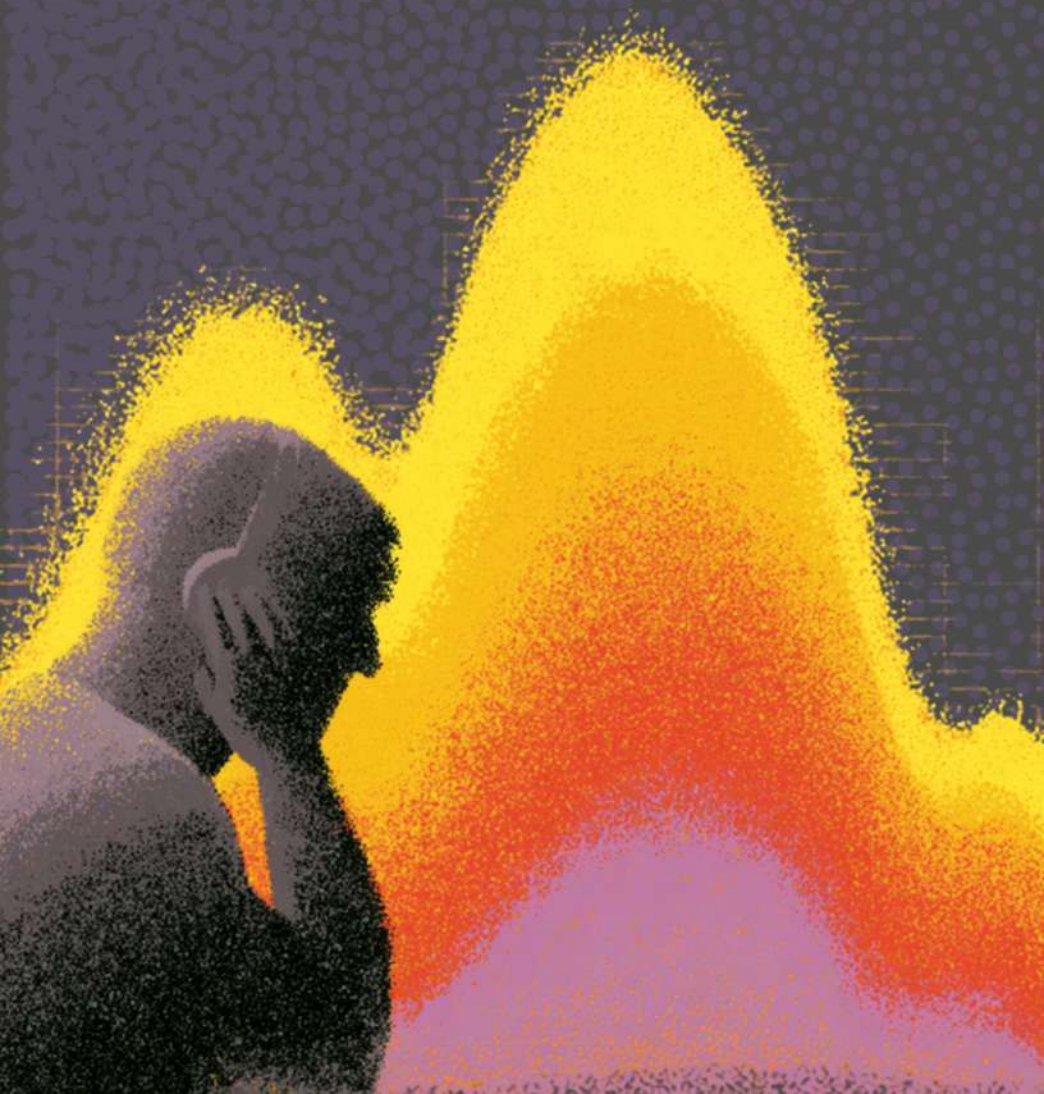


When **neuroscientists began scanning people's brains during real, live conversations** — not reading scripts, not pressing buttons in a scanner, but **actually talking** — they found something that stopped the field in its tracks.

The patterns of **neural activity** firing in a speaker's brain were showing up, moments later, in the listener's brain. Not similar patterns. **The same ones, echoing across two skulls.**

They called it **speaker-listener neural coupling**. The stronger this synchrony, the better the comprehension.

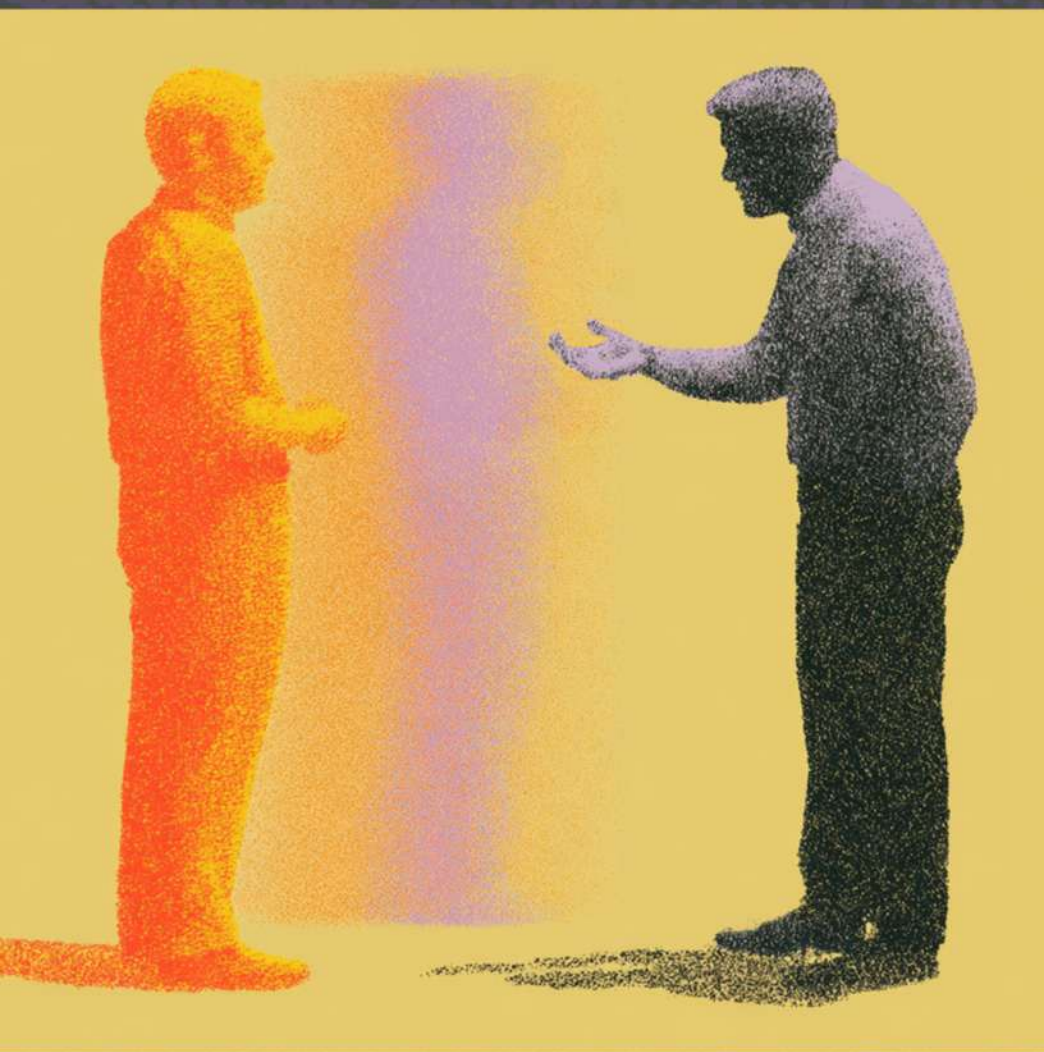
And when researchers played the same recording to people in a language they didn't speak — same voice, same sounds, same everything — **the coupling disappeared entirely.**



The signal was there. The meaning wasn't. And without meaning, **the brains stayed strangers to each other.**

This is not a small finding. It suggests that understanding someone is, **at the neural level, a kind of temporary merger.**

Here is something more: When the words and the body say different things, the brain sides with the body.



This is why someone can say "**I'm fine**" and the person across them will know, from a half-second pause, **that they are not fine at all.**

The words said one thing. Everything else said another. And the brain, remarkably, believed everything else.

The **Ancient** Mechanism



The longer a good story runs, **the deeper the synchrony goes.** Researchers have found not only that a speaker's neural patterns propagate into a listener's brain, but that listeners in the same room begin **synchronising with each other.**

It is multiple minds pulled into **alignment by a single voice.**

I've spent a long time thinking about why humans tell stories, and I suspect this is the answer. **Not to entertain. Not merely to inform.**



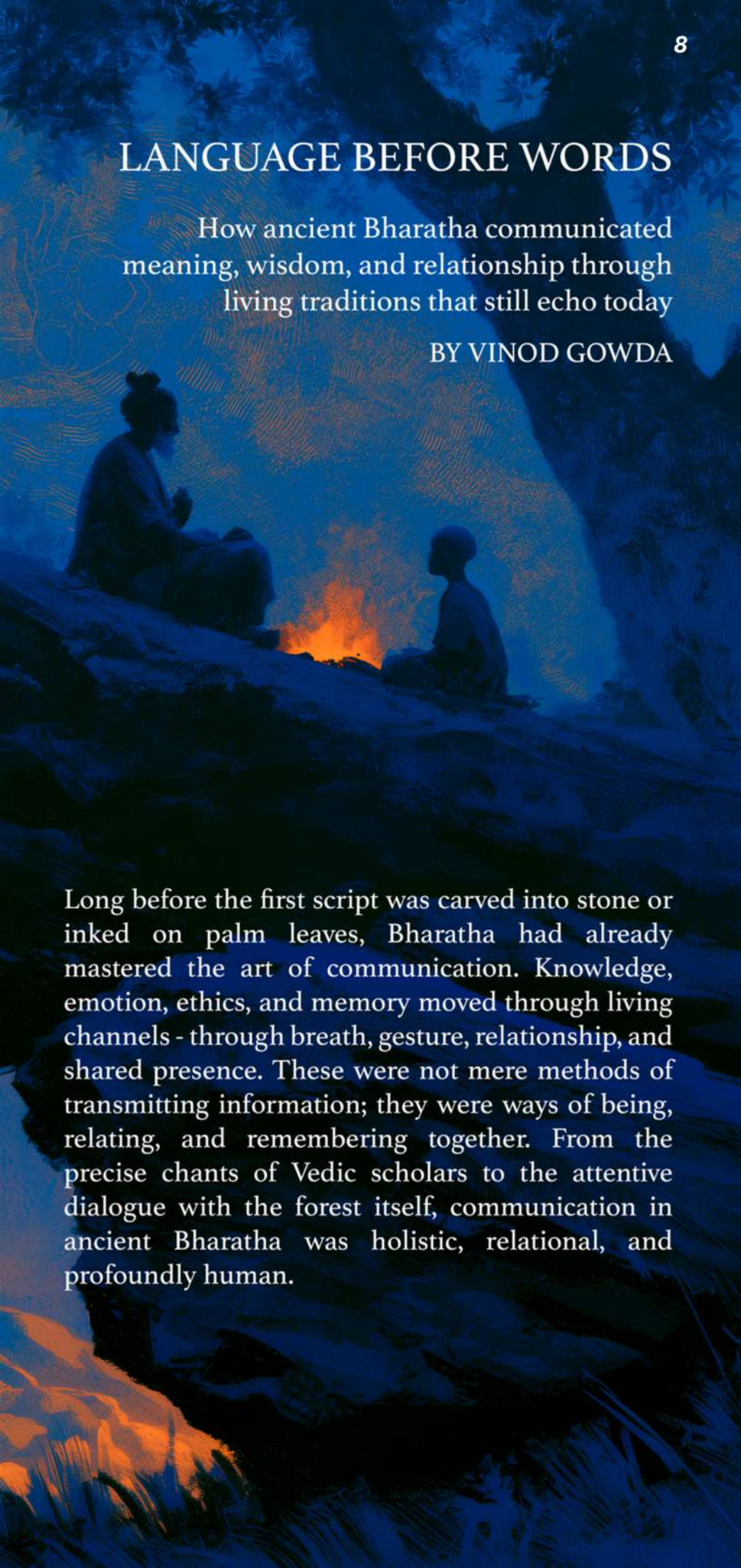
But because a well-told story is the most efficient mechanism we have ever developed for moving an experience from **one nervous system into another.**

Every culture that has ever existed has done this. **It may be the oldest thing we do.**

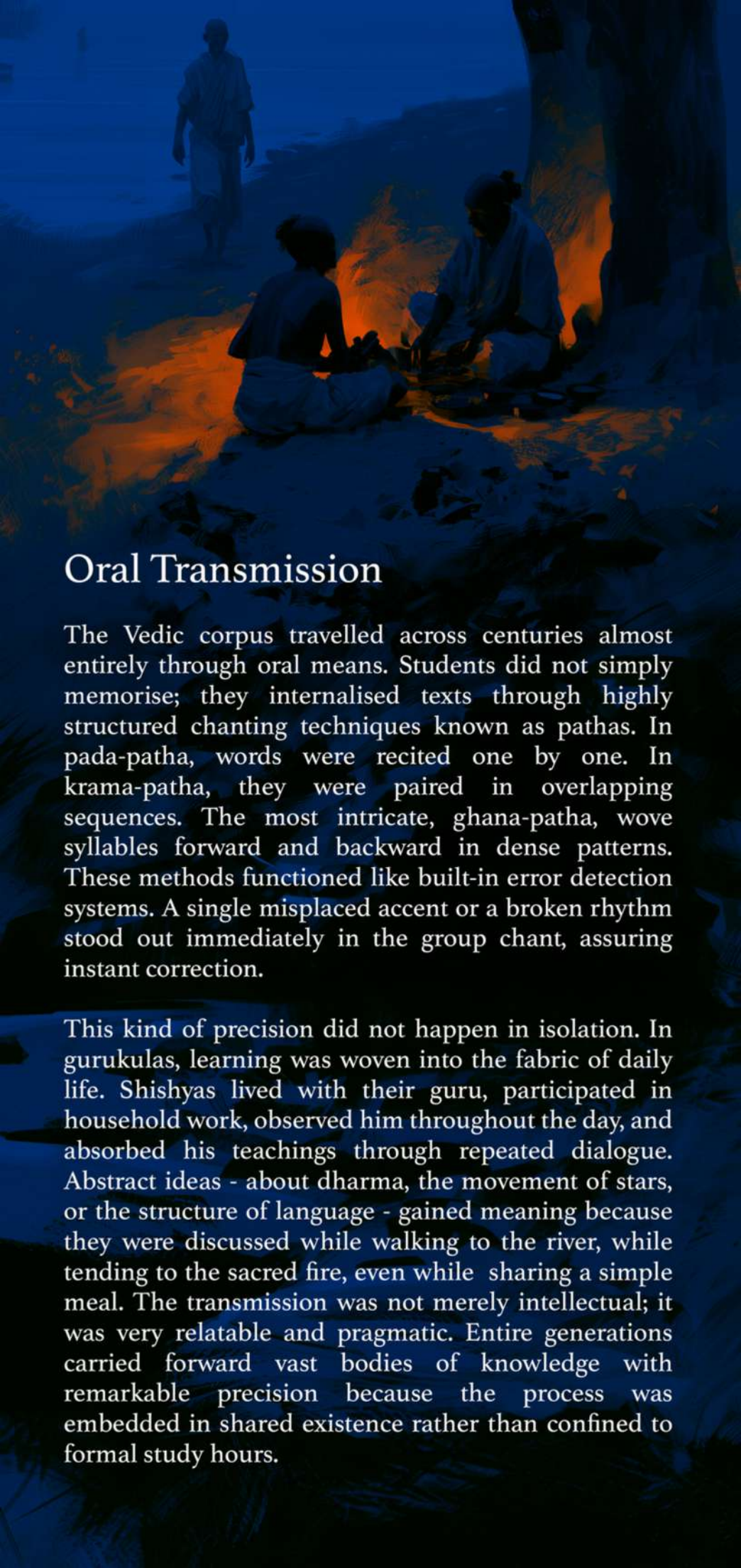
LANGUAGE BEFORE WORDS

How ancient Bharatha communicated meaning, wisdom, and relationship through living traditions that still echo today

BY VINOD GOWDA

A painting of an elderly man and a young boy sitting on a rocky ledge at night, illuminated by a campfire. The man, on the left, is seated in a meditative posture, wearing a simple robe and a turban. The boy, on the right, is also seated, looking towards the man. A small fire burns between them, casting a warm glow. The background is dark and textured, suggesting a forest or cave setting. The overall mood is contemplative and serene.

Long before the first script was carved into stone or inked on palm leaves, Bharatha had already mastered the art of communication. Knowledge, emotion, ethics, and memory moved through living channels - through breath, gesture, relationship, and shared presence. These were not mere methods of transmitting information; they were ways of being, relating, and remembering together. From the precise chants of Vedic scholars to the attentive dialogue with the forest itself, communication in ancient Bharatha was holistic, relational, and profoundly human.



Oral Transmission

The Vedic corpus travelled across centuries almost entirely through oral means. Students did not simply memorise; they internalised texts through highly structured chanting techniques known as pathas. In pada-patha, words were recited one by one. In krama-patha, they were paired in overlapping sequences. The most intricate, ghana-patha, wove syllables forward and backward in dense patterns. These methods functioned like built-in error detection systems. A single misplaced accent or a broken rhythm stood out immediately in the group chant, assuring instant correction.

This kind of precision did not happen in isolation. In gurukulas, learning was woven into the fabric of daily life. Shishyas lived with their guru, participated in household work, observed him throughout the day, and absorbed his teachings through repeated dialogue. Abstract ideas - about dharma, the movement of stars, or the structure of language - gained meaning because they were discussed while walking to the river, while tending to the sacred fire, even while sharing a simple meal. The transmission was not merely intellectual; it was very relatable and pragmatic. Entire generations carried forward vast bodies of knowledge with remarkable precision because the process was embedded in shared existence rather than confined to formal study hours.

The Language of the Forest

The Vedic corpus travelled across centuries almost Parallel to the Vedic oral traditions, forest-dwelling communities of the Western Ghats - ancestors of today's Soliga and Jenu Kuruba people developed rich ways of communicating rooted in one of the world's most ancient and biodiverse mountain forests. They learned the names and uses of trees, plants, and animals from experience. Elders would point, gesture, and demonstrate while children watched, touched, tasted, and practised alongside them. This hands-on knowledge has been passed down to the current generation.

These communities mastered multi-sensory, often wordless communication with wild animals. By moving quietly and reading signs like bird calls or sudden silences, they could signal peaceful intent and avoid danger. In elephant country, Jenu Kuruba honey harvesters know exactly when to stay silent and when to use soft songs or calls.

A striking example is their traditional honey collection. At night, groups climb tall trees using smoke from special torches to calm the bees. They work together with simple gestures and timing rather than many words. Special songs express respect for the bees. The activity draws the attention of other forest beings, weaving humans into the larger web of life.

They also marked time and life events by the forest's natural cycles - such as the rare flowering of bamboo that brings edible rice - keeping personal and community memory tied to the land itself. Temporary signs like arranged leaves or broken branches served as trail markers. What seems like silence to outsiders is often a rich exchange with the more-than-human world. These ecological, sensory ways of knowing remain one of Bharatha's oldest living traditions of communication.



Embodied Expression

Communication in ancient Bharatha was never limited to the spoken or chanted word. Bharata Muni's Nāṭya Śāstra is a complete framework of performance that functioned as public communication for all sections of society. Through precise mudrās (hand gestures), facial expressions, body movements, costumes, music, and rhythm, performers conveyed entire stories, emotions, and philosophical ideas. A single gesture can indicate a character, an action, or a state of mind; combined with voice and music, it created layered narratives that even those unfamiliar with Sanskrit can understand and feel.

In villages and temple towns, forms such as harikatha and yakshagana (especially vibrant in the Karnataka regions) brought epics and Puranic stories alive. Travelling bards and local troupes carried news, moral tales, and historical memory. Audiences did not sit passively; they responded, repeated refrains, and sometimes joined in. Children absorbed these narratives through repeated exposure during festivals and gatherings. The performances strengthened community bonds while transmitting cultural knowledge without requiring written words.

Threads of Continuity

From these ancient springs — the living breath of chant, the forest's silent knowing, and the fire of embodied performance — flowed a language older and truer than script. It moved through rhythm and wonder, presence and shared gaze, binding people, knowledge, and the earth in one luminous web.

“Language Before Words” is not merely history. It is a living seed. By honouring its depth, we can step beyond the noise of our age into an uncharted tomorrow — one that is richly rooted, quietly radiant, and profoundly connected: to one another, to enduring wisdom, and to the great living earth that still holds us.



WHEN PARIS WAS TRAPPED

Communication is often most inventive when **it is most difficult**.

In the winter of 1870, **Paris was surrounded by Prussian forces**, completely cutting off the city from the outside world. With traditional routes closed and information unable to move freely, the city faced a pressing challenge: **how to communicate when every usual method had failed**.



The answer involved hot-air balloons, microscopic photographs, and a flock of pigeons. It became one of the **most remarkable communication networks of the nineteenth century**.

HERE'S HOW IT WORKED.

The balloons carried **letters and passengers out over enemy lines**. But balloons were useless for the return trip; **you couldn't steer them**. So any reply had to come back a different way.

That's where the **pigeons** came in. Pigeons taken out of Paris by balloon could later be released elsewhere and would naturally fly back home.

So balloons carried the pigeons out. **The pigeons carried the messages back.**

But there was another problem: they needed to send **thousands of messages**, and a pigeon could carry only so much weight.

The solution came from an unlikely source: **a photographer named René Dagron.**

Dagron was a pioneer of **microphotography**, the art of reducing photographs and documents to extraordinarily small sizes. Entire pages of text could be shrunk onto **tiny pieces of film** just a few millimetres across.



His task was to leave Paris by balloon, establish a photographic workshop outside the besieged city, and find a way to **fit thousands of messages onto something light enough for a pigeon to carry.**

On 12 November 1870, Dagron left Paris aboard a balloon. The journey was far from smooth.

The balloon came down behind enemy lines, forcing Dagron and his team to make their way through occupied territory before eventually reaching Tours, a city in central France.

There, he began work on what would become one of the most **unusual communication systems** in history.

ONE PIGEON. A THOUSAND MESSAGES.

Dagron's microfilms, known as pellicules, could store an astonishing amount of information. **Each strip held up to 16 pages of text, containing thousands of individual messages.** A single pigeon could carry several pellicules inside a small quill attached to its tail feathers, all weighing less than a gram.

When the birds arrived in Paris, the quills were taken to the central telegraph office. The pellicules were carefully unrolled, mounted between glass plates, and projected onto a screen using their **"magic lantern"**. The enlarged images were then read and copied by clerks, who delivered the messages throughout the city.



The process may sound surprisingly familiar. Information was reduced to a tiny format, **transported across long distances**, and reconstructed at its destination.

Then a brand-new technology, was the first large-scale use of microfilm for communication, **turning a photographic innovation into a network** that kept an entire city connected.

More than a century before emails, cloud storage, and digital files, Paris had already discovered something that still underpins modern communication.

THE PRUSSIANS FOUGHT BACK

The system did not go unnoticed for long.

Once the Prussians realised that messages were reaching Paris by pigeon, they tried to stop them. **Hawks and falcons were trained to intercept the birds in flight,** while the French responded by sending decoy birds alongside the real ones.

Many pigeons never made it back to the city. **But enough of them did.**



By the time the siege ended in January 1871, Dagron's microfilm pigeon post had delivered an **estimated 115,000 messages into Paris,** helping reconnect a city that had been completely cut off from the outside world.

After the siege ended, the pigeons were sold at public auction. Dagron wrote about the experience and spent years seeking recognition for his work. What Dagron had built, under fire and in the middle of a war, was something the world had never seen before.

The pigeons, of course, received no credit.

Before James Bond, There Was Chanakya

-Riya Pradhan

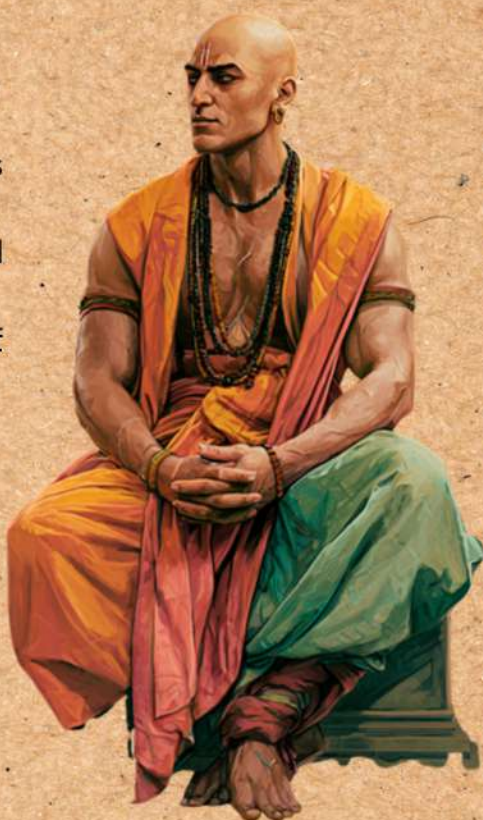
When we think of spies, we imagine encrypted messages, secret agents in disguise, and coded conversations exchanged in crowded cafés. It feels like the stuff of modern thrillers.

But more than two thousand years ago, **the Mauryan Empire** had already developed an intelligence network that would feel surprisingly familiar to any fan of spy movies.

At the heart of this system was **Chanakya**, also known as **Kautilya**, the mastermind behind the **Arthashastra**— a detailed treatise on governance, diplomacy, warfare, and espionage.

For Chanakya, **information was power**, and protecting that information was just as important as gathering it.

The Mauryan spy network was vast and remarkably diverse. Spies operated under a variety of disguises: **merchants, wandering ascetics, householders, students, performers, mendicant women, and even religious recluses.**



Each moved through society unnoticed, collecting information from places that soldiers and officials could never access. **The brilliance of the system lay in its invisibility.** A trader carrying goods across regions or an ascetic travelling between settlements could also be carrying secrets.



But collecting intelligence was only half the challenge. The real question was: **how do you communicate sensitive information without exposing the messenger?**

Chanakya's answer was ingenious. According to the Arthashastra, information could be transmitted through signs, coded writing, and concealed methods of communication.



Messages were often passed through **intermediaries who did not fully understand** the information they carried.

In some cases, agents communicated using symbols and signals; in others, **secret writing** ensured that only the intended recipient could decipher the message.

If direct contact became risky, information could be relayed through **entertainers, women artisans, wandering ascetics, or other unsuspected figures.**

Even more impressive was the system's emphasis on **compartmentalisation**. Different groups of spies operated independently and often did not know one another's identities.

Information gathered by one source was verified through multiple channels before it was considered reliable.



In modern intelligence language, this would be called **cross-verification** and need-to-know access. Chanakya understood a timeless truth: a secret known by too many people is no secret at all.

The network stretched across cities, forts, villages, forests, borderlands, and even foreign territories.

Merchants watched activity within forts, ascetics observed frontier regions, while forest dwellers and tribal chiefs monitored movements near the empire's edges.



Information travelled continuously through this **web of human connections**.

What makes the Mauryan spy system so fascinating is not merely its scale, but its sophistication.

Long before digital encryption, intelligence agencies, or spy satellites, **Chanakya had imagined a world of coded messages**, covert identities, secret networks, and carefully protected information.

So the next time a spy thriller amazes you with hidden signals and undercover agents, remember: **the art of secret communication is far older than modern technology**.

In many ways, the Mauryan Empire was already playing the game centuries before the world gave it a name.



Are you ready for an **immersive science experience in Whitefield?**

Scan/Tap the QR

Click here for our website or check out



paramfoundation.org