

A Unified Hypothesis on the Nasca Lines Water, Sky, and Coordination

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Introduction

Among the many explanations offered for the geoglyphs of the Pampa de Nasca and Palpa — the astronomical calendar theory of Maria Reiche, the subterranean water theory of David Johnson, the ritual pathway and pilgrimage theories tied to Cahuachi — most treat the phenomenon through a single lens. This essay presents an alternative framing: the hypothesis that these separate elements are not competing explanations but interlocking components of one integrated system, engineered and maintained by the Nasca culture over centuries.

The Hypothesis

The hypothesis holds that in antiquity, structures of importance — settlements, ceremonial sites, and the geoglyphs themselves — were sited in relation to subterranean water flows. These water-oriented structures were, in turn, correlated with a celestial map: a system of astronomical reference used not only for ritual purposes but for practical work, including the timing of food provisioning and the tracking of animal migration. Underlying both the hydrological and astronomical dimensions, the hypothesis proposes, there must have been a central coordinating point — a place from which knowledge of water sources, celestial timing, and resource planning was integrated and directed outward across the pampa.

In this view, the Nasca landscape functioned as a single coordinated infrastructure: water location, sky observation, and seasonal/resource planning were three faces of one governing system, rather than three unrelated cultural practices that happened to leave marks in the same desert.

Grounding in the Existing Record

Each strand of the hypothesis touches on real, documented threads of Nasca research.

Water and structure. Since the 1990s, the independent researcher David Johnson has argued that certain geoglyphs — particularly trapezoidal and triangular forms — align with the geological faults that carry underground water into the valley, while zigzag lines mark the boundaries of the aquifers. On this reading, the ancient inhabitants located subterranean water, settled near it, built the puquios (underground aqueducts) to draw on it, and used geoglyphs to record its position and extent.

Sky and timing. The astronomical interpretation of the lines has the longest pedigree in Nasca research, running from Paul Kosok's description of a "calendar in the desert" through Maria Reiche's lifelong study of solar and stellar alignments. The core claim is that observation of the sun, moon, and bright stars allowed the Nasca to track the agricultural calendar — the timing of planting and harvest in a hyper-arid environment where such timing was a matter of survival.

A central point. The site of Cahuachi, excavated extensively since the 1980s, is understood as the ceremonial heart of Nasca culture — a place of pilgrimage, offering, and communal gathering, situated where the water table remained reliable even in drought. Some researchers propose that certain geoglyphs functioned as markers guiding pilgrims toward it, making Cahuachi the symbolic and organizational center toward which the surrounding landscape oriented itself.

What the Hypothesis Adds

The distinctive move of this hypothesis is synthesis: it proposes that these three strands — water engineering, astronomical observation, and central coordination — were not parallel curiosities but functionally dependent on one another. A culture that had to locate invisible underground water in one of the driest places on Earth, and that needed to time planting and harvest with precision, would plausibly have needed both a reliable method of celestial timing and a central authority or institution capable of coordinating the knowledge and the labor involved in acting on it. The geoglyphs, in this framing, are not a monument to one purpose but the visible residue of an integrated system of ecological knowledge management.

The Geoglyphs as a Landscape Information System

A further implication of this hypothesis is that the Nasca geoglyphs should not primarily be understood as isolated images or symbolic artworks. Instead, they may have functioned collectively as components of a landscape-scale information system — an external memory system distributed across the pampa itself.

The concept of an external memory system, drawn from work on distributed cognition, holds that knowledge need not be stored solely within individuals but can instead be encoded in the surrounding environment, where it remains accessible across space and generations. Under this framing, the individual geoglyphs represent different classes of information rather than independent monuments. Long straight lines could define spatial reference axes; trapezoids and triangles could identify hydrogeological zones or areas of operational importance; figurative geoglyphs could encode seasonal, ecological, or administrative information immediately recognizable to trained observers.

The significance of the system would therefore not reside in any individual figure, but in the relationships between all elements. Meaning would emerge from topology rather than

iconography: from the spatial organization and interconnection of geoglyphs across the landscape, rather than from the symbolic content of any single design. In this sense the pampa functioned as a distributed information network or knowledge infrastructure, in which the structured relationships among geoglyphs — rather than their individual imagery — carried the operative meaning.

Under this interpretation, Cahuachi was not merely a ceremonial centre but also an information centre: the place where knowledge concerning water resources, celestial observations, seasonal planning, labour organization, and possibly animal movements was collected, maintained, and coordinated. The geoglyphs formed the durable external memory of this system, allowing information to be distributed across both space and generations, independent of any single individual's recall.

Open Questions

The hypothesis, as formulated, invites several lines of further inquiry: whether the water-marking geoglyphs and the astronomically-oriented lines show meaningful spatial correlation with one another and with Cahuachi; whether any archaeological or ethnohistorical evidence points to animal migration tracking specifically, as distinct from the agricultural calendar; and whether Cahuachi's role was administrative-technical in nature, or purely ceremonial, with coordination of water and timing knowledge distributed elsewhere or informally. These questions define the hypothesis's research agenda going forward.

Conclusion

Where prior scholarship has largely treated the water theory, the astronomical theory, and the ceremonial-center theory of Cahuachi as separate and often competing accounts, this hypothesis proposes reading them as three visible expressions of a single underlying system: a desert culture that mapped its water, tracked its sky, and coordinated both from a central point, leaving the geoglyphs as the enduring trace of that integration.