

SEALED BEFORE SEARCHING

The Aperture Test

Pre-registration and field protocol

APPARATUS

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Pre-Registration

The Aperture Test

Alignment Precision, Durability and Restoration, with a Field Protocol for the Sacred Valley

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Status of this document

Written 22 November 2026, **before any further searching** on the specific predictions below. The background survey of Inca site astronomy that prompted it is cited; nothing in the predictions was derived from a search made after this file was drafted.

This is the third sealed registration in the sequence, and the first in which **the author will be physically present at the sites within three weeks.** That changes what the file can ask for. It can ask for measurements.

Why this study

When the Sky Moves established four things that bear directly on stone.

Precision creates a surface for decay against a moving referent. Every precise stellar anchor in that study broke within a few centuries.

Coarseness is protection. The Polynesian star compass has thirty-two houses of 11.25 degrees each, and a millennium of precessional drift falls inside one house. Nothing breaks, nothing needs repair, and no correction is recorded because none was required.

Solar and terrestrial anchors are immune. The Hopi horizon calendar holds two to three days and is still running, because solstice sun against a landmark is governed by obliquity, not precession.

And a canon is silently demoted rather than corrected. The authoritative statement stays on the page, stops being a claim about the world, and nobody reconciles it with what is actually observed.

If those hold, they make predictions about **built alignments**, and nobody appears to have framed the archaeoastronomical debate this way.

A structure aligned to a tenth of a degree on a stellar rising goes out of true within a few centuries of construction. A structure aligned to two degrees on a solstice sunrise does not go out of true at all, ever. So the surviving, long-used, demonstrably intentional alignments should be **coarse and solar**, and the precise stellar ones should be short-lived, mistaken, or modern.

And there is a measurement that decides most of it, which is simple enough to take by hand.

The aperture principle

The precision of an alignment cannot exceed the angular width of the aperture that frames it.

A doorway two metres wide, viewed from ten metres back, subtends about eleven degrees. The sun's disc is half a degree. Anything seen through that doorway is located to within eleven degrees and no better, regardless of where the centreline points.

Published claims routinely give alignment azimuths to a tenth of a degree. That is the precision of the **modern survey of the centreline**, not the precision available to anyone standing in the building. The two have been conflated throughout the literature, and separating them is a measurement anybody can take with a phone and a tape.

So the study's central instrument is the ratio:

tolerance ratio = angular width of the aperture ÷ claimed alignment precision

If published claims are about what builders could hold, that ratio should be near one. If the ratio is routinely ten or a hundred, then the field has been reporting the resolution of its own instruments and calling it the intention of the builders.

The predictions

Scored only on cases examined after this file was sealed.

P1. Surviving intentional alignments are coarse

Predict that alignments at long-used sites have apertures wider than two degrees, and that the published precision substantially exceeds what the aperture permits.

Falsified if long-used sites show narrow apertures, or if aperture width and claimed precision are comparable.

P2. Solar dominates, overwhelmingly

Predict that at Sacred Valley sites, solar alignments (solstice sunrise and sunset, zenith passage, shadow-casting) outnumber stellar alignments in the credible literature by a wide margin. The broad survey of major Inca sites is the natural tally to score this against [496], and that stellar claims are disproportionately *claimed* rather than demonstrated.

Falsified if well-attested stellar alignments are as common and as well supported as solar ones.

Background note, recorded now so it is not later mistaken for a finding: the survey literature for the Sacred Valley already reads as heavily solar. Malville describes Moray as combining solstice and possibly zenith sun with water and offerings, Quespiwanka with horizon pillars and solstices, and Ollantaytambo with horizontal shadow-casting gnomons and a water shrine [497]. Hanzalová and colleagues demonstrate a probable solar-solstice orientation at Ollantaytambo, with an azimuth near 62 degrees for June solstice sunrise [499, 500, 501]. That is context, not confirmation. P2 is scored on the full tally.

P3. The precise instruments are the ones that are gone

Predict that where the Inca built **narrow, high-precision** solar instruments, those instruments are destroyed, while coarse features survive.

The reason for expecting this is specific. Gullberg records that the horizon pillars of Cusco were all destroyed in the anti-idolatry campaign of post-conquest Catholic priests [498]. Pillars on a

skyline are the most precise horizon instrument the Inca are known to have built, and they are precisely the thing that was removed.

Predict further that this produces a systematic bias in the record: the surviving evidence is biased toward coarseness not only because coarse things last, but because **precise things were targeted**. An iconoclast destroys what visibly functions, and a wall that merely faces a direction does not look like an instrument.

Falsified if precise instruments survive at comparable rates to coarse features, or if the destruction was indiscriminate with respect to function.

P4. Restoration inflates apparent precision

Predict that heavily reconstructed sites report tighter alignments than minimally restored sites of the same culture, and that reported precision correlates with degree of modern intervention rather than with the importance of the site.

Ollantaytambo, Pisac, Moray and Machu Picchu have all had substantial modern consolidation and reconstruction. Where a stone has been re-erected, straightened, or reset, its present azimuth is a twentieth-century fact.

Falsified if restoration history shows no relationship to reported alignment precision.

This is the study's methodological point and the one most likely to be unwelcome.

P5. Seven will be rare, and approximate where present

Predict that regular seven-fold geometry is rare to absent in traditions working by compass-and-cord or straightedge methods, and that where seven-fold division occurs it is approximate or achieved by counting rather than construction.

The reason is a hard mathematical fact rather than a symbolic one: **the regular heptagon is the first regular polygon that cannot be constructed with compass and straightedge.** Three, four, five, six, eight, ten, twelve and fifteen can. Seven cannot.

Falsified if exact heptagonal constructions are common in such traditions.

Noted and flagged as suggestive only: that seven is both the first number a builder cannot construct and a number sitting past the limit at which an observer can enumerate a compact group. These are

different mechanisms and the resemblance may be nothing. It is recorded because it would be dishonest to notice it after the fact.

P6. The prediction written to defeat the author

Predict that golden-ratio claims will not survive a measurement protocol specified in advance.

If the dimensions to be measured are chosen **before** looking at a structure, φ should appear at approximately chance rates. The usual procedure, choosing which dimensions to compare after inspecting the building, can find φ in almost anything.

Falsified if φ appears above chance under a pre-specified protocol.

If P6 fails, it is a real result in favour of the position this file doubts, and it will be reported as one. A sealed file that can only confirm its author is worthless. This is the third such prediction in the sequence; one of the previous two has already failed and was reported.

Scoring rules, fixed in advance

An aperture is the narrowest opening, gap, notch or frame through which the alignment is said to be observed, measured in angular width from the stated observing position. Where no observing position is specified, the alignment is scored as **unconstrained** and not as precise.

Claimed precision is whatever figure the published source gives. Where none is given, the claim is scored as qualitative.

Restoration is scored from published conservation records and from visible evidence (modern mortar, machine-cut faces, concrete, replacement stone), in three bands: minimal, partial, substantial.

A stellar alignment counts only where a specific star or group and a specific event are named. “Aligned to the Milky Way” is scored as qualitative.

Coarse means aperture wider than two degrees. **Precise** means narrower than half a degree, the width of the solar disc.

Hazards, written down in advance

1. **Archaeoastronomy has a severe post-hoc selection problem.** Any building has many lines; any sky has many events; some will coincide. Ruggles and others have made this critique at length and it applies to everything below.
2. **I cannot distinguish deliberate tolerance from sloppiness.** This is the most serious limitation in the file. Our own finding predicts coarseness, and incompetent building also produces coarseness, and an alignment alone cannot tell them apart. Any claim that coarseness was *chosen* is graded open unless there is independent evidence.
3. **Mountain horizons change everything.** In a deep valley the apparent rising point of the sun differs substantially from a flat-horizon calculation. Published work using digital elevation models rather than observed horizons may be precise about the wrong thing.
4. **I will be tempted to score coarse apertures as confirmation.** They are only confirmation if the published precision claim is also recorded alongside them. Aperture without a paired claim is scored as nothing.
5. **These are living sites.** Andean ceremonial practice is ongoing and Quechua communities hold their own knowledge of these places. Nothing beyond what is published by the communities themselves is recorded, and no ceremonial space is entered or photographed against local guidance.
6. **The author has a personal relationship with these sites.** This is a hazard in the technical sense and is written down as one. A fourth visit to a place that matters to someone is not a neutral observing condition, and the field protocol below is designed so that the measurements do not depend on the observer's judgement.

THE FIELD PROTOCOL

For execution in the Sacred Valley, December 2026. Everything here can be done with a phone, a compass app, and either a tape or a consistent pace.

None of it requires access to restricted areas, and none of it should displace the trip. If it turns out that standing somewhere is better than measuring it, stand there. The measurements will still be there next time.

A. The aperture measurement, which is the whole study

At any feature where an alignment is claimed (a doorway, a window, a notch, a gateway, the Temple of the Sun at Ollantaytambo, the Intihuatana at Pisac):

1. **Stand where an observer would have stood.** Note it.
2. **Measure or pace the distance** from that position to the aperture.
3. **Measure or pace the width** of the aperture.
4. That is all. The angular width is 2 × arctan(width ÷ (2 × distance)), and it can be worked out afterwards.

A photograph from the observing position, with something of known size in frame, serves as a backup for all three.

What this yields: the actual precision available to anyone using that feature, against which every published figure can be checked. Nobody appears to have compiled this.

B. The horizon profile

From each site, **photograph the full horizon** in the direction of any claimed alignment, including the skyline above it.

The reason: in a valley this deep the mountains set the apparent sunrise point, and much published work substitutes a modelled horizon for an observed one. A panorama from the actual observing position is data.

C. Restoration notes

At each feature, record what is visibly modern. Modern mortar is usually grey and uniform; Inca masonry is dry-laid. Machine-cut faces are flat and tool-marked differently. Replacement stone is often a different colour or grain.

Photograph the joint between original and reconstructed work wherever it is visible. A reconstructed wall's azimuth is a modern datum.

D. The December solstice, if the dates allow

The southern summer solstice falls on **21 December**. The Inca festival of **Capac Raymi** belongs to this season, as Inti Raymi belongs to the June solstice.

If you are present within a few days either side, the observation worth having is simple: **from a site with a claimed solstice alignment, watch an actual sunrise and photograph where the sun clears the skyline**, with the claimed alignment feature in the same frame.

The sun's rising position changes very little near a solstice, which is why horizon-calendar peoples everywhere used advance markers. A few days either side will do.

This is the one observation in the protocol that cannot be made from a desk, and it is the one that tests the whole file.

E. The Pleiades, since it is the reason all of this exists

In mid-December at this latitude the Pleiades is well placed in the evening sky, to the north and high.

The Andean tradition is already in both volumes: **Qullqa**, the storehouse, and the practice of judging the cluster's brightness in June to forecast the rains, which Orlove, Chiang and Cane verified in *Nature* in 2000 because El Niño brings the high cirrus that dims it.

December is not the forecasting season. But the observation worth making is the one from the end of the second volume, and it takes a minute:

Look at the Belt, and notice the number arrive without effort. Then look at the Pleiades, and notice it refuse to.

You will be standing in the one place on Earth where somebody turned that refusal into a working rainfall instrument.

F. What not to do

Do not measure anything in a space where ceremony is taking place. Do not enter restricted areas for a measurement. Do not ask local guides to confirm a hypothesis; ask them what they know and write down what they say, including where it contradicts the file.

And if the file turns out to be wrong on the ground, that is the best outcome available. Two of the five predictions in the last sealed file failed, and both failures produced better hypotheses than the predictions had.

What would make this study worth doing

If P1 and P4 hold, the field has a measurable problem: a substantial fraction of published alignment precision would be an artefact of modern survey technique and modern reconstruction, rather than a fact about the builders. That is checkable, it is specific, and it would be useful to the people doing the work.

If P3 holds, the record is biased in a way nobody has named: **iconoclasm selects against precision**, because a precise instrument looks like an idol and a wall that merely faces east does not. The surviving evidence would then be systematically coarser than what was built, and the tolerance finding from the previous volume would need separating from a destruction artefact.

And if P6 fails, φ is doing something after all, and the person who wrote this file was wrong.

In Harmony, Small Things Grow Towards Unity.

Background sources consulted before drafting

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