A little over one hundred years ago, as anthropology and ethnology began to be grounded in scientific method, the analysis of rock art began. Native American imagery began to be studied using methods that were thoughtful and innovative for the time, and that incorporated local mythology. Early accounts recorded by Frank Hamilton Cushing, Jesse Walter Fewkes, Matilda Coxe Stevenson, and others contain intimate detail that many anthropologists would hesitate to publish today. Also, cultural intellectual and philosophical misrepresentations may have taken place over the years that many times are offensive to Native Americans. All being said, some aspects of Native American belief systems are not easily talked about with “outsiders,” and even if so, there still exist variables of the individual informant’s status in the culture, and the ethnographer’s cognitive biases that would hinder or complicate the intended understanding.

Nonetheless, research has noted multiple interpretations and uses of rock art including socializing the landscape and incorporation of cosmological and metaphorical placement in the “present” world. Rock art has been variously interpreted as creation accounts,
marks of migrating ancestors, boundaries, markers of ritual pilgrimages, focal points of transformations and reappearations (shamanic or group), and emotional and moral values of places or events. Some rock art also unequivocally exhibits seasonally structured calendric systems based on the movements of the sun, moon, planets and even stars, ranging from Puebloan elder-practitioner use of horizon calendars to solar and lunar alignments. These calendric systems place human activities in balance with the cosmology of the culture.

The Casa Malpais archaeological site in east-central Arizona offers a unique opportunity to examine possible relationships of ancient rock art to some of these interpretations because it is an Ancestral Pueblo habitation site that includes petroglyphs in secluded locations apart from the settlement, and because some of the rock symbols may represent mythological characters or events and some of them interact with sunlight and shadow in distinctive ways on particular days of the year.

Casa Malpais Culture Context

Casa Malpais is located on several terraces above the Little Colorado River near Springerville, at an elevation of about 7,000 feet. As shown in the page 3 map of regional geography and prehistoric culture
areas, it is situated in a transition area between the Colorado Plateau that stretches northward (ancestral homeland of the Puebloan cultures) and, to the south below the Mogollon Rim, the Basin and Range province (which was occupied by the ancient Mogollon [including Mimbres] and Hohokam). The immediate area surrounding Casa Malpais includes grasslands and pinyon-juniper open woodlands, while to the south begins the forest zone of ponderosa pine, fir, aspen, and subalpine grasslands.

Geologically, the area is characterized by lava-capped mesas, deeply entrenched canyons, and over 200 cinder cones. The cliff face of the mesa on which Casa Malpais terraces and fissures are located is the western extent of the Coyote Hills flow, an eroded shield volcano dated at about 820,000 years ago.1

Visible to the south from Casa Malpais are the second and third highest peaks in Arizona, shown on this page’s map: Mt. Baldy (11,403 ft elevation), sacred to the White Mountain Apache and figuring in oral traditions of the Hopi and Zuni; and Escudilla Mountain (10,877 ft), an important landform to the Zuni people, part of their oral tradition of migration and maturation. The immediate area is arid but with wetter mountainous environments close by; moisture restricts the abundance of vegetation and game animals, and the location and size of areas suitable for agriculture and population. Access to, or control of water sources is extremely important. This rugged region of environmental diversity fostered behavioral variability: agricultural technology and cultural innovations were crucial elements in the development of strategies to buffer against unexpected shortfalls.

There is evidence of early (Paleoindian and Archaic) culture occupations from at least as early as 6000 BC in the region but the cultural context of Casa Malpais is the long Mogollon Formative period (AD 300 to 1450), which covers the gradual shift toward an agriculture-based economy that culminated in the Western Pueblo tradition expressed in Puebloan groups today. In the Early Pithouse period from about AD 300 to about 550, brownware and redware pottery, pithouses, and ceremonial kivas predominated, and three different community patterns emerged: (1) moderate- to larger-sized pithouse villages that included one or more unusually large communal kiva structures; (2) smaller settlements containing separate, dispersed houses with a single large or “great kiva”; and (3) small settlements dispersed over the landscape, in which only the largest had a separate great kiva that may have been used by all the district inhabitants.

The Late Pithouse period (AD 550 to 1000 or 1100) saw a transition from pithouses to above-ground pueblo dwellings and replacement of Mogollon plainware by various black-on-white decorated ceramics in many areas. The Mogollon culture and architecture of this later period suggest influence and migrations from the northern Anasazi/Ancestral Pueblo regions. Post-AD 1150 is referred to as the prehistoric Western Pueblo tradition, which represents a blending of Mogollon and Ancestral Pueblo cultural traits. The
change from pithouses to above-ground pueblos with rectangular rooms and open areas or plazas is seen at this time. Population increased and expanded into less productive, marginally agricultural areas.

Regionally, the great variety of painted ceramic designs suggests significant exchange networks and possible alliances, perhaps to buffer against lean times that occurred periodically. Population increase reflects movement of people into the area and, at times, co-residence derived from Ancestral Puebloans from the north who were abandoning the Colorado Plateau affected by the extended drought from 1275-1299. Research indicates evidence of migrations, conflicts, and cohabitation of the two cultural traditions in the various Mogollon regions during the late 1200s.

**Casa Malpais and Its Features**

Casa Malpais was occupied from at least Late Mogollon into the Pueblo IV (Late Pueblo) periods. Ceramics (see the illustration below) span the Mogollon Reserve phase (AD 1050-1175), Tularosa phase (AD 1175-1300), and proto-Zuni represented by Heshotauthla (AD 1275-1400), Kwakina (AD 1325-
1400), and Kechipawan (AD 1375-1475) polychromes, and Pinnawa Glaze-on-white (AD 1350-1400).

The rectangular great kiva at the site is aligned with ramped entry facing southeast, similar to the orientation common farther south and east in the Mogollon region during the Three Circle phase (AD 900-1000). The great kiva’s Mogollon-style cobble architecture and its added unique wall-delineated terraces contrast with the site’s Puebloan roomblock of vertical-slab-boulder and coursed, faced stone pueblo rooms. Added to these, the natural fissure chambers and secluded rock art panels at Casa Malpais evidence a settlement of special significance over a lengthy period of time.

Tree-ring dates from the pueblo at Casa Malpais demonstrate a period of growth through expansion and remodeling from about AD 1260-1280 (see page 6 illustration), confirming that occupations continued as people migrated through the area and began aggregating in the Cibola area (Zuni district). Recent excavations at nearby Rudd Creek Pueblo corroborate interpretation of archaeological features at Casa Malpais. Rudd Creek, about 10 miles south of Casa Malpais, demonstrates a contemporary presence of Mogollon and Anasazi (Ancestral Pueblo) material culture traits. The great kiva there was constructed or remodeled around AD 1275, suggesting a possible late date for the Mogollon kiva at Casa Malpais, and a corresponding co-ethnic population at Casa Malpais as well. Early Zuni glazeware (Heshotauthla and Kwakina polychromes) at Rudd Creek, and later types Pinnawa Glaze-on-white and Kechipawan Polychrome at other Upper Little Colorado sites, prompted Duffç to posit that Casa Malpais was no longer inhabited after AD 1325.

Casa Malpais occupies a series of slumped basalt terraces along the front of a mesa. Cleared areas with low, stacked basalt boulder and cobble walls on the lower approach sides of the successively higher river terraces suggest controlled access, or at least space reserved for specific functions. A vibrant use of the space is indicated by unexcavated circular and rectangular depressions that are believed to be where pit structures were situated on the terraces; dry-laid masonry compound walls and enclosed above-ground masonry structures; and prehistoric trails worn into huge fallen basalt columns, providing access to the

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### Casa Malpais decorated ceramic types and their time ranges

<table>
<thead>
<tr>
<th>Types</th>
<th>Year (AD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cibola White Wares:</strong></td>
<td></td>
</tr>
<tr>
<td>Snowflake Black on white</td>
<td>950-1000</td>
</tr>
<tr>
<td>Reserve Black on white</td>
<td>1050-1100</td>
</tr>
<tr>
<td>Tularosa Black on white</td>
<td>1150-1200</td>
</tr>
<tr>
<td>Pinedale Black on white</td>
<td>1250-1300</td>
</tr>
<tr>
<td><strong>White Mountain Red Wares:</strong></td>
<td></td>
</tr>
<tr>
<td>Wingate Polychrome</td>
<td>950-1000</td>
</tr>
<tr>
<td>St. Johns Black on red</td>
<td>1050-1100</td>
</tr>
<tr>
<td>St. Johns Polychrome</td>
<td>1150-1200</td>
</tr>
<tr>
<td>Springerville Polychrome</td>
<td>1250-1300</td>
</tr>
<tr>
<td>Pinedale Polychrome</td>
<td>1300-1350</td>
</tr>
<tr>
<td>Cedar Creek Polychrome</td>
<td>1350-1400</td>
</tr>
<tr>
<td><strong>Zuni Wares:</strong></td>
<td></td>
</tr>
<tr>
<td>Heshotauthla Polychrome</td>
<td>950-1000</td>
</tr>
<tr>
<td>Kwakina Polychrome</td>
<td>1050-1100</td>
</tr>
<tr>
<td>Pinnawa Glaze-on-white</td>
<td>1150-1200</td>
</tr>
<tr>
<td>Ketchipawan Polychrome</td>
<td>1250-1300</td>
</tr>
<tr>
<td><strong>Hopi Yellow Ware:</strong></td>
<td></td>
</tr>
<tr>
<td>Jeddito Black on yellow</td>
<td>1350-1400</td>
</tr>
<tr>
<td><strong>Central Arizona Red Ware:</strong></td>
<td></td>
</tr>
<tr>
<td>Gila Polychrome</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Tonto Polychrome</td>
<td>1450-1500</td>
</tr>
</tbody>
</table>

(References: Carlson 1970; Ditttert and Plog 1980; Fowler 1985; Woodbury and Woodbury 1966)
mesa top. Fissure caverns extending from the main fissure “canyon” westward under the upper terraces and pueblo, along with several rock art panels, many smaller single petroglyph locations, and “supplicant” altars or shrines that have associated boulder grinding basins (metates), suggest greater ceremonial function of the site than at many other villages/pueblos. Obvious visual clues to the continuity of Mogollon and Puebloan occupation periods are the 12.5 by 11 meter rectangular great kiva situated near the 60-plus room, mortared-masonry pueblo.

**Casa Malpais Rock Art**

“Hidden Valley,” an impressive geologic structure containing the rock art I studied, is not visible from the Little Colorado River floodplain nor from its lower terraces as one ascends further up into the site. This rift between the mesa cliff and the lower terraces forms a canyon-like setting that is aligned northwest-southeast and is approximately 400 meters in length, with a maximum depth of about 10 meters. There is a large boulder-fall about midway along the rift that effectively separates the northwestern from southeastern open portions of the feature. The pueblo component is located above the basalt column- and boulder-fall. Maximum width of the Hidden Valley canyon at the rift floor is about 20 meters. The bottom of Hidden Valley is 10 meters below the mesa top edge to its northeast and 6 meters below the highest river terrace to its southwest.

Petroglyph panels and single images vary in their height from the present ground surface inside the rift to positions about 1 meter below the mesa-top level (see page 2 map). The lower, solar-interactive petroglyphs range from ground level to over 2.25 meters above the rift floor. This does not include rock art at entrances to, or in the interior of fissure chambers, which are not effectively illuminated by sunlight.
Categorized rock art at Casa Malpais extends from Archaic Abstract styles (pre-1000 BC-AD 1000?) to a goggle-eyed mask or face of the Jornada style (AD 1250-1400). There are also possible clan or society images as interpreted by Native American informants, some of which are incorporated on panels with other geometric styles as recorded by this author in a previous work.

**Rock Art Research Perspectives**

In 1999-2000, I was employed by the Casa Malpais Museum in Springerville, Arizona. The Town of Springerville and the Museum were searching for guidance and funding for ways to improve protection of the Casa Malpais archaeological site approximately a mile north of the town, while enhancing the site tours and overall public understanding and enjoyment. Site and collections inventories were done as baseline data for presentation to various agencies. There were local hearsay accounts of solar markers among the rock symbols on the property, so as part of the inventory I began noting the angles of how and when sunlight illuminates various cliff faces and petroglyphs at the site. At the time, I knew that there were a few solar calendar markers recorded around the country, but like many archaeologists, I presumed that most others were part of the hyperbole of “Internet knowledge,” or hearsay.

I developed a field recording method that was systematic, but turned out to be a logistic challenge in simultaneous multiple-locus observations. After compiling panel-location interactions and sequences, the data showed an unanticipated complexity of solar interactions in one small fissure canyon, until then unrecorded. All of this became a focus of research that included tests of hypotheses, producing unexpected results that are partially presented in this short summary article. My research confirmed that there are visual characteristics of petroglyph images in which elements and panels display distinctive solar interactions (sunlight/shadow) on solar-critical dates (solstices, equinoxes, etc.), revealing one perspective of panel function. An unexpected additional revelation was that some locations have more than calendric notations or simple static iconic imagery, but rather are “kinetic” in nature, possibly expressing cosmological and mythological narratives that coincide with known Puebloan ceremonial calendars. Further, the purposeful placement of panels in discrete locations seems to define a sacred space used by society or clan practitioners, similar to ways in which Puebloan kivas are used.

Three groups of data were defined and collected to address the concept of stone imagery in sacred space: locational (intentional spatial relationships), identification of unique shadow-edge markers (“cursors” as defined in the box at right), and the precise sequential movements (progressions).

Petroglyphs on which no sunlight and shadow movements are observed, others of uncertain authenticity because of historical or modern modifications, and those that were unclassifiable due to defacing vandalism were eliminated from study. Of the 20 petroglyph single or panel locations in Hidden Valley, 11 that were determined to have potential sunlight and shadow interactions were observed from December 19, 1999, through May 4, 2000 (winter solstice through spring cross-quarter).

As shown in the accompanying Observation Dates table, my petroglyph observation schedule utilized the common calendar in conjunction with the solar year, creating a framework that is subdivided into periods: calendar months and solar synodic periods with astronomical positions (solstices, equinoxes, cross-quarter days, and “octaval” days). This created a dual control mechanism that allowed baseline reference (the European calendar) with solar calendar events,
and afforded identification of potential prehistoric and current Zuni ritual or ceremonial periods. Weekly checks were made to note approaching possible light and shadow. Lunar coincidental occurrences were not investigated for my study, although some octaval or noncritical-date panel interactions observed seem to be in agreement with lunation phases that may have been significant prehistorically.

Atmospheric light conditions were extremely varied during the recording periods. As the study was conducted before digital photography became common, balance of the film-camera settings to faithfully depict rock color and petroglyph, and illustrating the precise shadowfall on images, was at times hard to achieve. Many locations were photographed at multiple times during the critical date window.

Basic solar interaction criteria factors required to create solar markers are three positional factors: the position of the sun in the sky, a “gnomon” (shadow-casting object) to create shadow or alignment, and the location of a petroglyph in relation to the first two. Accuracy of alignment for the maker/practitioner is inherently simple and logical: having to critically place the image at a chosen location that is in agreement with predetermined meaningful time and essence. Sun angles at solstices, equinoxes, and other astronomic and ritual events are the driving factors that require compatibility of placement, and intended placement. Expressing precision of cursor touch on critical dates (bracketed windows) can be as long as four days during the solstices, but shortens to one or two days on the equinoxes. However, consideration of the periods of initiation and termination of rituals and ceremonies that may last up to 10 days or more, depending on lunar coordination, may explain slight situational alignment discrepancies.

Basic criteria require the interacting shadowfall be cast to strike the glyph surface in a distinct way: clear and sharp (in clear sky environment), not vague or ambiguous. Statistically, simple shadowfall alone across a petroglyph does not qualify it as a solar marker or by the investigative terminology, to be solar interactive. Since nearly all petroglyphs deep in Hidden Valley receive shadowfall numerous times during any period, further robust solar interaction criteria were applied.

This descriptive scheme allows measurement based on the interaction physical attributes, and the values of time-sensitive aspects of the panels. These capture the unique characteristics of interest for analysis in the study. Levels or scale of measurement through cursors shapes and progressions assess the assemblage from a panel as a unit, or in the case of single petroglyphs, their incorporation into an intended larger unit. Many rock art research structures are formalized, but when investigating panel function as sacred space, they must be flexible in recognizing that realistic, representative, stylized; iconic or metaphorical; geometric or anthropomorphic in composites may have been intended to be viewed kinetically as narrative, or as early forms of altar construction.

I concluded that a lot more is represented in the sunlight and shadow interactions with the petroglyph panels than simple calendrical observations. In many cases, the cursor movements over certain panels go sequentially from one glyph to another, and irregularities in some of the shadow boundaries seem to highlight specific symbols at certain times in the sequences.

<table>
<thead>
<tr>
<th>Solar Interaction Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Locational structure: any solar interaction that occurs only during critical event windows combined with the following criteria points.</td>
</tr>
<tr>
<td>2 Cursors (shadow lines) must:</td>
</tr>
<tr>
<td>a. Have a distinctive shape such as a slit, shaft, notch, niche, knob, bulb, platform, or significant shadow line angle change that emphasizes, highlights, frames or line-traces a glyph (element), or does so while moving to another glyph while maintaining that shape. Angle-change cursors seem to be involved in sliding through or pivoting on specific images.</td>
</tr>
<tr>
<td>b. Be oriented at positions that bisect the panel or glyph in a significant way, halving the element or segments in a balanced manner, horizontally, vertically, or possibly diagonally; in life-forms, on natural divisional parts; in geometric forms, a symmetrical division.</td>
</tr>
<tr>
<td>3 Progressions (sequential movements): are limited to, and determined as the physical movements of cursor (shadow line) framing, emphasizing, tracing, or bisecting a glyph or panel elements, by arrival at, expansion to, and progresses across it, or traversing across in a manner that may not be available or repeated at other times. (See “sequential” under subset definitions.)</td>
</tr>
</tbody>
</table>
Progressions of Shadow Cursors over Petroglyphs on Multiple Panels

In the following three examples, winter solstice presents two time-modal clusters, one at mid-morning, the other at early afternoon. The morning cluster was observed from 9:15 to 9:58, a span of 43 minutes; the two panel interaction times are overlapping and sequential.

Cluster 1 Winter Solstice Progressions: As shown in photos on pages 10-12, the winter solstice morning involves panel 17, which contains a large footprint, large zigzag, horizontal diamond chain, a “climbing anthropomorph” or lizard/frog being, and small zigzag glyphs; and panel 18, in which there is a cursor bisect interaction with a double spiral simultaneous with the panel 17 cursor movement. Cursor action on panel 17 on the winter solstice morning period is a combination angle change or large notch initiating the exposure of the large footprint, and right-side and left-side horizontal lines that interact with the geometric images plus the rectilinear anthropomorphic or lizard/frog being appearing to climb up out of the shadow. While panel 17’s progression is under way, a simultaneous sliding bisection interaction occurs on the large spiral of panel 18, which is located above and overlooking panel 17.

Although it is the shadow cursor that is actually moving on each panel, what appears to be happening is that the glyphs are rising out of their respective panels’ shadows. On panel 17, the symbols “emerge” one after the other: The footprint “steps out” of the shadow first and is followed out of it by the large zigzag, then the chain of horizontal diamonds, and finally by the anthropomorph or lizard/frog petroglyph.

The critical date, location of precise sequential movements and simultaneous interpanel interactions define a spatial relationship of panels 17 and 18. It demonstrates intentional placement and may illustrate the kinetic aspect of Puebloan cosmolological and mythological essence in multiple emergences and search for the Center (itiwanna) as portrayed by the ascending footprint and the spiral. Even if the geometric zigzags and diamond chain image interpretations or implications are indeterminate, the climbing zoomorph links them in the metaphorical narrative reference: The lizard or frog beings in the previous world before the Zuni became human. Being situated in the larger context of Hidden Valley doubly substantiates the mythology involved and also the context of the panels as specialized society receptors, and therefore their locations serving as early kiva functions (altars), along with the metaphorical nature of the rift and chambers as the abodes of the ancestors as beings able to intercede for life-giving moisture.

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Cluster 1, Panel 17 winter solstice solar interaction sequence:
9:17 a.m., interaction begins when toes of large footprint are exposed in an angle in the shadow cursor

Cluster 1, Panel 17 winter solstice solar interaction sequence, continued:
9:30 a.m., large zigzag is exposed as footprint ‘climbs upward’ (slides on shadowline).
Cluster 1, Panel 17 winter solstice solar interaction sequence, continued:
9:44 a.m., footprint glyph leaves the cursor as chain of horizontal diamonds is exposed.

Cluster 1, Panel 17 winter solstice solar interaction sequence, continued:
9:58 a.m., left foot of the ‘climbing’ anthropomorph or lizard/frog being lifts off of the cursor as it begins on small zigzag.
Cluster 2 Winter Solstice Progressions: Photos on pages 13-18 illustrate how the winter solstice after-noon cluster transpires from 1:11 to 2:00 p.m., a period of 49 minutes. The interactions at the four panels (11, 1A/1B, 3A, 3B) forming Cluster 2 (see page 2 map) are simultaneous and sequential. Zigzags and footprints on panel 11; anthropomorphs emphasize, sequential, panels 1A/1B; zigzag and diamond chain; sequential, panel 3A; concentric circles and X shape; sequential, panel 3B; anthropomorphs, emphasize/ sequential, panels 1A/1B; zigzag (upper), sequential, panel 3A.

Panels 1A/1B, and 3A and 3B are located in northwestern Hidden Valley but panel 11 is located at “Tether Rock” (an archer panel) in the southeastern portion where the morning interactions on panels 17 and 18 occurred (see page 2 map). As shown in photos on pages 13 and 14, Cluster 2 cursor interaction begins on panel 11’s zigzags involving a horizontal line-trace and notch, running simultaneously with anthropomorphs at panels 1A/1B being emphasized by a platform, and on panel 3A a zigzag and diamond chain traced by a small notch. Later progressions are also simultaneous: Concentric circles at 3B, anthropomorphs again at 1A/1B, and the whole cluster ending at a different set of zigzags on panel 3A.

Panel 11 is located in far southern Mid-valley, out of sight from other simultaneously interacting panels, while panels 1A/1B and 3A/3B are located in northwest Hidden Valley (see page 2 map). This factor elevates the co-occurrence phenomena stated as “simultaneous and sequential” in Criteria subset definitions as empirical and valid qualifying descriptors. It will be seen again in Cluster 3, and on isolate petroglyphs, further establishing the validity of the hypotheses put forth by this work.
Cluster 2, Panel 11 (“Tether Rock/archer” panel) winter solstice solar interaction sequence:

1:11 p.m., Panel 11 prior to interaction

Double zigzags being line-traced by cursor as the shadow moves to the right

Side-by-side footprints becoming enclosed by cursor notch

1:19 p.m., double zigzags being line-traced (highlighted) while notch is enclosing two horizontally side-by-side footprints.
Cluster 2, Panel 11 winter solstice solar interaction sequence, continued:
1:26 p.m., Panel 11 simultaneous and sequential progression near ending;
notice how lower shadow cursor is still sliding farther right compared to its position in the previous two photos.

Cluster 2, Panel 1A winter solstice solar interaction sequence:
1:14 p.m., cursor platform interaction on anthropomorph (simultaneous with panel 11 zigzag trace and footprint progression);
platform at this contact is moving to the right; anthropomorph never gets engulfed by the shadow.
Cluster 2, Panel 1A winter solstice solar interaction sequence, continued:

1:30 p.m., progression is a slide on the right-side arm of the anthropomorph as the platform moves to the right and upward to emphasize at least one other similar anthropomorph on panel 1B at 1:58 p.m., and later to the spiral and meander (see page 16 upper photo)

Cluster 2, Panel 1A winter solstice solar interaction sequence, continued: 1:57 p.m., second simultaneous cursor (notch) beginning as platform ends interaction on panel 1B (see page 16 upper photo, and at panel 3A (upper) double zigzags. This notch progresses in the same sequential manner as the earlier platform cursor, to highlight quadruped to the right, and upper anthropomorph
Cluster 2, Panel 1B winter solstice solar interaction sequence:
1:58 p.m., platform sequentially emphasizing upper anthropomorphs, a continuation of interaction number 1 on panel 1A

Cluster 2, Panel 3A winter solstice solar interaction sequence:
1:23 p.m., interaction number 4: simultaneous with interactions on panels 11 and 1A/1B; cursor is notch on diagonal line; movement is horizontally across lower zigzag to later highlight vertical diamond chain with interior images
Cluster 2, Panel 3A winter solstice solar interaction sequence, continued:
interaction number 4, continued, 1:29 p.m.

Cluster 2, Panel 3A winter solstice solar interaction sequence, continued:
interaction number 4, continued, 1:32 p.m., cursor sequential to trace vertical chain with interior glyphs
(clan[?] bird track and rectilinear scroll)
Cluster 3 Progressions: As shown in the photos on pages 19-24, this cluster 3 interaction occurs on the winter cross-quarter (in early February) over a 53-minute span from 8:47 to 9:40 a.m. The interactions are at three panels: 3B, 18, and 17, and are simultaneous, sequential, and stall-slide sequential. Concentric circles and “x” figure, simultaneous; panel 3B, concentric circles, stall-slide; panel 3B, double spiral, simultaneous; panel 18, multiple images, sequential, panel 17. Geometric glyphs initiate the cluster sequence on this calendric time period that progresses on to representative anthropomorphic images and further combines geometric petroglyphs.

The inter-related activity on these three panels again characterizes specialist audience at in the least, two locations. They are both simultaneous and sequential in relationship to each other.

Cursor action begins at panel 3B with a diagonal bisect of the concentric circles and trace of the “x” image, that becomes a (diagonal) stall and slide bisect as the vertical leg of shadow continues its move to the right. Simultaneously, on panel 17, a notch frames the upper footprints and then progresses downward to frame the lower footprint. The diagonal bisect slide across the concentric circles (3B) is followed by simultaneous bisects of both spirals at panel 18 (9:25) and closely by a precise frame of the lower footprint on panel 17 at 9:28. The horizontal shadow line at panel 17 follows the same sequence as on the winter solstice. Panel 17 sequence finishes a few minutes after the startling spirals’ departures from nubs on panel 18.

The dual action or repeated significance of the spectacular bisection and sequential nub activity of the spirals on panel 18 reinforces the validity of earlier bisecting on this date of the concentric circles at panel 3B, and also suggest the significance as being solar interactive on the winter solstice. The demonstrated ulterior conceptual equivalence is unmistakable, and even in the case of other metaphorical levels, the imagery must be accepted as functional. It is again exemplary of diverse panels receiving solar-calendric activity that seems to rely on geometric initiators to mixed geometric and cosmological and mythological time and place, while reconfirming their structures in this present world.
Cluster 3, Panel 3B winter cross-quarter solar interaction sequence:
8:58 a.m., progression is a bisection of concentric circles while tracing right-hand form of the X image.

Cluster 3, Panel 3B winter cross-quarter solar interaction sequence, continued:
9:10 a.m., diagonal bisect of concentric circles stalls and slides past the X.
Cluster 3, Panel 3B winter cross-quarter solar interaction sequence, continued:
9:16 a.m., continuing stall and slide on concentric circles image

Cluster 3, Panel 18 winter cross-quarter solar interaction sequence, continued:
9:25 a.m., start of sequential progression of large notch exposing both spirals
Cluster 3, Panel 18 winter cross-quarter solar interaction sequence, continued:
9:26 a.m., both spirals start to emerge from shadow

Cluster 3, Panel 18 winter cross-quarter solar interaction sequence, continued:
9:30 a.m., both spirals bisected simultaneously
Cluster 3, Panel 18 winter cross-quarter solar interaction sequence, continued:
9:31+ a.m., both spirals exposed, seemingly ‘manipulated’ to ‘roll off’ and detach from cursor nubs

Cluster 3, Panel 17 winter cross-quarter solar interaction sequence:
9:28 a.m., begin framing of lower footprint and line trace of diamond chain
Cluster 3, Panel 17 winter cross-quarter solar interaction sequence, continued:
9:32 a.m., large footprint appearing to move upward out of notch simultaneously as spirals at panel 18 finish interactions with nubs.

Cluster 3, Panel 17 winter cross-quarter solar interaction sequence:
9:34 a.m., large footprint has concluded interaction with notch but sequential action continues with line trace of arms of 'climbing' anthropomorph.
Cluster 3, Panel 17 winter cross-quarter solar interaction sequence, continued:
9:36 a.m., left horizontal line trace of small zigzag as notch now ‘opens’ on large zigzag on the right

Cluster 3, Panel 17 winter cross-quarter solar interaction sequence:
9:40 a.m., sequence finalizes as rough trace of large zigzag
Discussion

 Cursors on panels and individual glyphs could and do strike differently on other nonsensitive dates, but do not conform to the study criteria. When interacting on sensitive dates in very specific ways, they produce an effect similar to that of the southwestern Native American leading-cornmeal line on a floor and shrine creations of historic and present kiva ritual creations.

 Following the conceptual model, criteria, and interaction analysis, a functional model is proposed:
 1. Definition (class, the solar-petroglyph interaction) demonstrates intentional placement with date-specific precision, and coincide with dates of the Zuni ceremonial calendar.
 2. Locational structure establishes spatial relationships, intra-panel, and panel-to-panel, indicating function of multiple societies’ utilization.
 3. Ethnological analogs comparing mural and rock art studies demonstrate congruent complex cosmological or mythological metaphorical reference in imagery. Proposed movement criteria (the kinetic aspect) of date-specific line-to-glyph interactions emphasizes equivocal multilayered reference to metaphorical elements of myth and cosmology in abbreviated narrative structure. This further suggests that context is perceived as initiator or modifier rather than the representative images themselves or the complexity. (Images may represent tangential ideas not revealed in its common visual representation, or it may be an evolving portion of clan or society function under the guise of then-current identity.)
 4. Therefore, hypotheses demonstrated linkage to historic Puebloan examples fit posited model definitions, and promote the theory that unknown prehistoric examples that conform to model criteria also demonstrate similar cosmological and mythological references during culture change. (Within context, function is the essence, not style, iconography, or direct visual representations.)

 During the Pueblo IV Period (AD 1275-1400) there were changes in this part of the transitional Mogollon culture, characterized by migrations, increased local and regional integration, and ritual development. In Duff’s interpretation, the Casa Malpais pueblo expansion as indicated by construction spanned from about 1220 into the 1280s, but the site remained important after most residents moved on as evidenced by presence of later Hopi and Zuni wares. Whether this indicates ritual visitations, small maintenance/specialist priestly occupation, or those with a smaller agricultural population is not discernable from current data.

 During the 1300s new elements and styles in Pueblo IV rock art became widespread, and examples are present in Hidden Valley. These were accompanied by changes in many aspects of Puebloan culture. Increased receptivity to new ideas, a maturing cosmology, and participation in the Kachina religion reinforce positions of this paper that ideological changes followed population redistribution, and are demonstrated at Casa Malpais.

 Multiple associations as clusters occur in the a.m. and the p.m., and as a light/dark dividing line (cursor) passing over images, suggesting duality. When assigned a code number, these combinations revealed a string of interaction numbers that when placed in table form indicate certain repeated and recurring sequences between clusters. This author posits that these are indicating practitioners’ kiva retreats during the a.m. and p.m. on each calendrically significant date, and that repetitive images somehow represent specific ancestors, deities, essences (sacred beings or objects) of the ritual, and the overlapping societies’ ceremonial cycles.

 Analysis

 Co-ethnic occupation by Mogollon and immigrant Ancestral Puebloans at Casa Malpais is demonstrated not only by integration of the two different architectural styles, but also in the introduction and continued use of Cibola ceramics, including Zuni glazeware and Hopi yellow ware that suggest elite exchange systems in place. While northern wares occur throughout the region south of Hooper Ranch Pueblo site, Zuni and Hopi wares have higher frequencies at sites including Casa Malpais. Zuni oral traditions speak of one route of migrations southward along the Little Colorado River and mythological importance of Escudilla Mountain south of Casa Malpais (see page 26 map).
These data provide baseline chronologies in the assessment of rock art in Hidden Valley. The imagery displays cultural diversity and purpose or function that is complementary or is reinforced by the archaeological and ethnographic data.

The distinct panels and their locations opposite westward-trending fissure chambers under the highest terraces and the pueblo mirror cosmological structure of upper/lower worlds, ascension or transformation from lower worlds of darkness up into the present world of daylight, a metaphor for a correct lifestyle to all peoples of the community, respect and performance of ritual and other responsibilities of the agreement (sustainability) and gift of moisture, corn fertility, community fecundity/abundance.

Some rock art panels exhibit evidence of re-use (new symbols added) through time, which evidences the fluid nature of the concepts for the intent of the images together. Some panels apparently are intended to be used to give life, to animate, static, iconic images so they easily transfer into kinetic and narrative modes or oral presentations. Image incorporation links original shamanistic journeys (transfer of iconographic concepts to be narrative) for larger groups: clan or society.

**Cultural Perspectives**

Cultural landscapes are the physical, ecological, and mythological environments known to a culture that have specific use patterns; psychological perspectives that define the culture and enrich the people of that culture. Motifs in rock art are one manifestation of that cognizance, and can only be properly viewed or experienced with that perspective in mind.

The weighty conception of cognition must contribute to our understanding and organization of unknown prehistoric belief systems. Cognition is what the physical object may be to the participant/observer; not representational, but its specific meaning, personal and socially experiential and emotional personification and essence: life forces understood as metaphoric or fluid, and transposed in the object. In the case of Puebloan conceptualization, the “sacred transfer or flow of energy,” its responsibilities and its reciprocal relationship, in a cyclical manner from entities to physical manifestations (rain, fertility/fecundity, representative animal power) to reception by humans (practitioners or larger community) and the return act of preparations and production of the metaphorical images in ritual and ceremonies.

Perceptions of imagery therefore, can affect ethnographic, anthropological, or archaeological study. It may be descriptive of physical shape or actions and the nearest transmuted or morphologic emotion of the ethnographer, but may not be the innate essence held by the informer or practitioner.

In Puebloan belief systems all material objects, the physical and ecological world, and its sacredness are expressed in the cosmological: creation, emergence, search for sustainability, fertility, correct personal conduct and social cohesion are acknowledged in reciprocal acts of ritual and ceremony. The emergence from the dark underworlds to the present world and the search for Itiwanna (the center) is not only the...
migrations that the various peoples took before arriving in the Cibola area, but a recognition of tribulations and social changes that took place in the past that resulted in the formation of clans and societies of the Zuni and other peoples.

Early shamanistic journeys involved descent/ascent into other realms to engage essences of personal and social imbalance, as well as mediating with the ancestor for social well-being, all of which was ameliorated through ritual during and after re-emergence. Imagery from during and after these task journeys is many times visually distinct from formalized ideography of society and clan function within ceremonial structure, but many times it is incorporated into the (later) cosmological concepts in codified creations of panels. Evidence of this can be seen in the two Divine Ones created by Yāтокìa (Sun Father) in their task to descend into the four underworlds to guide the Ashiwi (ancestors) into the world of daylight, the present world. This theme of Hero Twins is found in various mythological/cosmological structures, and is similar to Mesoamerican mythology in which, in the Maya, two sons who descended to Xibalba to battle destructive forces so humans could live in balance, be productive in all work and the arts.

The gift of corn from Sun Father, with its life-instilling properties, is reciprocated in ritual and ceremony. Moisture as personified in the ancestors and which is necessary for growth and maturity, is acknowledged in re-enacted ceremony for the pueblo. Understanding life cycles, seasonality, and a deep knowledge of celestial movements in relation to the physical environment provided a calendar that mirrors the cosmological structure. All hunting and harvest, social responsibilities and prescribed prosaic activities are directly dependent on, and equivalent to, the ritual and ceremonial calendars. Zuni priests/practitioners use astronomical movements of sun and moon in position alignments (markers) to structure the ritual year; the Hopi use horizon markers as well in the same function.

Puebloan belief systems are pervasive in all life; they operate as an over-arching structure, but have been noted to be fluid in application by various corporate groups (societies and clans), and on an individual level. But the essences of players, the ancestors, kachinas, the physical manifestations (rain, corn, fertility, moral, and emotional correctness) remain constant. With this understanding, the perceptions of rock art imagery must extend beyond morphologic characterization, stylistic typing, rigid temporal use concepts, cultural identity and ideological interpretations.

Much of Western thought and philosophy is built on the concept of linear time, cause and effect; whereas Puebloan cosmology is based on a duality in cyclical structure, and must be reciprocal to function. Daily, seasonal, yearly, and larger cycles exist, and can be seen everywhere in this sacred space: personhood, social activities, house, village, field, crops, plants and animals, the skin of Earth Mother; mountains, plains, rivers, lakes; in the sky essences, sun, rain, snow, clouds, lightning, etc.

Summary

The ethnoarchaeological connection is that ceremonial dress, altar preparation, paraphernalia, prayers, and the shared and combined societies and clans responsible for perpetuation or respect of cosmological essences is perceivable at the sacred locations, such as on the panels in Hidden Valley. The physical and metaphorical – essences of corn, rain, ancestors/kachinas, community coherence, and individual adherence to lineage responsibilities – are presented on select panels.

There is obvious calendric function of some rock art, and it is paralleled in Puebloan systems focused on solstices, cross-quarters, equinoxes, and other specific dates. Individual images may have meaning on an iconic level, but when used in panel compositions as part of sequences, become narrative in the mythological or cosmological structure, and metaphorical. Panel locations and progressions (sequential and simultaneous interactions) have been described as sacred space, functioning as society kivas with their initiators (prompts) into and out of the kiva underworld.

The prehistoric imagery (as portions of cosmology and mythology) are suggested by this work to be functional in a similar structure as historic Puebloan belief systems, bridging the mythological and cosmologic essence to ritual practice in concept. Further, the demonstration of hypothesis of function reinforces the position that the panels and Hidden Valley are sacred space.
How Do YOU Pronounce “Baboquivari”?

Allen Dart, RPA

Baboquivari Peak is a prominent mountain southwest of Tucson, Arizona, that rises to an elevation of 7,730 feet above sea level on the eastern boundary of the Tohono O’odham Indian Reservation. In Tohono O’odham oral tradition it is a sacred place, said to be one of the homes of the creator deity I’itoi (Elder Brother). The original name of the peak is from the Piman (O’odham) language and means something like ‘pinched in the middle’ or ‘drawn up in the middle’ because when viewed from certain directions it looks like the top of the peak is wider than the part just below the top.

People of different cultures, languages, and dialects pronounce the peak’s name in a number of different ways.

Most Tohono O’odham who I’ve heard pronouncing its name say it wah-wo-KEE-wree or wah-wo-KEER-ee. These pronunciations seem most common among Tohono O’odham who grew up relatively far away from the peak. In contrast, people who live nearest to the peak in the Tohono O’odham Nation’s Baboquivari District mostly pronounce it something like wah-KEE-wulk. Note that many Piman dialects do not include a “B” sound.

European-derived peoples who first started exploring and colonizing southern Arizona in the 1690s (including the Jesuit missionary Father Eusebio Francisco Kino, who was Italian), were the first people to try to write down some of the geographic-feature names that they heard the local O’odham Indians pronounce. Spanish orthography does not include all of the sounds that are used in Native American languages so the transcribers often had to use the closest sound they could find in Spanish to approximate some of the unfamiliar sounds they heard the Indians speak. (The Spanish name transcribers also may not always have heard the Indian name pronunciations clearly to begin with.)

In Spanish, the letter B often is pronounced as a “soft B” – somewhat between the sound of a B and a V (I use the letter combination bh here to try to show English-speakers how a B sound is pronounced in Spanish); and the letter V is commonly pronounced as a “soft V” or “hard W” – somewhat between the V and W sound in English – when the V appears in the middle of a word rather than at the beginning. Therefore, the name-transcribers who were trying to approximate the O’odham wah-wo-KEE-wree name of the peak, using Spanish orthography, wrote down the name as “Baboquivari” and used the letter B (bh sound) to approximate the name’s first two “W” consonants and a V (soft V sound) to start the last syllable in the O’odham wah-wo-KEE-wree pronunciation. Note that the Spanish transcribers also included the accented vowel in the third syllable: Baboquivari.

The early European-derived transcribers and experienced Spanish speakers today thus would normally pronounce the spelled name “Baboquivari” something like bhah-bhō-KEE-war-ee. Some folks who are unfamiliar with local pronunciations of its name but who know Spanish pronunciation rules pronounce it bhah-bhō-kee-WAHR-ee because it is usually spelled without the accented “i” in the middle of the spelled-out name, and the proper Spanish pronunciation for the unaccented spelling is to place the accent on the next-to-last syllable.

In my experience, most non-Indians in southern Arizona who are familiar with the peak, but who don’t know the nuances of Spanish pronunciation pronounce Baboquivari as bahb-bō-KEE-var-ee or bahb-bō-KEE-vree using the hard B and hard V sounds.

So, how do YOU pronounce “Baboquivari”?
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Thursday April 21, 2016 ►►
“Third Thursday Food for Thought” dinner & “Himdak doo Ilna: A Way of Life – How Societies Shape Culture” presentation by Royce & Debbie Manuel at Dragon's View Asian Cuisine, Tucson (cosponsored by Arizona Humanities): 520-798-1201 or info@oldpueblo.org

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Friday April 29, 2016
“Park of Four Waters Tour” of Hohokam canals drawn from the Salt River sponsored by the Pueblo Grande Museum Auxiliary at Pueblo Grande Museum and Archaeological Park, Phoenix (This is not an Old Pueblo Archaeology Center-sponsored program. For information please contact the Pueblo Grande Museum directly.) pueblo.grande.museum.pks@phoenix.gov
Thursday-Monday June 9-13, 2016
“Mimbres Ruins, Rock Art, and Museums of Southern New Mexico” archaeology education tour with archaeologist Allen Dart. Drive your own vehicle and meet tour in Silver City, NM: 520-798-1201 or info@oldpueblo.org

Saturday Dec. 3, 2016 is the deadline to get your tickets for the December 15 “Raffle of a 2016 Ford Mustang Shelby GT350” by Tucson’s Jim Click Automotive Team to benefit Old Pueblo Archaeology Center and other Arizona charities (tickets are $25 individually or 5 tickets for $100): 520-798-1201 or info@oldpueblo.org
Notes to text for “Solar-Petroglyph Interaction as Cultural Narrative at Casa Malpais, Arizona” by Thomas P. Robinson


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