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## Coping with chance: animal bones and the aleatory

### *Afrontando la suerte: Huesos de animales y el azar*

**KEY WORDS:** Dice, engraved scapulae, Magdalenian, divination, El Juyo Cave.

**PALABRAS CLAVE:** Dados, omóplatos grabados, Magdaleniense, adivinación, Cueva del Juyo.

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#### ABSTRACT

During our excavations of the Cantabrian Early Magdalenian levels in the site of El Juyo (Igollo, Cantabria), a series of peculiar bone artifacts was recovered. These consisted of one group of three small cut bones found together in Level 6 and several fragmentary engraved and burnt cervid scapulae, found in greatest numbers in Level 8. Comparison with ethnographically known specimens suggests that these pieces may have been used as divinatory devices to deal with the random vagaries of the natural world. We postulate that the cut bones may have been dice used in gaming and divination, and that the scapulas are the result of the practice of scapulimancy.

#### RESUMEN

Durante nuestros trabajos de excavación en los niveles del Magdaleniense Inferior Cantábrico del yacimiento de El Juyo (Igollo, Cantabria), se recuperó una serie de peculiares artefactos óseos. Se trataba de un reducido número de pequeños huesos cortados que se encontraron juntos en el Nivel 6 y de diversos fragmentos grabados y quemados de escápulas de cérvidos, descubiertos en mayor cantidad en el Nivel 8. La comparación efectuada con especímenes etnográficamente conocidos sugiere que tal vez se utilizaran estos objetos en la adivinación para enfrentarse a los aleatorios caprichos del mundo natural. Postulamos que los huesos cortados podrían ser los dados utilizados en juegos y en la adivinación y que las escápulas son el resultado de la práctica de la escapulomancia.

#### LABURPENA

El Juyo-ko (Igollo, Kantabria) aztarnategian Behe Madeleine aldiko mailetan indusketak egiten ari ginela, hezurrezko tramankulu berezi batzuk aurkitu genituen. Hezurtxo landu horien kopurua ez da handia, baina denak batera aurkitu genituen 6. mailan; horiekin batera eta kopuru handiagoan, zerbidoen eskapula grabatu eta erre batzuk ere aurkitu genituen 8. mailan. Etnografikoki ezagunak diren espezimen batzuekin alderatuz atera ditugun ondorioek iradokitzen dutenez, agian hezurrezko gauzatxo horiek iragarpenak egiteko erabiltzen ziren natura apetatsu eta auzazkoari erantzunak bilatzeko. Hezurtxo landu horiek jolasetan eta iragarpenetan erabiltzen ziren dadoak izan zitezkeela aldarrikatzen dugu, eta eskapulak, eskapulomantzia egiten zutenen frogia.

Throughout his career, JESÚS ALTUNA has worked to realize a major goal of paleo-anthropology: the reconstruction of prehistoric human socio-cultural systems and their complex interrelationships with past environmental settings. His expertise in the study of faunal remains is unsurpassed, and his contribution to our understanding of the relationship between past human communities and their surroundings has always been unshakably grounded in empiricism. Alone or in collaboration with colleagues such as J. M. APELLÁNIZ, he has

added substantially not only to our knowledge of past environments and their exploitation, but also to our understanding of some of the less concrete, "belief-related" aspects of prehistoric cultural systems. For while socio-cultural systems are parts of total ecosystems, as systems they combine belief with behavior, the two intertwined so thoroughly that they are impossible to separate.

When an analytical distinction is made between belief systems and the behaviors they originate, justify, and regulate, many evidently fail

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to recognize that the differentiation is purely arbitrary, and without basis in reality. Beliefs about the right ways to do things and proper behavior are as much a part of the technological and economic domains as are tools or foodstuffs. When faunal analysis is thought to be only relevant to the reconstruction of behavior, and in particular to the study of paleo-environments and such behavioral dimensions of survival as what was eaten and how it was procured, the view is only partial. Animal remains also reflect the ways past humans thought about the animals they dealt with, about the natural world, and even about themselves. Some investigators have shown that they are at least vaguely aware of this fact, but others have stressed the difficulty or impossibility of reasoning from material residues of almost any kind to past belief systems (HAWKES 1954, p. 162)<sup>1</sup>. Of course, such technological uses of faunal remains as their role as raw materials for tool manufacture have long been recognized by all, and norms and rules of for tool-making are surely parts of a group's belief systems. An obvious concession to the use of bones as vehicles for belief systems has also been made in the case of their uses as supports for the production of Upper Paleolithic mobile art. However, traditional suggestions about the belief systems involved in artistic production have almost always told us more about the thought processes of the analysts than they did about the art itself: they were usually fantasies based on poorly understood ethnographic analogy, when they had any basis at all.

The existence of bones bearing so-called "tally-marks" is a problematic case that might be a reflection of belief systems in bone artifacts, though it might simply reflect a behavioral encoding of technological or economic phenomena. But even though most experts admit that some tally-marked pieces show that prehistoric people were counting something, their most widely popularized explanation is another work of fantasy. ALEXANDER MARSHACK'S (1972) well known conclusion that tally-marked bones were lunar calendars is highly debatable (as are his explanations of the significance of sequencing of engraving "points" that he postulates, based on an

1) "In general, I believe, unaided inference from material remains to spiritual life is the hardest inference of all." (HAWKES 1954, p. 162) By "unaided" Hawkes apparently means without historic documentation or direct ethnographic analogy. Undoubtedly, there are aspects of "spiritual life" that leave no material residues and so will forever elude us, but there are more reflections of more different facets of spiritual life in the archeological record than HAWKES realized.

examination of their microscopic characteristics). Only rarely have the uses of bones as media for the expression of intellectual capacities or "psychic" dimensions of culture other than those just mentioned been recognized.

This paper examines an unusual aspect of the information that may potentially be gained from the study of worked bones from Paleolithic occupations. Bone artifacts can reflect other seemingly intangible dimensions of the psychic development of prehistoric people, and their functions can be plausibly interpreted. In the specific cases to be discussed here, bone artifacts seem to reflect game- playing and/or divination, and to attest to early attempts by Upper Paleolithic humans to deal with chance: to cope with the seemingly "uncontrollable" randomness of natural phenomena.

Modern human beings (and Upper Paleolithic people belonged to the same species as we do) find it hard to understand that many natural phenomena are simply random, a fact that is at least perplexing if not troubling, and that leads us to invent various means of coping with this randomness. We inject imagined "patterns" into randomness, as when we attempt to find faces or animals in the random textures or colors of slabs of stone or wallpaper, or the "Action Paintings" of Jackson Pollock. Such attempts to cope with randomness are, as much as graphic art, an important hallmark of fully modern, fully elaborate, socio-cultural systems. They permeate our belief systems, and play a large part in magico/religious ideas.

These attempts can be discerned even in "fair" games with seemingly uncontrollable outcomes. Despite the role of chance, some players are consistent winners and others are consistent losers. That is because characteristically human psychological factors, such as the ability to bluff, or to "second guess" the behavior of one's opponents, alter the outcomes of apparently random events. In the "hand game" or "moccasin game" played by American Indians a small object is hidden by one player, in one of two places, and its location is then guessed by one or more others. Bets are placed on the outcome. The same person continues to be the "hider" until another guesses correctly. Because of the intricate mental calculations involved, the outcome is anything but random. The guesser may presume that the hider would not hide the object in the same spot twice, unless the hider thought that the guesser would come to that conclusion, and the hider in turn calculates what he thinks that the

guesser will do. The relative psychological sophistication of the players, and their ability to second guess each other, provide the reason why certain players are apparently able to alter the “odds” against them, and become just as consistently successful as others are consistently unsuccessful. (Some enigmatic bone artifacts from El Juyo and other sites may have been used as counters in games like this, but they are too rare to be interpretable).

In hunting wild animals, there is always a certain (often large) likelihood that no game will be found on any specific day, or that the hunt in any particular part of the territory will be unsuccessful. Nevertheless, once again we find that certain hunters are more consistently successful than others. This can certainly be due to the differential technical skills of different hunters, but almost always it seems also to reflect their self-confidence and such other factors as their feelings of solidarity with and support from other members of a society.

It is a characteristic of modern human behavior to behave as though such random phenomena as the availability of game, the likeliness of success in the food quest, and other vagaries of nature could be controlled or, what is the same thing, “divined” or predicted, in the sense of determining their indeterminable future direction. Even when the phenomena, such as the likelihood of success in hunting expeditions, would in reality seem to the “scientific” analyst to remain entirely random and uncontrollable, the use of magico-religious practices designed to control them can increase feelings of group solidarity (thus increasing the self confidence of group members and contributing to their future efficiency), console the unsuccessful hunter, and provide an explanation for failure (the presumed transgressions or failings of some or all of the group). They can also insulate successful hunters against the jealousy of their less successful colleagues.

This is not the place to quibble over definitions of religion and magic, or even to try to differentiate them at all. Without entering this discussion, we can show that there are artifacts such as “dice” and engraved scapulae in the bone inventory from the Magdalenian site of el Juyo (presumably other such pieces have been or will be found in other Upper Paleolithic sites as well) that are most effectively explained as devices showing an awareness of the effects of chance and as implements to predict the direction of the aleatory: to cope with the randomness of nature.

### I) POSSIBLE BONE “DICE” FROM EL JUYO LEVEL 6

In 1974, MICHEL DEWEZ reported the discovery of an unusual engraved bone fragment, with grouped incisions, from the Ahrensburgian site of Remouchamps, Belgium. The apparently notational character of the engravings on that find and another bone fragment decorated with several engraved cup-marks, mostly arranged in groups of five (and the recovery of a polished astragalus from the old spoil-heaps) led him to suggest that the engraved bones could possibly be Stone Age gaming pieces, analogous to notched wooden rods used by some North American Indian groups (DEWEZ 1974, pp. 337-345). Although this was not the first time that prehistoric gaming pieces have been postulated, Dewez’s paper was, as far as we are aware, the first such suggestion that did not spring from simple speculation, but was instead based on a careful empirical comparison of Paleolithic bone objects and ethnographic artifacts of this type. DEWEZ of course recognized that his case could not be proven with the limited data on hand.

From 1978 on, analogous evidence, including worn astragali, an engraved horse hyoid and a fragment of cervid petrous engraved on one side, (all of which may well be gaming pieces) has been recovered from the Cantabrian Magdalenian site of El Juyo. Most suggestive of all is a set of three bones recovered in 1983, described below. While not totally conclusive, the new finds add more convincingly to the corpus of data supporting DEWEZ’s suggestion that some small Paleolithic bone items may be pieces that were used for gaming or divination. Divination by observing the results of cast dice or slips of bone, sometimes referred to as astragalomancy or astragyromancy, is a well known technique that has been reported for many societies (FLINT 1991, p. 218; JACOB 1922, p. 308; RADA, RINPOCHE 1981, pp. 8, 17; GURNEY, 1981, p. 165; SHAW 1995, pp. 14, 60-61).

The outcome of true games of chance, a category barring those where physical skill or physical trickery is involved, might be judged *a priori* to be uncontrollable. Some apparent “gaming pieces” are seemingly designed to minimize the use of skill or second guessing to influence the outcome of play. The El Juyo pieces described below as “dice” are of this type, and it is for that reason that we suggest their use in divination, where in theory at least only the supernatural should be able to affect the fall of the

pieces. We believe that they show how randomness may be made to serve human needs. But even if the dice were simply used for gaming, their presence would be conclusive evidence that the Cantabrian Lower Magdalenian cave-dwellers at El Juyo manifested a concern for the effects of randomness, even if only in play.

### Context of the El Juyo Finds

A small, square, rubble-walled, semisubterranean room abuts the West side of the larger, oval dugout in Level 6 (Fig. 1). It was filled with stones, mostly from the collapse of its own walls, mingled with lamps, cut antlers and colorants. At its northern wall, in square 7M, two of our field assistants (Brian Marsh, of the University of Chicago, and Ramiro Doce of Barcelona), discovered three nearly identical bone fragments cut from a single cervid metapodial, stacked neatly one atop the other. Had these small and apparently unexceptional objects not been left in place so that they could be examined and photographed (Fig. 2) while still *in situ*, it is likely that they would have been recovered as so many indifferent cut bone fragments, catalogued, and sent with the faunal remains to a museum for safekeeping, there to lie unrecognized for that brief span that curators optimistically call "forever."

### Description of the Finds

The pieces, designated 7M/451 (a), (b), and (c), cut from the same diaphysis, can in fact be more or less perfectly refit (see Fig. 3). When that is done, it becomes evident that they were made by scoring a long bar of metapodial shaft at regular intervals, and then snapping it by delivering a series of sharp blows with a hammer to the scored points on the external or convex bone surface. The ends of the segments show other kinds of scarring and abrasion, probably resulting from use.

The measurements (in cm) of these three short, narrow bone segments are as follows.

	L	W	T
451 (a)	4.21	1.0	0.75
451 (b)	4.02	1.32	0.75
451 (c)	4.14	1.28	0.72

As the measurements, photographs (Figs. 4 and 5) and drawing of the pieces show, they are short, undecorated bars of bone, naturally convex on one surface and concave on the other. The ends of the bones are beveled intentionally where the original larger bone bar was scored to facilitate its fracture into the desired sizes. The scars of chipping appear at the ends of two of the pieces. Some chipping may have resulted from blows given to the convex surface of the bone in the manufacturing process, but the morphology of some of the chips at the ends of the bones shows that they resulted from battering of the ends themselves, and these marks would be consistent with the pieces having repeatedly fallen or been struck on their ends. The extremity of one of the pieces is more deeply notched. In this case, the notching could have been produced either during manufacture or in use; the former seems somewhat more probable. The positions and relationships of these three pieces on their discovery, stacked tightly in a neat pile, are suggestive evidence that they were bundled together, probably tied with some more perishable material, when they were dropped and abandoned. That in turn indicates that they were most likely intended to be used together: but to what purpose?

### Ethnographic Comparisons

Descriptions or illustrations of comparable specimens are not easy to find in the most recent literature of cultural anthropology, even though there is some acknowledgment that material objects are often vehicles for the manifestation of social relationships, or embody symbolic representations of belief systems. A preliminary search of the latest ethnographic literature yielded only scattered descriptions of objects that may be formally similar to the bone fragments from El Juyo.

But whatever their undoubted shortcomings, ethnographers in the earlier decades of our century observed, recorded and analyzed material objects whose appearance and cultural meaning would otherwise be lost. Pieces resembling those found at El Juyo are well represented in earlier ethnographies about native peoples in the Americas (see, for example, KROEBER 1983, pp. 393-4, SWANTON 1911, p. 91; RADIN 1923/1970, p. 74). Thanks to the pioneering compilation of data on North American Indian games by STEWART Culin, first published in 1907, much information about comparable artifacts is accessible in a single source.



Fig. 1: Plan of northern part of Level 6, showing outlines of dugout rooms, stone rubble, and location of bone dice.  
 Drawing by J. OGDEN, with minor additions by FREEMAN.

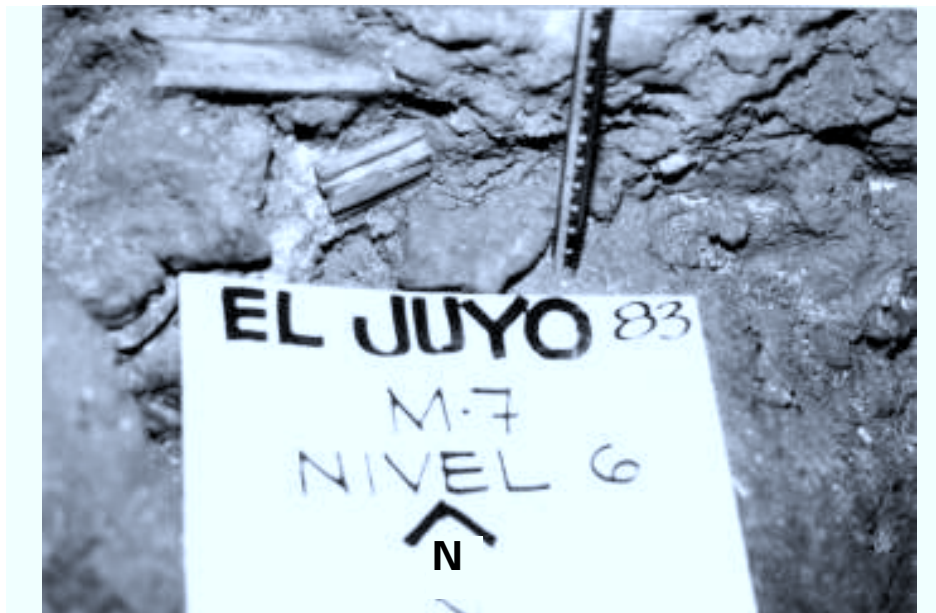


Fig. 2: Photograph of bone dice in situ in Level 6 clays.

The gaming pieces described by CULIN that resemble the El Juyo artifacts are “dice” or their divinatory equivalent. Aboriginal Amerind dice are often pieces with two faces, made of “a great variety of raw materials” including animal teeth, nut shells, peach and plum stones, disks of stone or pottery, seeds, and (most relevant to this presentation), split canes and staves of wood or bone (CULIN 1907/1975, p. 45). The resemblance between the El Juyo pieces and the half-round bars of cane, wood, and bone used as dice by some Amerind groups is remarkable (Fig. 6). The best matches are found among groups from the Southwest, West, and Plains, but two-sided dice of other shapes are quite widespread across the continent.

The following table presents the cases that correspond best to the El Juyo pieces. References are to Culin’s illustrations, and his measurements, in inches, have been converted to centimeters. Where no measurement is provided we have shown a question mark, even though measurements can be estimated from the figures with accuracy that is probably acceptable.

Gaming pieces described by CULIN betray both similarities to and differences from the El Juyo artifacts. All the pieces shown in the table above have one surface flat and the opposite surface convex, just as do the El Juyo artifacts. However, in almost all the tabulated ethnographic cases, additional effort was taken by the manufacturers to make the differences between the two surfaces even more readily discernible. Most

frequently, one or both sides were painted to increase their contrast, but other techniques such as engraving or notching were often added, sometimes to distinguish one or more of the gaming pieces from the rest. Where that practice is documented, it seems that the specially marked piece had a unique value, and was counted differently from the others. Whether this should be considered a point of resemblance to the El Juyo pieces (one of which is notched) may be doubted, since its notch could have been accidentally produced in use or manufacture. No vestige of paint or engraved decoration was found on the Magdalenian specimens, but any pigment used to

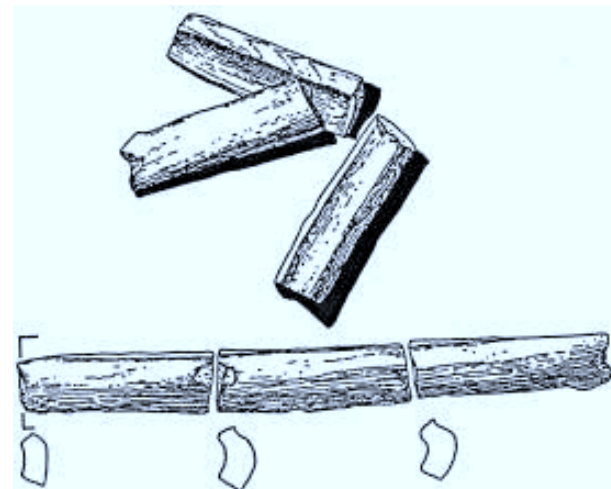


Fig. 3: Drawing of the three dice, showing them as segments in anatomical alignment and as they might appear after a throw. Drawing by J. OGDEN.

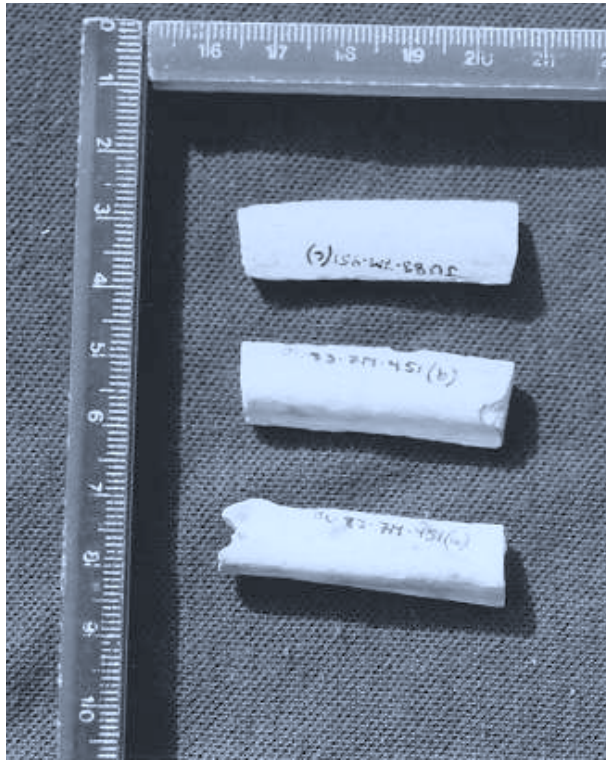


Fig. 4: Photograph of the Juyo dice (obverse).



Fig. 5: Photograph of the Juyo dice (reverse).

decorate them would probably have disappeared during the millennia that have passed since they were lost. However, the difference between the undecorated concave and convex sides of these bone objects seems to be naturally more noticeable than is the case for most of the ethnographic specimens documented in CULIN's work.

Even when these discrepancies between the Amerind artifacts and the Magdalenian bones are admitted, there remains a balance of striking formal similarity that seems more than coincidental. It is also suggestive that many of the games CULIN documents use dice in groups of three, the number of pieces found together at El Juyo.

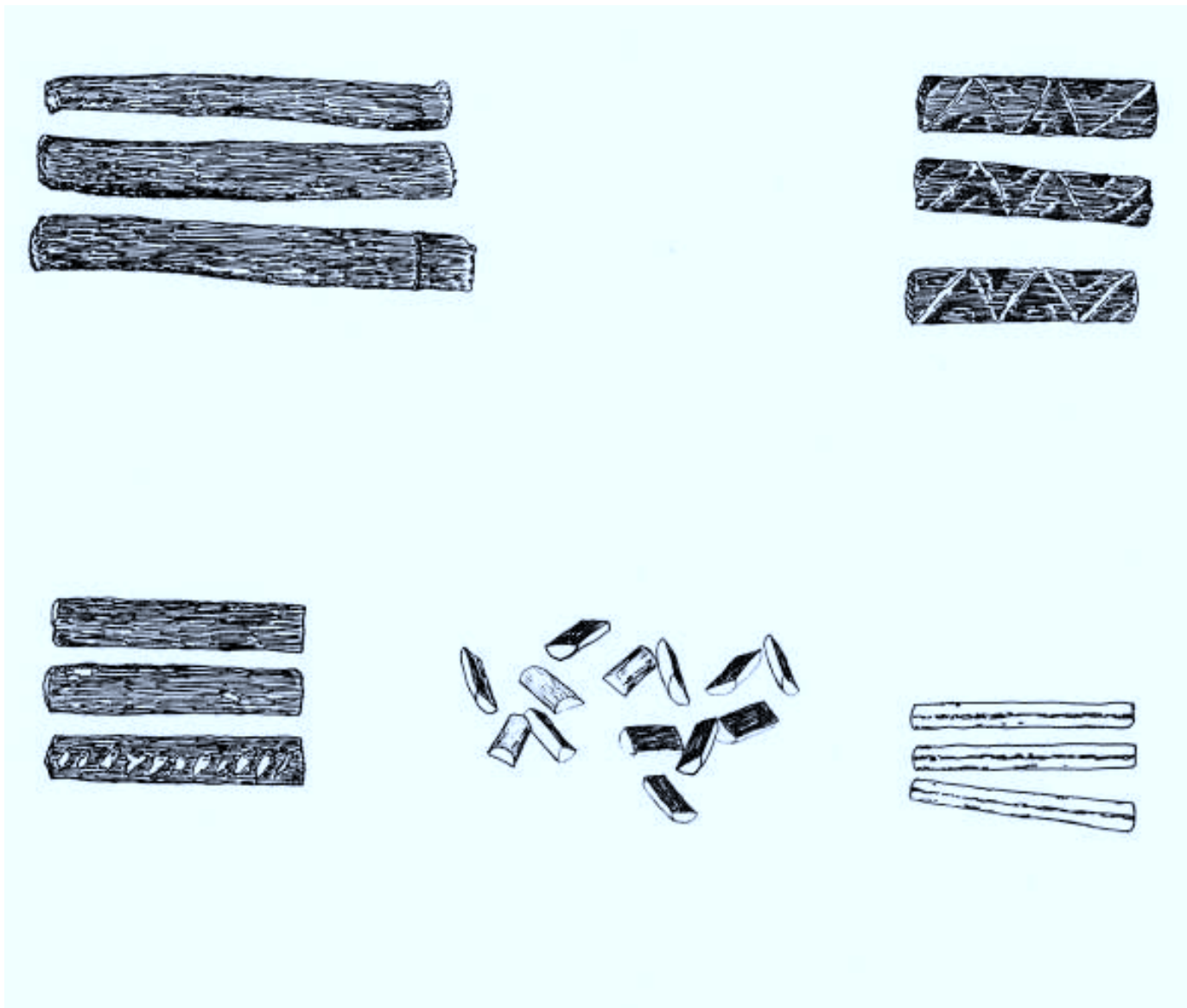
The range of sizes among pieces known to have been used as dice is quite remarkable. Pieces used by different groups in games with similar rules may be quite different in size, though otherwise nearly identical. The El Juyo pieces, diminutive enough to be concealed in one hand, are considerably littler than the largest dice in CULIN's list; however, the smallest Navajo gaming pieces listed are very much smaller than the El Juyo artifacts.

That many ethnographically-known groups had games with similar rules is not surprising when one considers that the possible structure of

two-sided dice games, using a few gaming pieces, is quite limited. While one might be tempted to add the effects of borrowing by adjacent groups (many of the groups documented by CULIN were close neighbors), that is probably not the major factor in causing such parallels, because exactly similar dice and dice games are so very widely and discontinuously distributed. Similar pieces, used as dice for gaming or divination, are recorded in Asia (e.g., CULIN's (1895/1958) description of Nyout divination in Korea), in Europe, in ancient Egypt, in Africa, and probably elsewhere. Those communities that used two-sided dice often played with groups of three.

#### **Dice Games, Outcomes, Conventions of Play**

Dice games played with three otherwise undifferentiated two-sided dice have very constrained outcomes. In fact, unless individual dice are distinctively marked, when three two-sided dice are cast there are only 4 possible outcomes: 3 convex up, 3 concave, 2 convex or 2 concave. When one die is especially differentiated, the number of possible outcomes is increased to 6, and making each die distinctive raises that number to 8.



Representative Amerind dice of the historic period. The illustrations were redrawn by J. POKINES from figures in CULIN (1907/1975). They are listed by rows, from left to right.

Top row: Culin's figs. 95 (20.3 cm, Navajo); 298 (14 cm, Zuñi).

Bottom row: figs. 250/253 (either 8.6 or 11.4 cm, Tewa); 90 (3.5 cm, White Mountain Apache); 275 (9.5 cm, Walapai).

In North America, either men or women could participate in dice games, but usually the sexes played separately, and CULIN observes that "in their ceremonial form, these are distinctively men's games" (1907/1975, p. 45). CULIN goes on to cite the description given by CAPT. C. N. B. Macauley, U. S. Army, of the White Mountain Apache rules and scoring system for a dice game, using three undifferentiated dice, played (by women) in a circle of stones with a large flat rock placed in the middle.

*"Four or six can play. Two sides are formed of equal numbers, and two sets of sticks are used. The players kneel behind the rock circle. The first player takes the sticks in one hand, rounded sides out, and slams them end first on the rock....The counts are as follows: three round sides up counts 10; three flat sides up, 5; two round sides up and one flat, 2; one round side up and two flat, 3. A throw of 10 gives another throw."* (CULIN 1907/1975, pp. 90-91).



Group	No in set	L	W	T	Remarks
Apache (San Carlos) (Fig. 80)	3	22.9	?	?	Flat surface red with blackened incisions, round surface yellow, ends notched. Wood.
Apache (White Mtn) (Fig. 83)	3 25.4	20.3	?	?	Flat face painted yellow with green stripe. Wood.
" (Fig. 88)	3	24.1 1.9 0.95			Diagonal band across middle of flat side. Other side unpainted. Hazel wood.
" (Fig. 90)	1314	3.5	?	?	Flat faces black, round sides white, three red-brown. Wood.
Navajo (Fig. 95)	3	20.3 4.4 1.3			Flat side black, round unpainted. One tied to stop splitting. Cottonwood.
" (Fig. 97)	13	1.90 1.11 0.64			Flat sides painted, round unpainted. Cedar wood.
Keres (Fig. 126)	3	10.2	?	?	One round side marked with 14 to 15 notches. Wood.
Hopi (Figs 194 196)	3	ca.10	?	?	Painted inner side or with burned lines on outer. Used in a board game. Slips of cane.
Paiute (Fig. 206)	8	7.0	?	?	Flat side stained red, round plain. Willow wood.
Tigua (Fig. 250)	3	8.5-11 2.5 0.6			Halves of twigs, one side flat, other rounded. Eleven diagonal notches on one round side. Used in Patolli. Wood.
Walapai (Fig. 275)	3	9.5	1.9	?	Rounded side plain, flat with a painted streak. Wood.

(Data and figure numbers from CULIN 1907/1975).

The reason dice are slammed on the rock is the following. A skilled dice cheat or "mechanic" can control the fall of dice on a soft surface, such as soft ground or a blanket, enough to secure an advantage in scoring — using techniques like those exposed by SCARNE (1962 and elsewhere). Throwing the pieces against a hard surface causes them to bounce, ensuring fair play, and insisting that the dice be bounced is a common gaming convention. The traces of battering on the ends of the Magdalenian pieces from El Juyo suggest that they may have been cast end-first against a hard surface; if so, they may have been used at least sometimes in competitive gaming. But gaming, as Culin notes, is frequently incorporated in ritual.

### Gaming, Ritual, and Divination

While admitting that there is almost no direct evidence to support his view, CULIN believed that games, and dice games particularly, had their origins in divination (1907/1975, pp. 34-35); he also observed that games are frequently played in a ceremonial setting, to appease the gods, to secure fertility, to bring rain, to cure sickness, or to expel evil spirits (1907/1975, p. 34). Divination by means of casting lots, including items as simple in form as these bone fragments, is documented for such disparate groups as early Germans and the Slavs of the Viking Age — for both, the number three was of divinatory importance (DAVIDSON 1981, p. 117) — the Sumerians (GURNEY 1981, p. 165),

and the Chinese (NEEDHAM 1956, p. 309; 1959, pp. 140, 305), but there is of course no proof that such use of lots precedes their use in gaming.

### III) POSSIBLE EVIDENCE OF SCAPULIMANCY

Other evidence from El Juyo is also suggestive of divination, but by other means. In several of the Magdalenian levels we excavated, we found fragments of deer shoulder blades that bore fine-line engravings of deer or other animal figures, and/or geometric decorations such as cross-hatching. (The largest number of such pieces was recovered from Level 8). Small works of mobile art are relatively common in the Magdalenian levels, and that, and nothing more, is what we at first considered the scapula fragments to be. (There are certainly other categories of decorated bone objects, but they are far less common than, for example, spear points or small shells and teeth that have been perforated for suspension, or bone or antler "spatulas").

Red deer scapulae can be quite thin and delicate, and thus seem unsuited for use as decorated bone "tools" or as items of adornment. Because of their delicate nature, we did not at first consider it at all extraordinary that individual pieces of this kind were often broken into dozens of small fragments, or that they had to be laboriously reassembled and glued before they could be studied and their engravings deciphered. Nor were we sufficiently intrigued by the fact that many of the small fragments were charred or burnt around the edges. It was not until we recovered scapula 9N/85 during the 1987 field campaign that we began to see that the decorated scapulae were very probably something more than simply whimsical works of art, or portable pictures.

Piece 9N/85, once it was reassembled from the more than 30 fragments we found scattered over an area over 3 square meters in extent, measured some 14.4 cm. in longest dimension, with a greatest width (perpendicular to the longest dimension) of 7.8 cm and a greatest thickness (perpendicular to both) of 1.5 cm (Figs. 7 y 8). The shoulder blade was broken by percussion in prehistoric times, evidently so as to remove the spine and upper portion of the blade. The coracoid/glenoid portion was separated from the rest of the scapula by means of a notch formed by repeated blows of a hammerstone, an action that was probably performed before the bone was engraved. Part of the neck bearing scars of repeated

flaking was found beside the larger fragment of the scapula. There are groups of small depressions, which we at first mistook for toothmarks, on both surfaces of the bone, near the caudal edge. However, when the bone was cleaned and reassembled, we saw that these were charred indentations, made by contact with a burning pointed object. The (evidently deliberate) charring is especially well-marked on the ventral surface, where it eventually resulted in fracturing the bone. Apparently the operations of trimming the scapula and charring it were performed at or very close to the spot where the bones were recovered.

The largest fragment of the scapula bears extensive engraving over both its dorsal and ventral surfaces. Fine, very shallow, parallel to sub-parallel engraving is the principal technique employed, and the only kind of engraving on the dorsal side. On the other hand, there is a concentration of single deep line incisions along the thick part of the scapula near the caudal edge of the ventral surface. There are still some confusing details that we hope can be resolved after further study, so the following description should be regarded as preliminary.

On the dorsal surface, the engraving is partly representational, depicting at least two hinds' heads (Fig. 8)<sup>2</sup>. The clearest figure is the head and neck of a doe that faces up and toward the neck of the scapula (to the right in the drawing). Her muzzle is square, her ears are laid back and her chin is raised. Her lower face and neck are shaded by means of multiple fine line engraving. Her neck is long and the back of the neck converges with a series of parallel lines that may be intended to represent her back. Significantly, a semicircle of eight small charred indentations surrounds her head, separating it from the neck of the figure (Fig. 9). The raised edge of the caudal border of the scapula is extensively roughened and browned by heat, and there are two other small charred and checked depressions behind its anterior extremity.

The second figure is also quite clear: it is a much larger hind's head facing the posterior border of the scapula (left in the drawing). The muzzle of this figure is more rounded, and the nostril is indicated by a punctate depression. The muzzle and upper lip are well differentiated from the chin and mandible. The eye is a slanting oval

2) Fig. 7 was made two years later than Fig. 8, and by that time a small number of additional fragments of the scapula had been recovered and refitted to it. The drawing does not include these pieces, but they are immaterial to the discussion.

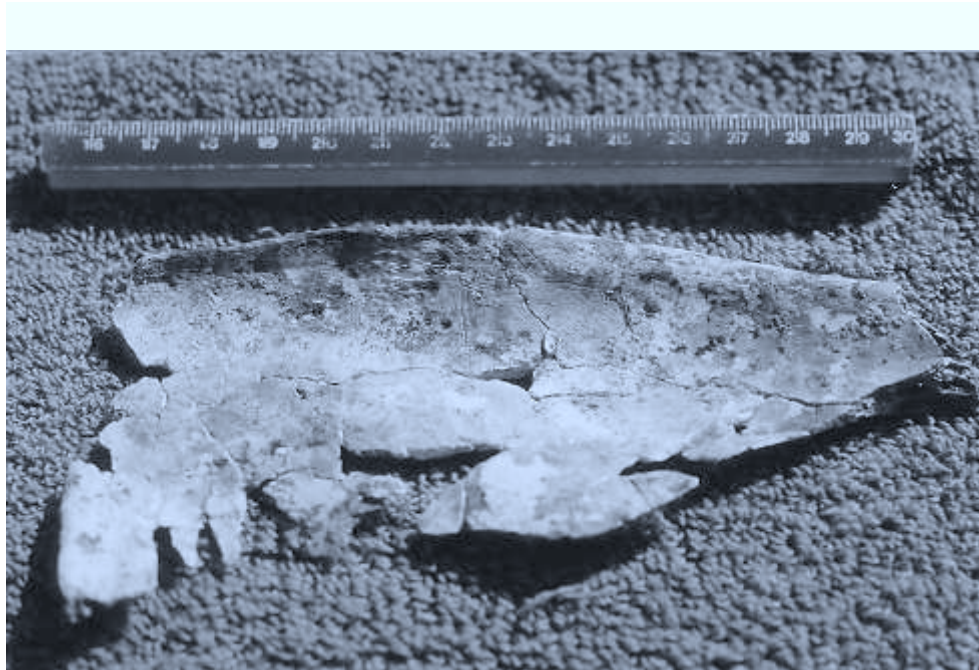


Fig. 7: Scapula 9N/85, assembled.

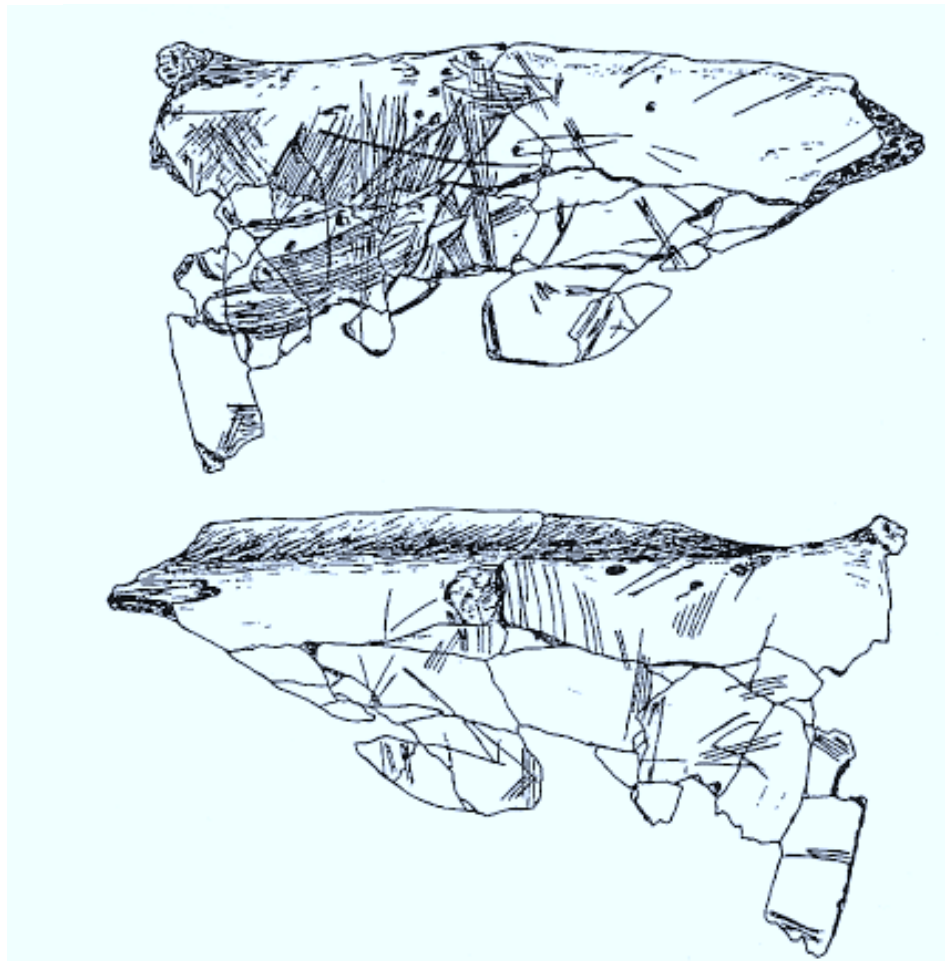


Fig. 8: Drawing of Scapula 9N/85.

and the left ear is shown laid back as a pointed teardrop-shaped projection. The right ear may also be represented, but is held more nearly erect. The back of the mandible curves upward toward the left ear. The whole head is filled with fine parallel shading. There is a deep charred depression above the head, just in front of the eye.

Under the second doe's head is a series of parallel lines that may depict the muzzle and forepart of a third head. This figure is still too incomplete to permit a definitive identification. Other sets of parallel lines are also to be found above those two heads and behind the first, but they do not seem to form part of any recognizable figure.

The reverse side of the scapula is covered with apparently non-representational engraving. There are two separate sets of sharp parallel linear incisions near the vertebral margin. Several other patches of parallel hatching or angular cross-hatching are present between 6 and 8 cm. from the vertebral margin (Fig. 10). Originally, the piece seems to have been crosshatched, but heat has caused checking that coincides with the incisions in one direction, obscuring them. Repeated applications of a hot brand to this crosshatched area eventually caused a large chip to pop out, breaking the scapula at precisely the spot that had been crosshatched. The brand had been applied seven or eight times to other points along the convex ridge paralleling the caudal border, charring the bone without cracking it. When the brand was finally applied to the hatched zone, the shoulder-blade split apart. There is little doubt from the location of the scorched areas on both surfaces that the charring of the shoulder-blade was an intentional act, and that the placement of the charred points follows a deliberate pattern.

There are other engraved scapula fragments from El Juyo that have also been heated or burnt, but none that shows the pattern of deliberate charring so clearly. However, that is not so surprising. The reconstruction of scapula 9N/85 from the many small pieces recovered by the excavators, or found in our fine screens, took over three years. We have been unable to reassemble any other engraved scapula so completely. Nonetheless, the larger decorated fragments we have recovered often show charring along their borders, and we suspect the deliberate burning of 9N/85 may prove to be the rule rather than the exception.

The El Juyo case is not an isolated example. Photographs of some of the engraved shoulder-blades recovered from the cave of Castillo show

seemingly analogous, apparently intentional, charring (ALMAGRO 1976, Plates IIIa, VIb, VIIa, XIIa). At least one of the engraved scapulae discovered at Altamira by Alcalde del Río also shows minor charring, too small to be conclusive. Unhappily, investigators either devote no space in their descriptions of engraved scapulae from other European sites to a discussion of charring, or dismiss them with the most cursory comments, and such apparently "natural" marks are ordinarily omitted from the drawings of such pieces. Since 9N/85 is the only relatively complete specimen that we have been to study intensively, more visible details of its manipulation were available for our examination, and consequently it provides the most suggestive evidence for the possible interpretation we propose.

Although it may seem peculiar that a carefully decorated bone object would be intentionally damaged by burning, there are exact parallels to this behavior in ethnography. Divination by shoulder-blades, referred to as "omoplatoscopy", "spatulamancy" divination by "speal-bone" or, most commonly, scapulimancy (sometimes spelled scapulo- or scapula- mancy), is a practice that is well attested among peoples from both the Old World and the New. It survives to the present day among some hunting/gathering peoples of the American Subarctic, and among herdsmen elsewhere (KROEBER 1923, pp. 210, 469; MARTIN 1978, pp. 121-122). It usually consists of scorching the scapulae of some animal in the fire until the bone cracks or breaks, and then using the shape of the breakage to foretell the future. The Chukchi of Siberia cast reindeer shoulder-blades into the fire for this purpose, Turkic and Mongolic herdsmen used sheep bones as well as reindeer, and the use of the shoulder-blades of other animals such as beaver, rabbit, or seals, is rarer but not unknown (ELIADE 1964, p. 164). A well-known example is the ancient Chinese charring of tortoise plastrons for divination, although they also used animal shoulder-blades for the purpose (NEEDHAM 1956, pp. 132, 301, 347).

Not all examples are non-Western. In ancient Rome, scapulimancy was performed by heating a sheep shoulder-blade over coals (LUCK 1985, p. 253). Archbishop Hincmar of 9th Century Rheims stated that diviners "indulge in divinations from animals' shoulder blades ..." (FLINT 1991, pp. 56-57, 65). Traveling through Wales in 1188, Gerald of Wales came upon some folk from Flanders, about whom he says: "A strange habit of these Flemings is that they boil the right shoulder-blades

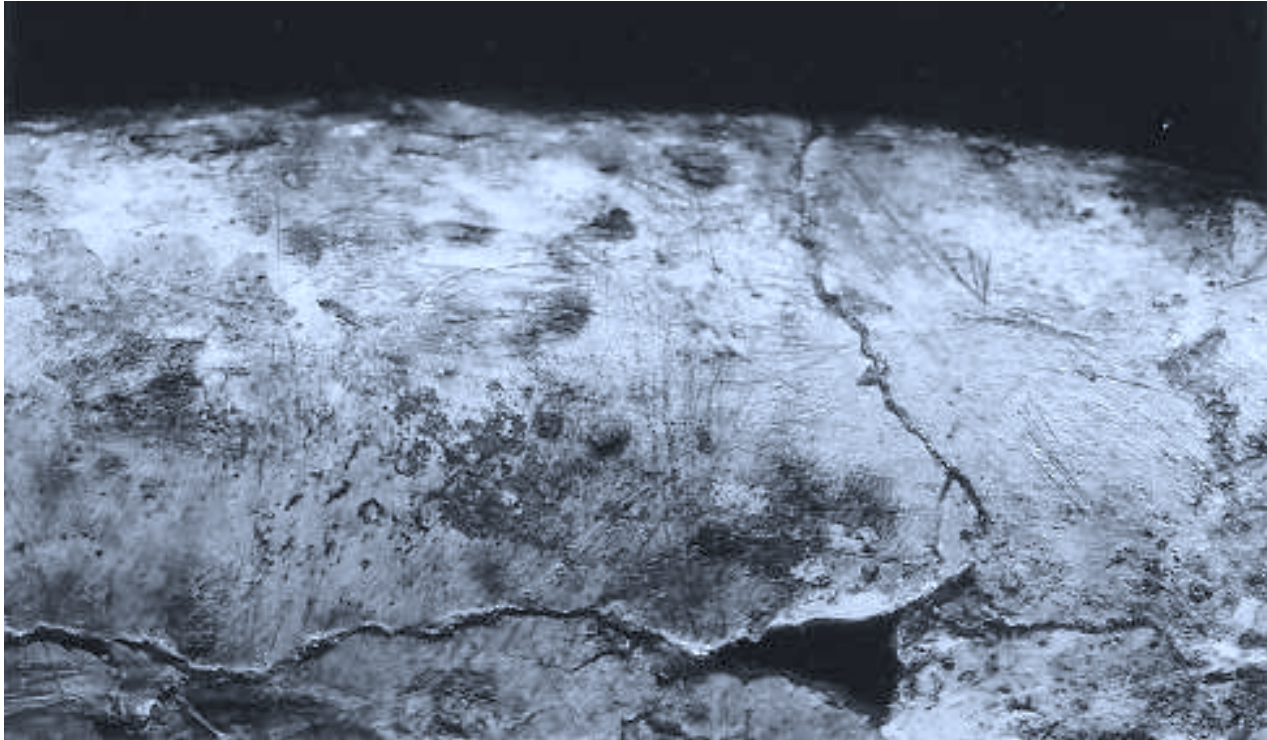


Fig. 9: Circle of charred dots surrounding hind's head.

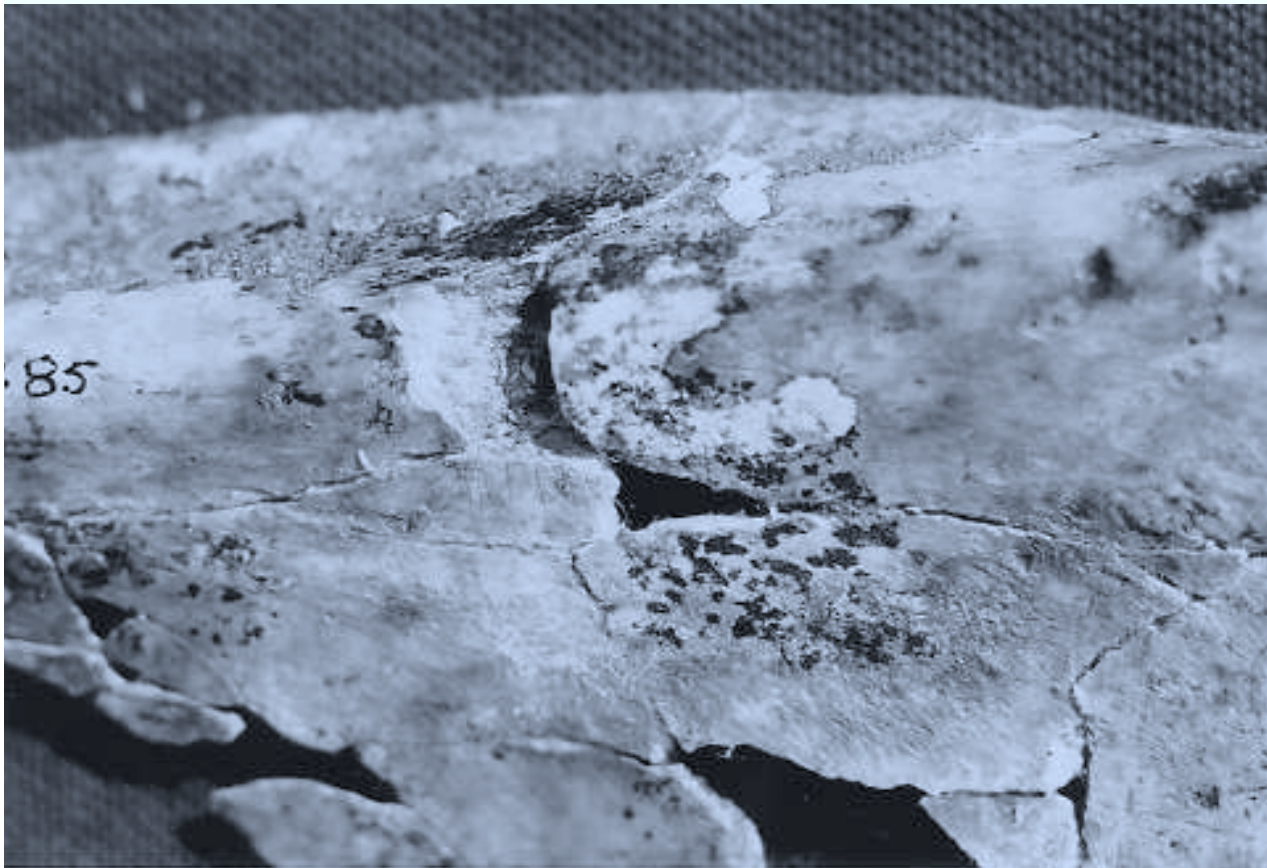


Fig. 10: Hatched and charred area on "reverse" of scapula.

of rams, but not roast them, strip off all the meat and, by examining them, foretell the future and reveal the secret of events long past". A little further on: "Many people foretold from the shoulder-blades the devastation of their homeland which was to follow the death of Henry I, and this a year and a half or more before it happened. They sold everything they possessed, both portable property and land, abandoned their homes and so by their prescience escaped disaster" (Gerald of Wales, c. 1191, pp. 144; 146-147). Apparently this custom was not restricted to the Flemish, as further anecdotes relate.

Nor are all the Western cases so ancient. In a treatise about a fifteenth century magician's manual, we read that "Johannes Hartlieb tells how the shoulder blades of various large animals are examined in the form of divination known as spatulamancy" (KIECKHEFER 1997, p. 113; reference is to Hartlieb 1456-1464). In Fernán Pérez de Guzmán's *Confesión rimada* (late 15th or early 16th Century), we find the following verse:

*"Aquel a Dios ama que de las cartillas  
no ponen al cuello por las calenturas  
non usa, nin cura de las palabrillas  
de los monifrates, nin de las locuras  
de aquel mal cristiano que con grandes curas  
en el hueso blanco de la espalda cata...."*  
(MENÉNDEZ PELAYO, 1978 [1948], p. 624).

In fact, the practice of scapulimancy continued unceasingly well into the modern era. John Campbell, the 4th Earl of Loudoun who was later (1756-7) Commander-in-Chief of the British Army in America, during a retreat to the Isle of Skye while fighting the Jacobites in Scotland in 1745, learned the outcome of the battle of Culloden from a common soldier who saw it in a shoulder blade at the very instant that it was decided (SPENCE 1988, p. 377). ANDREE (1906) noted that scapulimancy was still used for divination in parts of rural Europe and the British Isles in the 20th Century. He recounts the story of a Corsican diviner who, when Napoleon was still a child, foretold his future by observing the cracks on a shoulder blade (p. 159).

An exhaustive study of recent scapulimancy among the Naskapi Amerinds of Labrador in the American subarctic is provided by Frank Speck in his book *Naskapi* (1935). Speck devotes several pages of discussion and illustrations to the practice. The Naskapi believe that something of the spirit of the hunter's prey remains in its bones. Before setting out to search for game, they

question caribou shoulder-blades, asking where game will be found. Placed on the hot coals of a fire, the shoulder-blades develop scorched spots and cracks that are understood to be the response. Those marks are interpreted as maps to the part of the hunting grounds where the hunters will find prey (SPECK 1935, pp. 127-159).

The characteristics of the decorated scapula from El Juyo do not exactly match any of the known cases of scapulimancy. Nevertheless, piece 9N/85 incorporates many features that indicate such use. Scapulimancy as described in the ethnographic literature produces durable remains analogous in so many ways to deliberately charred and broken engraved scapulae from El Juyo that we feel compelled to suggest, as we have done for the bone dice from level 6, that they resulted from a similar sort of magical or divinatory rite.

### Dice "Games" in Context

The three "dice" found together in El Juyo Level 6 are morphologically very like ethnographically known Amerind gaming and divinatory pieces such as those illustrated by CULIN. It seems to us highly plausible — in fact very likely — that the El Juyo finds are truly dice used in gaming or divination.

The case that these El Juyo bone artifacts may be gaming pieces is based on quite different (and we believe, stronger) evidence than the case Dewez made for Remouchamps. It is the peculiar decoration of the Remouchamps pieces that suggested to Dewez analogy with Amerind "dice". Decoration is absent or minimal on the El Juyo pieces. Had these three otherwise unremarkable bones not been recovered lying together, their resemblance in size and shape and the battering on their ends might have gone unnoticed. The spatial context of discovery — their contiguity — facilitated the recognition of these significant attributes, and, once they had been identified, helped suggest their function.

Gambling games played with undecorated three-sided dice are seemingly not very challenging. The most elementary, four-outcome, version is so simple that one would presume it boring, because the expected frequency of casting three-up (or three-down) is so small (12.5% each) compared to the likelihood of throwing two-up or two-down (37.5% each). Such apparently tedious games are more than enjoyable recreation. According to the reports, players find the simplest games anything

but dull, and animation and excitement run high during play, which is very rapid, highly social, often noisy, and requires no major investment of attention that would disrupt interaction. Moreover, because skill — if no one cheats — plays no part in them, they are eminently “fair”: over the long run there should be no consistent winners, so social relationships between winners and losers are unlikely to be upset by differences in playing ability. Particularly those games in which skill plays little or no part serve to strengthen social cohesion as they divert and entertain. In difficult times, they may provide important alternative means of gratification. Those are among the attractions that ensure such games the large following they enjoy now as they undoubtedly did in past. One might have expected that our Upper Paleolithic relatives, so like us anatomically and behaviorally, would have had a well-developed taste for such diversions, and that, like many living peoples, they would have invented a material apparatus, including gaming pieces, for use in such activities.

Games can do double duty as both recreational and ceremonial devices. There are some possible adaptive advantages of schemes for randomizing (or at least making less regular) certain human activities — even aspects of subsistence behavior. Of course, the use of dice in divination does not require differentiating a large number of outcomes, and for divinatory purposes it is best that they be obtained by chance alone, essentially without human “manipulation”, so such dice as those from El Juyo would be eminently suited to magico/religious uses.

It has always puzzled us that (setting aside the present pieces and the engraved artifacts from Remouchamps) obvious examples of such gaming pieces as dice have not been recognized in Upper Paleolithic contexts. Having suggested that the El Juyo bone bars are in fact just such pieces, we now echo Dewez’s question if such items — perhaps even more elaborate ones than those found at El Juyo and Remouchamps — have not perhaps been excavated from Upper Paleolithic contexts before, but gone unrecognized. It seems to us possible that the enigmatic perforated and decorated bone roundels (*rondelles*), some of the decorated “half-round rods” (*baguettes*) usually interpreted as parts of spear shafts, or some of the flat bone laminae bearing engravings, from sites (particularly Magdalenian ones) such as Isturitz, La Madeleine, or Laugerie Basse (CAPITAN and PEYRONY 1928; LEROI-GOURHAN 1967; Saint-Perier 1936), may in fact be just the

gaming/divinatory pieces that we have been missing. We add our voices to his in calling for a careful reexamination of extant collections of Upper Paleolithic “mobile art” with this possibility in mind. The El Juyo case, more particularly, suggests to us that careful attention to context in future excavations may help provide more conclusive evidence for recreational and expressive aspects of past cultural systems.

### Scapulimancy in Context

It is not surprising that Upper Paleolithic peoples, like “moderns,” would have thought it necessary to turn to divinatory practices from time to time. There are some possible adaptive advantages to divinatory practices as guides to subsistence behavior. Dice would be suitable matériel for divination, although they could simply have been used in gaming. The burnt scapulae from el Juyo may well be evidence for scapulimancy, which is a purely divinatory practice. Finding both kinds of evidence in one prehistoric site has the fortunate consequence that each kind reinforces our interpretation of the other.

Scapulimancy is surprisingly widespread. What is more, if our interpretation is correct it resolves a long-standing debate about its age and origins. Since scapulimancy is best represented in among northern and central Asian shepherds, Andree believed that it was devised by those herdsmen, from whom it spread to their hunting neighbors. Speck, in contrast, thought it an integral part of the ritual and belief system of hunting peoples. The evidence from el Juyo would seem to indicate that it was in fact developed by hunting peoples, as Speck suggests, but also that its roots extend back to the Paleolithic past, a much more remote period than either Andree or Speck suspected.

Omar KHAYYAM MOORE (1957) has provided one possible adaptive interpretation that may help explain the long persistence and popularity of this seemingly non-adaptive technique for survival in a natural world that is really anything but predictable, and where the outcome of any given hunt is impossible to foresee. In areas where game is scarce, so that the hunters have only a small likelihood of success on any foray, should they kill an animal in one place, other game will avoid the area for a while. So, it is not likely that a hunt over the same limited area on two successive trips will be successful. And, should hunters make repeated kills in the same part of their territory, the game there would soon be depleted.

According to Moore, scapulimancy probably tends to randomize the directions taken in the search for game, and so to improve the hunter's chances of success. He may well have detected the function of scapulimancy of one kind, but there are other varieties, and the Juyo specimens seem to document a different use of the technique.

At the time the scapulae were burnt, game was doubtless more abundant in the environment immediately surrounding el Juyo than was ever the case in the settings discussed by MOORE. It is recorded (by KIECKHEFER 1997, pp. 89-90; 229-231) that the deliberate charring of scapulae, marked with letters and names, was also a magical means of constraining the will of people or beasts (in the former case, presumably for erotic purposes). Scapulae of asses, hares, capons, or geese, are recommended, each presumably with its own particular virtues. This would seem to be a somewhat different use of the shoulder blade than Moore's, and one more closely related to what we postulate for the el Juyo case. Even where game is plentiful and the odds favor the hunters, scapulimancy may be a material embodiment of behavior reflecting generalized beliefs about the relationship between hunters and their prey. Some features of the Juyo scapulae suggest that their use may have involved elements of magical compulsion of the outcome of the hunt: if the charred dots arranged about the head of a hind, or the hatching in the area where burning broke the scapula are any indication, it is likely that the variety of scapulimancy used at el Juyo was intended, not so much to map the direction that hunters should take in pursuit of their quarry as to "compel" success in the hunt, or to determine the number or variety of prey to be encountered.

### CONCLUDING OBSERVATIONS

If our interpretations are correct, Upper Paleolithic *Homo sapiens sapiens*, at least during the Magdalenian, was not so different from living peoples: earlier members of our species had developed socio-cultural systems that in their variety and sophistication can be characterized as "fully modern" in the effectiveness with which they coped with their surroundings and dealt with the physical and psychological needs of their members.

Art, reckoning, gaming and magic/religion seem to have been as important to the psychic well-being of Upper Paleolithic members of our species as they are to moderns. In contrast to their role among earlier hominids, they seem to

have been as fundamental to the survival of the species as were technological devices. We believe that the evidence from El Juyo provides solid evidence for some or all of those domains of belief and behavior. If our conclusions are correct, it would not be unusual: other archeological evidence has long shown that at least three of those cultural sub-systems were already present during the Upper Paleolithic.

In contradistinction to earlier fossil hominids, the behavior of Upper Paleolithic peoples, as inferred from subsistence practices, artifact manufacture, building techniques, aesthetics, and mortuary practices, gives every indication of having been as complex and elaborate as that of living humans. We know of no human group living under natural conditions today that makes no attempt to deal with chance phenomena, and none that is completely without games. Games, particularly those in which skill plays little or no part, serve to strengthen social cohesion as they divert and entertain. In difficult times, they may provide important alternative means of gratification. Simple dice games are among the most widespread of these.

Like living peoples, our Upper Paleolithic relatives seem to have devised a surprising variety of ways by which to manage those aspects of human dealings with the "external world" whose results western civilization considers invincibly aleatory and completely uncontrollable by human activity. But prophecy of a future event, particularly when one believes that one can constrain that event's outcome by an act of will, can in fact be efficacious. It can increase individual self-confidence and augment group solidarity, both of which are fundamental to successful exploitation of environment, especially in times of scarcity. And when one can explain any case where prophecy fails as the result of some imagined human transgression that offends the supernatural, its effects seem little different from compelling nature to obey one's desires.

The uses of dice or scapulimancy in operations designed to affect the natural world are not the only ways that fully effective sociocultural systems have devised to deal with the unpredictable aspects of nature. Often, as BRIGHTMAN (1993) documents for the Cree of northern Manitoba, dreams (which are assiduously sought) are considered to be prophetic of future events, indicating the places where game will be available to the hunter. Although dreams frequently present the dreamer with alternative choices, each of



which may lead to a different outcome, dreamers consider that they can control the content of their dreams volitionally. Among the Beaver, Ridington says, dreams show the trails that the hunter must follow to ensure success, and dreaming is as important to the hunt as the weapons used in the chase. Of course, unlike gaming or scapulimancy, dreaming as such leaves no durable residues in the archeological record.

It may be that the bone "dice" from El Juyo were not really used as were the artifacts described by Culin, but their formal similarity to those pieces, given the context of their discovery, is great enough to demand serious consideration of the possibility that they are also functionally analogous. It would of course be inexcusable for us to claim that we have somehow demonstrated that the bone billets from el Juyo level 6 can only

be dice. Nor can we show that the engraved and burnt scapulae from the site are incontrovertible proof of scapulimancy. It would be just as irresponsible for us to claim that we advance these claims as hypotheses to be tested, because right now we know of no body of evidence that could test them. Nonetheless, our interpretations, while they cannot be absolutely proven, fit the El Juyo finds better than any other. We can only hope that further research may eventually substantiate them<sup>3</sup>.

3) The drawing of the El Juyo dice was made by Ms. Judith Ogden; she also produced the schematic map of Level 6 structures in 1983. Illustrations from Culin were redrawn by James Pokines. The drawing of scapula 9N/85 was produced by Juan Tresguerres. We thank all of these colleagues for their assistance. The map of Level 6 was digitized (scanned using Publisher's Paintbrush) and completed with more recent data by Freeman, who is also responsible for the photography.

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