SIMON HOLDAWAY SUSAN A. JOHNSTON

The search for an indigenous writing system among the prehistoric cultures of Temperate Europe has a long history which may in part be motivated by the desire to show that they were not barbaric and culturally backward, but rather possessed of one of the hallmarks of "civilization" (Childe 1950). Systems of writing and counting in other areas of the prehistoric world were developed primarily, it would seem, for the recording of economic and religious information, as in the Near East and Mediterranean area. However, before the Roman invasions, there is no evidence that similar types of communicative devices existed in Temperate Europe. While some scholars continue the search for an indigenous writing system, specialists in European archaeology have
used a chronology based on radiocarbon dating to show that the prehistoric peoples of Temperate Europe were neither backward nor barbaric, but simply followed a different path of cultural development (Benfrew 1979).

Beginning in the last century, research on indigenous writing systems focused on the decipherment of marks made on the walls of caves dating to the Upper Paleolithic (30,000-10,000 B.P.; Fig. 1) that were regarded as precursors of writing (Forbes and Crowder 1976-336). More recently, claims for an early writing system have been based on a series of tablets found on the site of Tartaria in Romania, dated to the 3rd millennium B.C. (Hood 1967). The earliest definitive writing system indigenous to Temperate Europe is, however, a script used in Ireland and parts of Britain in the 4th century A.D. Known as ogham, it is a kind of stroke writing based on long and short dashes arranged around a central stem line. Ogham inscriptions appear on stone monuments (Fig. 2), with the edge of the stone providing the central line (Thomas 1966:142-144).

Along with the quest for early European writing systems, efforts are still made to identify possible forerunners of writing systems. Alexander Marshack in particular has turned attention once again to the symbols, signs, and other marks found on both cave walls and on portable artifacts dated to the Upper Paleolithic. Using a microscope, Marshack has identified a "notational system" which appears most frequently on bone and stone objects from sites all over Europe. These were previously interpreted as hunting tallies or as abstract sexual symbols, but Marshack has attempted to show that the engraved lines and notches conform to a pattern which can be matched, not with the vagaries of a hunter's luck, but directly against an observable phenomenon—the monthly cycle of the moon.

**Lunar Calendars**

The moon takes around 29.5 days to complete an orbit of earth. At new moon (M1 in Fig. 3) the moon is between the earth and the sun, hence the hemisphere facing the sun remains dark. As the moon orbits the earth, more and more of its surface becomes illuminated until the complete hemisphere is facing toward the earth at full moon (M5). The moon then continues its orbit, and the illuminated surface is gradually reduced until the end of the month at the next new moon. As Marshack notes, this cycle would have been visible to Paleolithic humans as it is today. He suggests that the marks found on Upper Paleolithic artifacts were not random decorations but were "time-factored," that is, made on purpose sequentially over a period of time recording such natural phenomena as the phases of the moon.

By showing a correlation between the cycle of a lunar month and the engraved lines on Upper Paleolithic bone artifacts, Marshack proposes a unity of cognitive development between Upper Paleolithic people at around 30,000 B.P. and people today. While not yet writing as we know it, the lunar notation systems would indicate that the organization of time was a central concern to Paleolithic humans. This, Marshack suggests, acted to integrate various aspects of their culture: language, ceremonies, religion, and art. Through identifying lunar calendars and hence "time-factoring" in Paleolithic life, Marshack feels that he is demonstrating a more basic level of human cognition than previously identified by archaeologists.

His analysis essentially consists of two parts. He has first to show how the lunar cycle might be represented by engraved marks, and second, to demonstrate that the marks were made sequentially during the lunar cycle. Thus, Marshack considers the lunar cycle itself from the point of view of the observer. First, he notes that while the true lunar month lasts approximately 29.5 days, this period could vary for the observer between 28 to 31 days, depending on where in the cycle the count began. Similarly, while the new moon theoretically lasts only a day, to an observer the moon might appear to be absent for up to three days until the thin crescent of the waxing moon becomes visible. These factors could introduce uncertainty into any single month's recording. Marshack suggests, therefore, that variation in the number of marks for any single monthly cycle is to be expected, and does not necessarily invalidate the association between the lunar month and Upper Paleolithic notation.

Error could also occur because the lunar month is primarily dependent on the appearance of the moon, not the actual number of days elapsed. Marshack argues that the appearance of a half, full, or new moon might be indicated on the artifact even when the correct number of days had not been recorded. Over a longer sequence of several months, however, these variations should not disrupt the overall lunar pattern as indicated in the notational notches.

As examples, Marshack selected two engraved bone plaques from Upper Paleolithic sites—F. Abri Lar- tet and F. Abri Blanchard (see box)—with Aurignacian levels (ca. 30,000-25,000 B.P.) for detailed calendric analysis. First, he showed that the number of engraved marks recorded on the plaques was a near multiple of 29.5 (the length in days of the lunar month). He then demonstrated that the marks were made sequentially by investigating the engraved pits, lines, and grooves under a microscope, and suggested that variations in the shape and direction of the engraved marks resulted from the use of different tools. So many tools were re- presented on one piece that Marshack felt the marks must have been performed sequentially over a long period of time. The three-way correlation between the lunar calendar, the number and shape of the marks, and the use of a series of tools provided considerable support, Marshack felt, for the lunar notational theory.

**Other Time-Factored Notational Systems**

At the same time that Marshack published his most detailed exposition of his calendrical theory, he was also extending his ideas on the...
significance of time-factoring to other types of Upper Paleolithic artifacts. In particular he suggested that seasonal changes in flora and fauna would have had a great impact on Paleolithic people and to might be expected to appear in their representational art forms.

The Lunar Notations on Bone Plaques from Two Paleolithic Sites in France

Two artifacts which Marshack has analysed in detail are bone plaques from the sites of L'Abri Lartet and L'Abri Blanchard (Dordogne, France), both excavated in the last century. The artifacts are small (less than 12 cm long) and bear a series of engraved pits and lines on their surfaces. On the piece from L'Abri Lartet (Fig. 5a; Marshack 1972:52-54), face 1 has 31 lines and 87 pits, while face 2 has 35 lines and 54 pits. In addition there is a series of notches along the edge of the artifact. Some areas of this notched edge have been broken or eroded but if these are reconstructed (by substituting the number of lines in an undamaged area of similar length) the number of engraved notches comes to 121. Marshack notes that if the total number of edge notches and of engraved lines and pits on each side are divided by the length of the lunar month (28.5 days), the result is 11 months. From this he derives a sequence for reading the notation which gives this number of lunar cycles.

He assumes that the lines were engraved first and the pits afterward because the lines are more widely and freely spaced than the pits. Similarly an order is proposed for the pits moving right to left based on their relative size and spacing. Each side is read in turn with the notches continuing the notation at the end of the sequence. If the marks are laid out linearly, they can be mapped against the lunar model (Fig. 5b). With a certain amount of manipulation (Marshack feels that the last line of pits on face 1 may have extended into the broken area on the top left hand corner of face 1, so it might be necessary to add one or two pits to the count), a reasonable fit can be made to an eleven-month cycle.

6a Marshack's schematic representation of the engraved lines and pits on the bone plaque from the Abri Lartet. The groups of marks have been laid out linearly and arrows provided to show the direction in which Marshack believes they should be read. Marshack suggests that a pattern is apparent that corresponds to the lunar cycle. In the figure, black circles represent a new moon, while white circles represent a full moon, and partial circles correspond to the waxing or waning moon.

6b Marshack's schematic representation of the engraved marks on the bone plaque from Abri Blanchard. In Figure 5b, the marks are laid out linearly together with a diagram showing the order in which they should be read on the plaque. The sequence of marks is compared to a diagram of the lunar cycle.

Marshack also points out that if the notation begins and ends with a new moon, the sequence spans a lunar year in terms of lunar appearance and disappearance (but not in the total number of days recorded).

The plaque from the Abri Blanchard (Fig. 6a; Marshack 1972:44-51) also has a series of notches and pits that like that from the Abri Lartet, but in a different style. Marshack investigated the pits under a low power microscope and identified the markings by which the pits were produced. Some were formed by punching an instrument into the bone, while others were made by a quick turning blow from either the left or right. Groups of similarly made marks form clusters, from one to eight marks in length, in a horizontal direction along the bone. Marshack proposes that the marks can be read in a sequence forming a serpentine shape. A total of 69 pits is represented by 24 different types of mark. If two unusual marks are taken as a beginning point and correlated with the new moon, the serpentine sequence corresponds to the full moon at the end of the plaque, and those corresponding to a new moon on the right (except for the beginning marks).

Like the plaque from Lartet, that from Blanchard also has a series of notched grooves around the border. Microscopic examination shows that the grooves were at a variety of angles suggesting the use of different tools. In a total of 81 marks or grooves there are 35 to 40 changes of angle. Marshack tentatively correlates the grooves with a lunar notation (Fig. 6b), but he cannot rule out the possibility that they aided in holding the piece in the hand, as the grooves show considerable wear and polish. What the Blanchard plaque does suggest, however, is that the notched grooves on the Lartet plaque might also have been formed by different tools. Marshack differentiates the marks made by separate tools on the Lartet plaque and incorporates these results into the lunar notation diagram. The resulting complex sequence corresponds almost perfectly with the lunar observations and therefore, in his opinion, tends to validate the lunar interpretation.
represent acts of participation or rites related to the time of foaling. This combined with the lunar notations suggests a "complex time-factorized symbolism and mythlogy" (Marshack 1972:185).

Similar links between seasonality and calendrics have also been discerned in cave art. A painting of a pregnant horse at the famous French cave site of Lascaux has images superimposed upon it which were previously interpreted as darts. Marshack, however, considers them to be branches; the presence of "foliage" might then indicate spring, or alternatively its openness might refer to autumn. He suggests that other leafy branches are associated with pregnant horses. While brambles are found together, stags, stonies, and bulls. These relationships are then taken to mean that seasonality was a method of conveying time-factorizing in Upper Paleolithic cave art. Just as the etchings from La Vache had darts superimposed on the main engraving at different times, so the famous cave paintings are composite creations produced over a considerable period. The famous spotted horse at Pech-Merle, for instance, was originally painted only in outline. Using infrared photography, Marshack claims to have determined that the spots were made with ochre from different sources and were therefore applied at different times. He infers that the painting was created in a number of separate episodes and is best interpreted as a special type of time-factorized ceremony (Marshack 1980).

Multiple use also helps to explain the so-called "macaroni" forms found in many painted and engraved caves. "Macaroni" aptly describes the masses of painted and engraved lines and meanders which often seem to form random jumbles (Fig. 7). Marshack argues that rather than compositions created at one time, careful observation indicates that many of the lines were made at different times using either different engraving tools or different pigments. Further, if the "macaroni" on different artifacts and paintings from various sites are studied, a system consisting of a central core meander (in a serpentine shape) associated with various branches and subsidiary markings can be identified. This system can, according to Marshack, be traced over much of the Upper Paleolithic into the later Mesolithic, and perhaps has antecedents in the earlier Mousterian. Meanders appear on both portable artifacts and in painted caves, perhaps most clearly in the cave of Rouffignac (Dordogne, France). The "Rosetta Stone" for understanding the significance of these meanders comes in the form of an engraved bone from late Magdalenian (15,000-10,100 B.P.) contexts in the site of Petersfels (Germany). Here, three engravings were all of fish are associated with a series of "running angles" representing water. On the basis of this example, Marshack concludes that the meanders signify "acts of participation in which water symbolism or water mythology played a part." Just like the ceremonies which involved the production of cave paintings, the "macaroni" are to refer to time-factorized events.

Alternatives to Marshack

From an initial consideration of lunar calendars on portable artifacts, Marshack suggested his corpus of material to include virtually all the recognized categories of Upper Paleolithic art. While never claiming that the material with which he deals is a true Paleolithic writing system, he does argue that the lunar calendars, seasonal engravings, rock art paintings, and macaroni engravings were part of a unified system spanning much of Upper Paleolithic prehistory in Europe, based on a deep concern with recording time-factorized events. This is not writing, but rather a notational system for recording attributes in conjunction with ceremonial activities. To Marshack such a system is evidence that people operated at the same cognitive level as later literate peoples.

Marshack’s theories about the Upper Paleolithic rest heavily on the notion of time-factorized behavior as a system. The evidence that he presents for this time-factorizing can be evaluated in two different ways. First, can it be proved that the artifacts were used repeatedly over an extended period of time and second, was the same message being repeatedly conveyed and understood?

To answer the first question we must return to the lunar calendars. Marshack argues that the number of marks, their style, and the type of point used to create them all correlate with various phases of the lunar cycle, but in the examples he gives, the number of each is perfect, close, is never perfect. Marshack accounts for the variation by arguing that the meanders were in fact a system of time-factorized events. But as the months were being recorded, not the number of days. This approach does permit flexibility, with the result that each series of marks must be read differently to correspond with the lunar calendar. It might be more convincing if the series of pits, lines, and notches was much less complex and seen repeatedly on different artifacts, but repetition does not occur. Similarly, Marshack never really addresses the problem of distinguishing notational marks from those intended for decoration. Statements that the marks are "random and therefore intentional are not convincing without objective support."

But at the core of his arguments about Upper Paleolithic calendars and notational systems in other art forms is the notion of time-factorizing, shown by the sequential use of different tools. Here Marshack relies heavily on his microscopic analysis of engraved marks to demonstrate that different marks were produced by different tools. There is experimental work, however, to suggest that such a single correlation cannot be made.

Archaeologist Michel Lorblanchet (1972) investigated engraved material recovered from the later Upper Paleolithic site of La Grotte de Saint-Édelice (Lot, France). He looked both at the engravings themselves and at the stone tools called burins used to produce them (Fig. 8). The engravings showed several types of lines, including single lines, deeper lines produced by repeated engraving, and much more detailed engraving. These are the same ones which Marshack suggests were produced by different tools through sequential, time-factorized process. But Lorblanchet’s experimental work indicates that they can be interpreted in another way. He notes that cutting lines with stone tools are both stone and bone require considerable force, which tends to wear down the tools rapidly. To produce a considerable amount of engraving Lorblanchet thinks that the tool would have had to be changed often, with the result that several different tools would need to have been used even on a single engraving. Other experimenters have noted that even if a new tool were not used, the old one would require frequent resharpening, so the variety of grooves detected by Marshack need not have been formed over an extended period of time. Much the same conclusion has been recently reported by D’Errico (1989), who studied a large number of terminal Paleolithic inscribed stones also thought to bear calendrical notations.

Lorblanchet’s study is much more restricted than Marshack’s, starting with several of his assumptions, but it does indicate that there are other interpretations for the varying patterns which Marshack observed. The microscopic differences in themselves need not imply a substantial period between engraved marks. Similarly, the additional markings onto, or adjacent to, a central figure (like the darts on the Lascaux horse) could be part of the original composition, or even, in cases where fainter outlines of the same animal are present, the traces of earlier or preliminary sketches. The point is that there are alternative explanations to time-factorizing which are equally reasonable.

The complications of Marshack’s work for the origins of writing go beyond any problems with the microscopic interpretation of marks or their possible fit with the cycle of the moon’s movement. One of the most notable aspects of the various lunar notations which Marshack identifies is that no two representing the same phases of the moon, or in the way in which they are recorded. If there was some kind of related different tools through sequential, time-factorized process. But Lorblanchet’s experimental

work indicates that they can be interpreted in another way. He notes that cutting lines with stone tools are both stone and bone require considerable force, which tends to wear down the tools rapidly. To produce a considerable amount of engraving Lorblanchet thinks that the tool would have had to be changed often, with the result that several different tools would need to have been used even on a single engraving. Other experimenters have noted that even if a new tool were not used, the old one would require frequent resharpening, so the variety of grooves detected by Marshack need not have been formed over an extended period of time. Much the same conclusion has been recently reported by D’Errico (1989), who studied a large number of terminal Paleolithic inscribed stones also thought to bear calendrical notations.

Lorblanchet’s study is much more restricted than Marshack’s, starting with several of his assumptions, but it does indicate that there are other interpretations for the varying patterns which Marshack observed. The microscopic differences in themselves need not imply a substantial period between engraved marks. Similarly, the additional markings onto, or adjacent to, a central figure (like the darts on the Lascaux horse) could be part of the original composition, or even, in cases where fainter outlines of the same animal are present, the traces of earlier or preliminary sketches. The point is that there are alternative explanations to time-factorizing which are equally reasonable.

The complications of Marshack’s work for the origins of writing go beyond any problems with the microscopic interpretation of marks or their possible fit with the cycle of the moon’s movement. One of the most notable aspects of the various lunar notations which Marshack identifies is that no two representing the same phases of the moon, or in the way in which they are recorded. If there was some kind of related different tools through sequential, time-factorized process. But Lorblanchet’s experimental
which could only be "read" by the person who made it. Marshack himself is aware of this, and suggests that each notational system was accompanied by a "story," a verbal narrative, that was the marks meant, including both what they actually recorded and their relevance to the mythical or symbolic beliefs of the prehistoric peoples who made them. Thus, a sequence which recorded the wading of the moon could be accompanied by a myth concerning birth, while that showing the moon's wading might have been associated with a story about death.

While this idea is plausible, it is difficult to see how such a system might have worked, since there is no consistency in the number of marks or of groups into which they fall, the seasonal events which they purport to record, or, by extension, the myths or stories which would have accompanied them. Ethnohistoric evidence suggests that in all societies myths or stories which explain the significance of birth and death, the changing of the seasons, and similar topics are usually shared among a wider group. But Marshack's interpretation of the artifacts shows no distributional pattern that might correlate with a group. If these notational systems are in any way related to the precursors of writing, they would have to be far more consistent than Marshack's analysis indicates.

The consistency that Marshack claims is rooted in the idea that the marks are time-factored, which means that they are constructed by a sequential addition of elements over time (either a very long or a very short period). The elements come together to form a coherent pattern, which can then be interpreted on subsequent occasions with the aid of a story. It is not necessary, however, to see these marks as a highly complex, time-factored notational system for them to have functioned in this way. The sequential addition of elements, which then are "read" to aid in telling a "story," is also the basis of the art of a more general sense. Images are formed in particular patterns or sequences, which together create a coherent composition. This is subsequently seen or "read," thereby conveying its meaning to a group beyond the individual who made it, within a culturally defined context. Under this interpretation, Marshack's notational systems become a part of the broader body of Upper Paleolithic art, whose function, as he points out, may well have been to aid the imparting of important cultural information, perhaps in a ritual context. Such an approach to Upper Paleolithic art—regarding it as conveying information in a more general symbolic fashion—is being further investigated (e.g., Conkey 1978; Gamble 1993).

The Origins of Writing in Prehistoric Europe

A final question posed by Marshack's analysis concerns the fate of the Upper Paleolithic notational system. If the roots of writing lie in it, as claimed by Marshack, then how do we account for the gap between the end of the Upper Paleolithic and the first true writing system indigenous to Temperate Europe? That of 4th-century N. Ireland? While ogham does superficially look like Marshack's notational sequences, it has a clear, consistently repeated system of denoting letters by their position relative to the central stem. Further, these inscriptions, although in the Old Irish language, are at least in part based on Latin principles of grammar. A consistently repeated pattern, which is characteristic of ogham, is entirely absent from the artifacts Marshack analyzed.

The explanation for what happened to the Upper Paleolithic system of notation may lie in the function which writing serves in other societies. Writing is developed to fill some particular need, such as providing information about economy or group membership. If in the prehistoric social characteristic of Europe that function was already being met by a longstanding artistic, religious, or symbolic tradition, there would be no impetus to develop a second system for conveying the same information.

Marshack may well be correct in his view that Upper Paleolithic art, including its notational systems, functioned to provide complex and organized information through the interaction of symbolic and verbal communication. But whether or not the notational systems actually recorded lunar or some other seasonal changes must remain an open question. As for writing, it would seem that Europe displays a different pattern than most of the rest of the prehistoric world. The evidence which bears on this present can be taken to show that the conditions which necessitated the development of writing in other areas of the world were either not present in Europe, or were fulfilled by some other form of culture, or both, until comparatively late in the prehistoric sequence. While there may not be written records to help in the interpretation of these cultures, there is a long, rich tradition of artistic and symbolic representation which is slowly beginning to be understood.

Bibliography


Thomas, Charles 1986 Celtic Britain. London: Thames and Hudson.

Susan Holaday is a graduate student in anthropology at the University of Pennsylvania. A New Zealander, she did her B.B. and M.A. at the University of Otago, Dunedin, New Zealand. She is presently studying for her Ph.D., specializing in the Paleolithic of Western Europe. She has excavated at the sites of La Quina and Combe Capelle in France, as well as at several sites in New Zealand.

Bashford S. Warner was a student of prehistoric rock art. She received her Ph.D. in Anthropology from the University of Pennsylvania in August 1969. Her thesis dealt with Irish rock art, which she spent 7 months studying in Ireland during 1966. She has also participated in excavations in England, Ireland, and the United States.