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Ethnographic Analogy and Archeological Interpretation

Past and present southwestern Indian cultures serve as a test of the interpretation of prehistoric artifacts.

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Interpretation of the use of prehistoric artifacts is one of the most basic and challenging problems of archeology. More than 99 percent of human history belongs to an era before writing; understanding how men coped with nature and each other during this time must derive primarily from their physical remains—tools, crafts, art, architectural remains, and burials. Insofar as prehistoric technology is regarded as an adaptation to, and modification of, natural environment, environmental remains are also relevant to cultural reconstruction. Pollen analysis, geologic studies, and identification of plant and animal species are used to reconstruct the natural world which simultaneously fostered and limited prehistoric technology. Familiarity with the environment of an extinct culture gives knowledge of the resources available for manufacture of artifacts as well as clues to behavioral characteristics of plant and animal populations. From this information, we can infer problems that men had to solve in order to survive, and the technological devices appropriate for their solution. However, even with careful analysis of the total assemblage of artifacts, reconstruction of the natural environment, and inferred systemic relations between the two realms, the specific uses assigned artifacts may be only vague statements of probability. If the social and ritual context of primitive technology is considered as well, interpretation becomes increasingly tenuous. Nevertheless, understanding the evolution of human culture depends upon such interpretation. One of the most important tasks of the archeologist, working as a cultural anthropologist, is to determine the context and uses of prehistoric artifacts. In doing so, he must exercise careful logic and draw upon every source of comparative information. Interpretation of 13th-century artifacts from Arizona by analogy with historic Pueblo Indian culture provides an example of the problems and potential involved in such analysis.

Resources of Interpretation

Interpretation of an artifact depends first on careful description and consideration of its physical features, with the purpose of delimiting its logically possible uses. For example, in analyzing a 13th-century stone axe from Arizona (Fig. 1) the hard stone (basalt) used, size, and weight, the encircling concave groove, the polished and scratched sharp-edged blade, and the battered poll would all be considered. These are the features pertinent to the use of the object, whereas other characteristics, such as color and mineralogic content, would be deemed irrelevant. To almost any observer this would be interpreted as a chopping and pounding implement, and its use would be more apparent if the object were found with the original withe handle fastened around the groove. Detailed formal analysis seems pedantic and superfluous. The object is seen as an axe because axes are part of the observer's personal knowledge and cultural background; however, a prehistoric stone axe need not have been used in exactly the same way as a steel one in our culture.

Few artifacts are so instantly recognizable as the stone axe, and physical traits alone do not reveal the intended use of an object. Insight into use requires a background of cultural information that can be logically manipulated, such as the trained archeologist has. This knowledge is often related to his own discipline through a glossary of more or less defensible use-names traditionally applied to artifacts. In the literature of American archeology there is a plethora of terms handy as common labels of form but inexact or questionable as terms of use. Thus, the archeologist is bound by his professional categories. However, almost every excavation produces unfamiliar objects whose interpretation requires ingenuity and research.

If certain features of an artifact, such as a cutting edge, sharp point, or abrasive surface, suggest that it may have been used as a tool, the investigator can infer the utility of this feature in terms of a range of possible purposes. Few artifacts are so specialized in form as to be useful for just one task. The next step is to consider the prehistoric environment, both cultural and natural, to infer the tasks for which the implement is most appropriate. To confirm inferred uses, the tool may be tested to see if it will perform these tasks. There have been innumerable similar experiments, and many have provided valuable clues to use of artifacts.

Excavation and observation can provide evidence of the use of an object from the materials and other artifacts associated with it at a site. For instance, North American Paleo-Indian kill sites of large mammals frequently include tools for both hunting and butchering that are associated with skeletons (*1*).

The occasional significant association of artifacts and their context of use is

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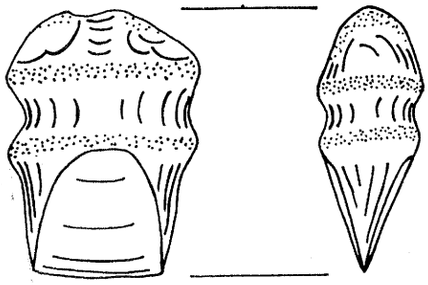

Fig. 1. Stone axe from 13th-century site in northern Arizona site. A "universal" tool; front and side views.

one of the most telling arguments for disciplined and sensible excavation and recording techniques. Unfortunately, lack of such data has been a common failing of archeological research in the past, and the rare instance of an in-place find indicating use of an artifact may serve to identify a well-known item which has been unidentified for years. For example, in the American Southwest, a frequent find in prehistoric cliff dwellings has been a rectangular wooden tablet, often slightly dished (Fig. 2a). Many of these have been excavated, but their use has been conjectural. Only recently was one found in place at Mesa Verde, Colorado, in a meal-grinding bin, evidence that the tablet was used as a scoop for picking up freshly ground cornmeal (*2*).

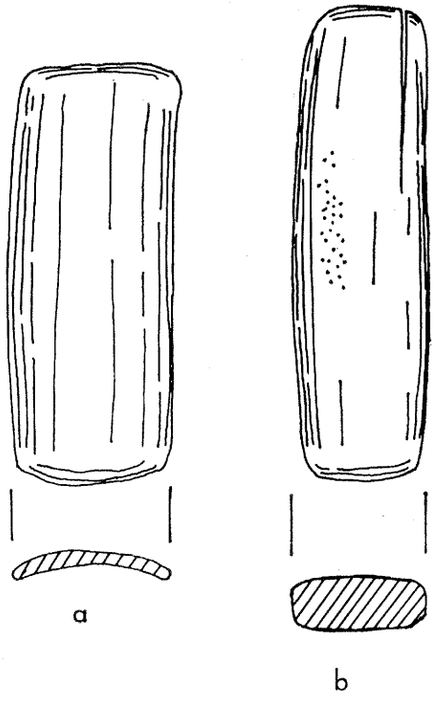

Fig. 2. Wooden artifacts interpreted by archeological associations. (a) Scoop; (b) billet.

The data of archeological association may not be completely satisfactory. In 13th-century Indian burials in northeast Arizona, it is not uncommon to find the head pillowed with thick wooden tablets (Fig. 2b). But these probably served for more than headrests as evidenced by the fact that many bear scratches, punctures, and cuts on one or more flat surfaces, and are commonly regarded as lap-held working platforms or billets. This is a reflection of the expectable variety of cultural uses for any given object. In any culture an item may have different purposes in different contexts—such as tool manufacture, food preparation, or ritual. Consequently, interpretation of any artifact on the basis of one type of archeological association cannot be assumed to define the total use pattern of that object. In fact, chance association may well result in an artifact receiving a name reflecting only one of its minor purposes.

Ethnographic Analogy

The most confident interpretation of a prehistoric artifact comes from discovery of a similar or identical implement used by a living people. Ideally such ethnographic data should be based on observation of the objects during manufacture and use, so that complete information may be obtained on the full context and range of use of the implement, and on the other tools required for its manufacture. The comparison of archeological and ethnographic technology is most meaningful if we can compare context of the analogous items. The information should come from a group closely related to the prehistoric culture being studied. With such historical connections, the best guess is that the prehistoric use of the item is the same as its historic analog. This lessens the number of possible interpretations of an artifact, although it cannot guarantee completely valid interpretation. The archeologist can never assume complete cultural stability through time—the opposite is almost certainly the case—and hence the likelihood of loss or change of meaning of an artifact.

Comparison of prehistoric artifacts with ethnographic analogs is limited in many parts of the world, chiefly because of the biased nature of archeological collections, and because few prehistoric cultures have close analogies in living cultures. Artifacts remaining from Paleolithic cultures are restricted, with

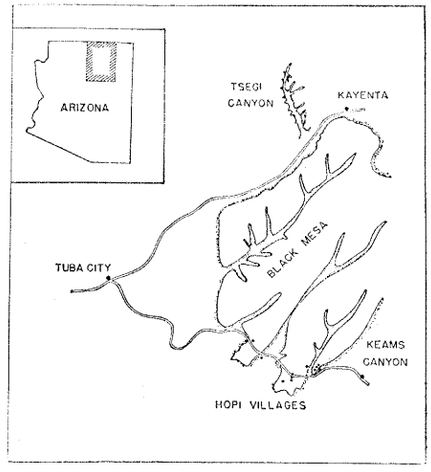

Fig. 3. Location of Tsegi Canyon, home of 13th-century Kayenta cliff dwellers and of their descendants, the Hopi Indians.

a few exceptions, to tools made from stone and bone, and in graphic art. The few historic hunting and gathering cultures that can be used for comparison, such as the Bushmen, Eskimos, and Australian aborigines, have progressed beyond the simple technologies of the Paleolithic, and their environments rarely duplicate those of Paleolithic cultures. Even with more advanced Mesolithic cultures, which are more appropriately compared with extant (or recently extinct) hunting and gathering cultures, cultural reconstruction is severely limited by the dearth of technology preserved. The technological inventory of living Mesolithic peoples includes a number of wooden tools and crafts that depend on the use of wood, other plant material, and animal resources rarely preserved in prehistoric sites. Therefore, reconstruction of early prehistoric cultures, usually based on interpretation of implements of stone and bone, is limited to what was probably a small part of the original tool kit. Later Neolithic cultures, with sedentary farming villages and craft elaboration, undoubtedly included even more perishable artifacts. Inferences about our prehistoric ancestors may often be limited to a mere fragment of their technology.

Kayenta Anasazi—A Special Case

In the American Southwest, circumstances have reduced to a minimum the obstacles to interpretation of artifacts. In this high and arid region, prehistoric remains have been found preserved in excellent condition, and the artifacts have close analogies in existing Indian

cultures. One prehistoric culture in particular, the Kayenta Anasazi of northeastern Arizona, has provided an excellent object for interpretation by ethnographic analogy.

The prehistoric cultures of Arizona, Utah, southwest Colorado, and New Mexico are among the most intensively studied in the world. Partly because of this thorough work, they present a unique laboratory for study of cultural development. At about the beginning of the Christian era, cultures of the arid Southwest began to assume the sedentary patterns of life associated with control of domestic plants, particularly corn, beans, and squash. During a span of about 1000 years the final steps were accomplished in the transition from seasonally mobile hunting and plant-collecting bands to fixed communities of horticulturists. With this development came clear-cut tribal parochialism, ritual elaboration, and ingenious adaptation of farming to special environments. Because of the intensive excavation and reconnaissance done in the area, cultural boundaries and relations of prehistoric southwestern tribes have largely been defined. Their historical inferences are given added control by the tree-ring calendar, which provides closer chronology for these cultures than for perhaps any other prehistoric cultures in the world.

The best-known southwestern cultures belong to the Anasazi tradition of northeast Arizona, southern Utah, southwest Colorado, and northeast New Mexico. The Anasazi lived in compact villages, or pueblos, consisting of dwellings, storerooms, and ceremonial rooms (kivas). Buildings were of masonry, adobe, or wattle-and-daub, and the well-preserved remains of Anasazi sites usually permit good definition of the total village pattern. In later periods of Anasazi history, villages were built in shallow caves in canyon walls. In these sheltered "cliff dwellings," a wide range of perishable artifacts has often been found, providing an excellent sample of Anasazi technology.

Important for interpretation of the Anasazi is the fact that they are the close ancestors of living Pueblo Indians. Anasazi cultural patterns are still preserved in the conservative Pueblo Indian villages of New Mexico and Arizona, and the history of some of these still-occupied villages can be extended back 1000 years or more ago. Such is the case in northeast Arizona, the location of the division of the Anasazi tradition called the Kayenta. First identifiable as a distinct culture in sites about 1200 years old, Kayenta culture is preserved today in the Hopi towns on the southern edge of Black Mesa between Tuba City and Keams Canyon, Arizona (Fig. 3).

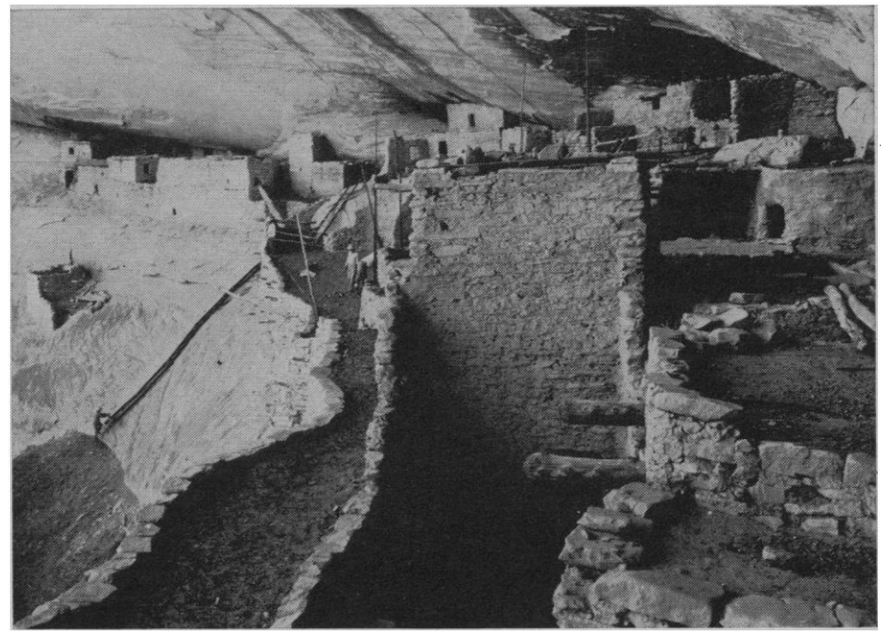

Fig. 4. Keet Seel, largest Kayenta cliff dwelling, occupied between A.D. 1245 and A.D. 1300. [National Park Service]

Tsegi Phase Sample

The Kayentans occupied most of northeast Arizona east of the Colorado River, but the classic definition of their culture is based on excavation and reconnaissance in the region of Tsegi Canyon. From 13th-century cliff dwellings in the Tsegi comes one of the largest collections of perishable artifacts in the Southwest.

Tsegi Canyon is a tortuous, many-fingered gorge about 30 miles (50 kilometers) long, cut by erosion to as much as 1000 feet (300 meters) deep. Exfoliation and weathering carved sheltering alcoves in the sandstone walls, occupied by prehistoric people since at least A.D. 500. The most complete use of these sites came in the 13th century, when they were occupied by small villages of Kayenta farmers (Fig. 4). These cliff-dwellings were among the first ruins to attract the attention of archeologists in the Southwest. In the masonry-walled rooms, often with roofs still intact, they found a remarkable array of wooden artifacts, baskets, sandals, cloth, hide, and similar perishable objects which would not ordinarily be preserved in an exposed prehistoric site. Although some of these early collections have been lost over the years, others remain in museums. Most field records are inadequate, but because of the excellent tree-ring dates for the cliff dwellings that show that they were occupied for no more than 50 years, all artifacts can be assigned to the period from A.D. 1250 to 1300.

This period, the Tsegi Phase of the Kayenta tradition, has one of the best assortments of technological materials of any prehistoric phase in the world. Materials used in Tsegi Phase technology (Table 1) show the advantage of such dry cave sites for preserving a good representation of prehistoric cultures. Of 273 artifact classes, 78 percent are of perishable plant and animal materials and only 23 percent of materials (stone, pottery, horn, and bone) which would ordinarily be preserved in an open site.

Hopi Culture and Analogic Interpretation

For analogic interpretation of this well-preserved material, we can use the culture of the Hopis, whose villages lie about 55 miles (90 kilometers) south of Tsegi Canyon. Although the Kayentans abandoned Tsegi Canyon by 1300, they have persisted on the southern rim of Black Mesa until the present day. One Hopi village, Oraibi, is well known for its long occupation, extending back to A.D. 1100 or earlier.

Anthropological descriptions of Hopi

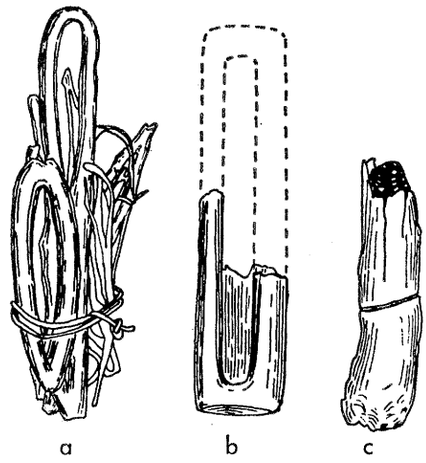

Fig. 5. Artifacts of specific known use. (a) Loom anchor; (b) feather box; (c) pipe lighter.

culture abound in the literature. Protected by isolation from Spanish missionizing and conquest that did much to change Pueblo tribes to the east in New Mexico, the Hopis preserved much of their original culture. In recent decades, education, wage work, technological borrowing, and increased communication with modern American culture have made marked changes in Hopi culture, but basic elements remain. The traditional economy based on hand-tilled gardens of desert corn persists, and most Hopis still live in masonry pueblos (cover photo), though some villages include modern houses. Although social organization is no longer as strictly structured as in the past, Hopis retain the elements of a tightly integrated social system. Membership in family, village, and clan defines rights and obligations within and among villages. Reinforcing and facilitating these social relations is the highly organized religion, well known to anthropologists and tourists, which centers on the cult of masked dancers representing supernatural beings called *Katchinas*. While the expressed purpose of Hopi ceremony is to bring rain, cure illness, and promote the general welfare, religious organization and ritual include a system of roles and expressive devices that have probably contributed more than any other elements of Hopi culture to its continuity and smooth functioning village life (*3*).

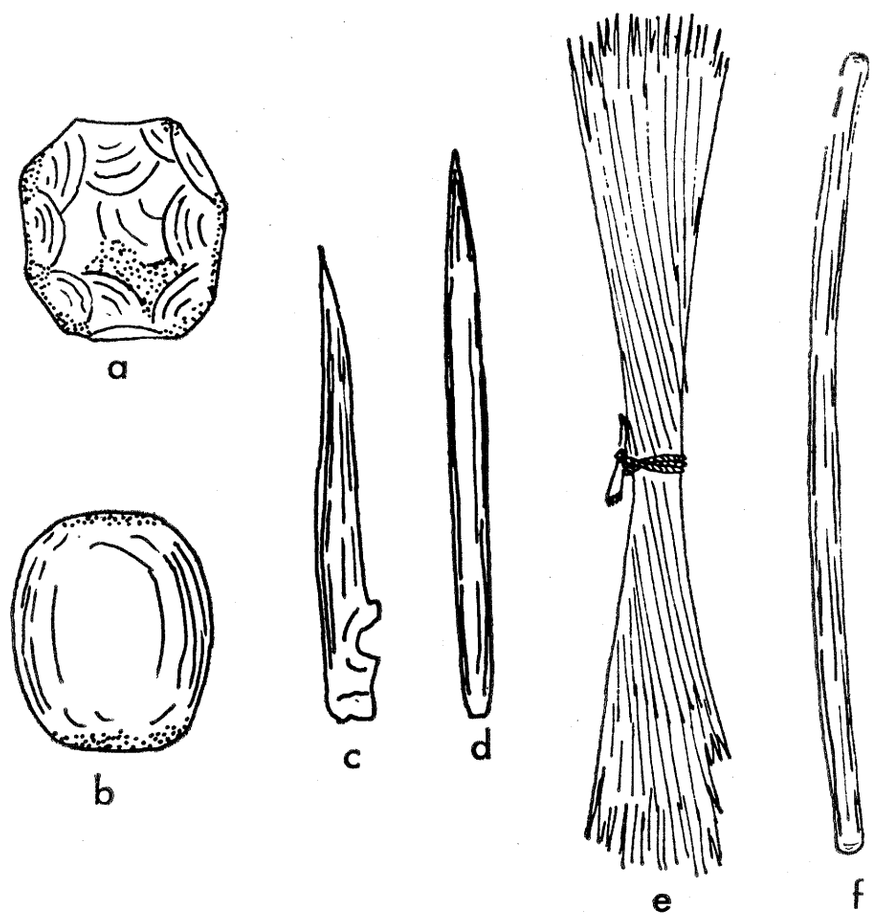

Fig. 6. Multipurpose artifacts. (a and b) Hammerstones; (c) bone awl; (d) wooden awl; (e) grass brush; (f) wooden dowel.

Hopi Culture and Ethnographic Comparisons

Data on Hopi culture used for interpreting artifacts from the Tsegi Phase come from ethnographic descriptions, small collections of Hopi crafts, and responses of Hopi informants who were shown the prehistoric collections. The most copious records of Hopi technology come from the late 1800's and early 1900's, from observations made at a time when American anthropology was in its infancy. Hopi technology was frequently observed and recorded by early ethnographers, but prime emphasis was on the exotic aspects of Pueblo ceremony. Descriptions of artifacts are often incomplete and lack adequate illustrations. Nevertheless, it is possible to find in these reports a number of items analogous to prehistoric artifacts.

Direct identifications came from showing artifacts to Hopi informants. They were asked to identify items that they recognized, and this usually resulted in short discussions of use and cultural context of the objects. Time for response was limited, since a large quantity of artifacts was displayed, and the informants had come away from the village to view the objects. Consequently, there was no opportunity to compare them with presently used items. This use of informants could not be called sophisticated ethnographic technique, but was an introductory attempt. Nevertheless, worthwhile results were obtained, and this experiment indicated what might be achieved with more thorough and systematic questioning, following the pioneer study of Ingalik material culture by Osgood (*4*). Questions used to obtain information on primitive technology must be as carefully prepared as those used to obtain data on social structure or ritual. It does not suffice merely to ask "what is this," because this fails to communicate the information desired. If possible, one should witness demonstrations of how the object is made and used. Failing this, thorough questioning and discussion should be directed toward eliciting as complete information as possible.

Some examples of questions follow. What kind of material is used? Are alternative materials acceptable? Why is such material used? What are the steps of construction? What kind of tools are used? Who makes the object? Who uses it? What other items are used with it? Where is it stored? What happens when it wears out? Who owns it? Is there more than one kind? If so, which is

best? Why? When during the year or day is it used?

Such a list of questions should result in enough information to allow full comparison of the ethnographic object with its prehistoric analog. Only such data can permit confident assessment of the analogy.

Often identification of artifacts depended on only one source of ethnographic information—books, or responses from informants or Hopi collections—but in some cases it was possible to compare data from more than one source to provide verification or contradiction of the original identification. Occasionally, too, it was possible to compare ethnographic data with information from archeological context, although the field records were often inadequate. One of the rare cases when informant response, ethnographic literature, and archeological association combine to provide identification of an object is the feather box shown in Fig. 5. This incomplete wooden box, made from an oval cross-section tube with an opening in the side, was identified by two Hopi informants as a repository for feathers used in ceremonial regalia. An almost identical ceremonial feather box is illustrated in an early ethnographic account of the Hopi (*5*). The specimen contained no feathers when it was found, but its ceremonial context is confirmed by archeological association since it comes from debris which very likely originated from a Tsegi Phase kiva, or ceremonial room.

In a few cases, contradictory evidence comes from different sources and leads to inconclusive identification, or requires a choice from two or more alternatives. Contradictions in identifications by various informants often gave insights into the basis for their interpretations. In some cases they were viewing objects unfamiliar to them, and they relied on common sense as much as the archeologist would. This was generally true in the case of objects which have stone components. Stone technology has been much reduced among the Hopi since the introduction of metal tools, and identification of stone arrowheads, knives, and axes by Hopis is not based on current use. In some cases, archeological context directly contradicted the informant's response. An item tentatively identified as a medicine bundle by Hopis (Fig. 5a) is unquestionably an anchor to attach a vertical handloom to the floor. Such loom anchors have been found numerous times in place in archeological sites, and their use is well established. This kind of anchoring device is no longer used by the Hopis, and its identification as a medicine bundle came from men who are accomplished weavers. Such incidents make it clear that informants' identifications must be carefully considered before being accepted. Often Hopis saw analogies between prehistoric items and their own culture that were based on vague or insufficient similarities. In one instance a dished wooden tablet measuring 19.8 centimeters by 7.4 centimeters by 1.0 centimeters was tentatively identified as a cover for a feather box, such as the one shown in Fig. 5b. While the form of this tablet is generally appropriate for such a cover, it is too large.

Table 1. Materials used in Tsegi Phase technology.

Material	Artifact types	
	Number	Percentage
Stone	35	12.8
Pottery	12	4.4
Wood	142	52.0
Other plants	53	19.4
Cotton cloth	5	1.8
Hide and sinew	7	2.6
Horn	3	1.1
Bone	12	4.4
Hair and fur	2	0.7
Feather	2	0.7

Success in Identification

In Table 2, artifact classes of the Tsegi Phase are listed on the basis of identification by (i) form and general analogy, (ii) archeological association, and (iii) identification by Hopi informants or reference to ethnographic reports or collections. Most of the informants who observed the artifacts were middle-aged or elderly men whose memories of their culture reach beyond the last few decades of rapid change. Because Hopi society is on a relatively small scale and members rarely possess esoteric knowledge except about ceremony, one might expect the technological knowledge of one person to be much like that of another. This is not necessarily true. For example, many weaving materials were identified because two of the informants were practiced weavers. Some weaving implements drew no response from other informants.

From 273 classes of artifacts, 62 are identified on the basis of ethnographic analogy, 48 are interpreted by form and general knowledge, and 10 are identified by archeological association. This makes a total of only 44 percent of all artifacts whose use could be determined. The balance, or 56 percent of the artifacts, comprises 153 unidentified classes of which many are represented by incomplete specimens.

In a number of cases there are simply no reasonable analogies for prehistoric artifacts in historic Hopi culture. This is understandable, since culture change between A.D. 1300 and A.D. 1900 must have caused the loss of some elements of culture. Pottery, baskets, clothing, and multipurpose tools lost most or all of their cultural significance due to disappearance or change during this 600-year span. Many of these items were replaced by European or American implements. Some basic crafts—

Table 2. Types of activities inferred from Tsegi Phase artifacts and the basis of inference.

Cultural use	Interpretive basis		
	Form and general analogy	Association	Specific ethnographic analogy
Horticulture	2		2
Weapons	2		5
Hideworking	2		1
Stoneworking	2		1
Woodworking	2		2
Fire tending	1		3
Burden carrying			2
Food preparation		1	7
Pottery containers	5		1
Baskets	3		1
Bags	3		
Pottery making		1	3
Basketmaking	1		2
Clothmaking	2	2	11
Clothing	9		1
Multipurpose	7	3	2
Miscellaneous	3		3
Smoking			2
Musical instrument			1
Games	2		5
Ceremony	2		7
Burial		3	

hideworking, stoneworking, woodworking—were recently lost or modified; hence comparative data for these activities come only from ethnographic records dating from around the beginning of the 20th century.

Ethnographic identifications are often limited by lack of accuracy of description in the literature, or by limitations in informants' knowledge. Frequently, prehistoric artifacts can be tentatively identified from brief descriptions or sketchy illustrations in ethnographic reports, but this information is usually too vague to provide certain identification.

Even with the relatively low percentage of positive identifications through ethnographic analogy, use of Hopi informants and the ethnographic literature produced some surprising insights into the general problem of interpretation of artifacts. One of the most interesting was comparison of naive interpretation, based on formal characteristics and common sense, with an ethnographic identification. An example is an object from Keet Seel pueblo made of a hollowed-out branch or root, 12.7 centimeters long and 2.5 to 3.5 centimeters thick, with a small piece of charred corncob inserted in the open end (Fig. 5).

Encircling the center of the tube was a thin crooked groove, and trapped in the hollow branch were two juniper berries. The feature of this item that impressed Anglo-American observers was the presence of the berries which rattled softly when the object was shaken. This led everyone to call the object a rattle. But when it was shown to Hopi informants their attention was immediately drawn to the small piece of burned corncob. The consensus of the informants was that the specimen had been used as a lighter for ceremonial pipes, and that the slow-burning corncob was left alight in a ceremonial room during ritual occasions so that it could be used anytime during the day. This charring had been considered a result of fire in the ruin by the writer and other archeologists, but a review of the ethnographic literature confirmed the Hopi identification. Logical analysis of form depends as much on perception of the object, which is conditioned by cultural background, as by any universal principles. In retrospect, the use of this pipe lighter might have been more closely approximated without ethnographic analogy, if the collection had included a series of charred-end specimens from different sites, or from different locations within a single site. This would have indicated that the charring was a significant feature of the artifact, but it would not have shown specific use, unless chance had left the lighter in association with a pipe.

The aim of interpretations of artifacts is reconstruction of as much of the prehistoric culture as possible. The Kayenta-Hopi case exemplifies the problems of interpretation and cultural reconstruction, and indicates that even if we view prehistoric artifacts solely in their utilitarian roles, for modifying the physical environment, reconstruction of culture will be less than complete. Not only are we limited by imperfect preservation of artifacts, loss of cultural significance through time, error of the informant, inadequate samples, lack of data on association, or inadequate ethnographic record, but also the nature of the artifacts may be such that their use may never be exactly determined. Such are the "multipurpose" tools included in Table 2. These are objects sufficiently generalized in form and physical characteristics to have had a number of uses (Fig. 6). Hammerstones—pebbles or stone cores with battered ends or faces —were probably used to shape other stone objects but could also have been used to crush or fracture bone, wood, or plant materials. Bone and wood awls are piercing tools, but ethnographic analogy indicates they could have been used to punch hides, to pierce basket walls to make holes for the weaving splints, to separate warp threads to aid in handweaving, or to pierce corncob stems before the corn was hung to dry. Brushes of grass or the yucca plant were used by Hopi women to comb their hair, to sweep the floor, to scoop up ground meal, and to strain food coloring.

One of the most common items in the Tsegi Phase collections, a shaped, worn-end wooden dowel made from a cut branch, was simply shrugged off by informants because, as one observed, "how many things can you use a stick for?" To attempt to reconstruct a more specific set of uses for such items is not only impossible for an archeologist, it would probably be difficult for an ethnographer. Knowledge of the systemic relations between components of technology and the rest of culture is necessary to make inferences concerning the use of particular artifacts. However, there are limitations to the exactness of a systemic model.

Conclusion

Archeologists are far from exhausting the resources of inference about man's prehistoric past. With careful and logical consideration of physical features, archeological associations, cultural and natural context, and use of ethnographic analogy, we can greatly increase knowledge of past cultures. As the Kayenta-Hopi case shows, we can never expect neat reconstructions. Even under the best of circumstances we must be content with statements of probability, gross purposes, and flexible performance of tasks, since we will never have complete knowledge of the total cultural context of prehistoric technologies. We are limited, as well, by the nature of our subject. Prehistory is, after all, the indirect study of human behavior, which is inadequately represented in a rigid and stereotypical cultural scheme.

Careful analysis and comparison of archeological remains, the use of rigorous analytical techniques, and statistical manipulation may lead to precise definition of significant and comparable technological elements. However, these techniques do not by themselves interpret prehistory. Such interpretation depends on ethnographic analogy. A number of existing societies still preserve primitive technologies analogous to prehistoric cultures, but they will not exist for long. The study of extant primitive technologies, conducted with the same rigor and care now given to social systems, is one of the most critical needs in anthropological science.

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