

The New Archeology: Toward a Social Science

Archeology has traditionally been considered a branch of the humanities by some of its practitioners, and as such has derived part of its inspiration and methodology from classical scholarship. Other archeologists, especially in the United States, have considered their work to be closely related to anthropology. But a new generation of archeologists has adopted a more explicit model; these new archeologists have been trying to develop what they think of as the science of archeology. Their research efforts are designed to go beyond the stylistic characterization and historical reconstruction of ancient culture which is typical of traditional archeology. Instead these archeologists are interested in using the past as a laboratory for the analysis of social and cultural process, in the hope of gaining a better understanding of human behavior and cultural change.

The trend toward a modern social science is most clearly evident in the methodologies of the new movement—including careful research design, randomized data sampling, statistical analysis, and modeling techniques—which while common in a field like sociology are radically new for archeology. Despite a decade of intensive activity, relatively few research results have been reported yet by practitioners of the new archeology because of the time and manpower required for the extensive analysis from which implications about human behavior are inferred. But the trend in archeological research clearly seems to be in the direction of increasing study of the economic, sociological, and behavioral evidence contained in the archeological record.

Although the new archeology is becoming widespread in many countries, it began as a small movement in American archeology. James Deetz, now at Brown University, is credited with one of the first studies to emphasize the anthropological dimensions of archeological data. Deetz showed that the reduction in the degree of patterning in ceramic design among the Arikara Indians in South Dakota during the 18th century corresponded to the break-up of extended family units and the greater mobility of women. Since women were the potters, the disruption

of the previous tightly knit units meant that mothers could no longer pass along a consistent set of designs to their daughters as easily as they once had.

The point emphasized by Deetz in his study and by others is that the patterning in the physical artifacts is indicative of the behavior of those who made and used them and can be used to infer changes in that behavior. But the analysis of the relationships among artifacts in detail sufficient to document such inferences is demanding work; in Deetz's study more than 2000 pieces of pottery were studied and the degree of association between stylistic elements was statistically tested period by period with the aid of a computer. Whether such detailed analyses and the deductions based on them are worth doing or can be accurately done, given the complexity of the archeological record, is the subject of some disagreement among archeologists. Many established archeologists of an older generation have not accepted the new approach and have criticized behavioral inferences as speculative and unprovable. However, one of the more outspoken and influential proponents of the new archeology, Lewis Binford of the University of New Mexico, has insisted that archeology can in fact be science, that it has almost never been performed as a science, and that it can make a major contribution to the understanding of cultural processes only if it becomes a science (1).

New Notions of Culture

The divergence between the traditional and the new archeologists originates in part in different theoretical views of the nature of societies and culture. Traditionally, culture has been thought of by some anthropologists as a set of shared norms, and patterns in the type and distribution of physical artifacts have often been taken as a measure of cultural affinity reflecting those norms. More recent notions of culture—influenced in part by the structural-functionalist social theories of Leslie White and A. R. Radcliffe-Brown—have emphasized that they are not homogeneous entities but are composed of many closely interrelated subsystems.

Hence the questions that the new archeologists raise have to do with the organizational and behavioral aspects of past societies as well as their technological and stylistic features.

These theoretical differences are also reflected in the more complicated view of causality adopted by the new archeologists. In their view, human interactions with their environments and with each other are rarely so simple that chronological succession can be equated with causality. Thus the idea, for example, that the use of irrigation led to the rise of the political state in early agricultural societies would be regarded with suspicion. More convincing explanations, they believe, can be inferred from the archeological record when it is examined for evidence on policies and cultural practices, not just events.

The alternative concepts of culture lead to divergent methods of doing archeology, both in the way in which data are collected and in the techniques of analysis that are used. An investigator who views culture as a set of shared norms and hence expects homogeneity of pottery styles and architectural forms at a given site will excavate in a manner rather different from that of one who is concerned with the organization of the extinct society and is looking for evidence of how its varied inhabitants interacted, as William Longacre of the University of Arizona pointed out in a recent survey article (2). To a traditional archeologist, for example, the style of a piece of pottery might help indicate the values, ideal forms, and development of a civilization while to a new archeologist the same piece of pottery would be of more interest for what it, in relation to other pieces, could tell him about the changing group behavior—from marital patterns to the growth of the size of the community—of the people who made it.

Choosing specific problems, testing explicit hypotheses, and collecting data in accordance with statistical sampling techniques characterize the new archeologists' approach to research design. Relying on the intuition of the investigator, they believe, has in the past sometimes led to untypical samples and

skewed distributions of artifacts that can bias statistical treatment of the data. At a site in southern Illinois, for example, where previous investigations had failed to find remains of houses in all but the most recent time periods, Binford showed that the investigator's expectations can strongly affect site selection. He found that previous excavations had been made where the highest density of broken pottery was located, and that housing remains were located at the periphery of the site.

One advantage of prearranged research plans and explicit hypotheses is that details whose significance might be missed are more readily noticed. In a recent investigation of room use in southwestern pueblos, for example, James Hill of the University of California at Los Angeles and Richard Hevly of Northern Arizona University at Flagstaff decided to map the distribution of fossil pollen on room floors. They hypothesized that pollens from storage rooms would differ from those of ceremonial chambers or living quarters. The analysis of the pollen samples collected during the excavation showed that pollen could be used as an indicator of room function, relative dates, and groupings of activities within the community.

Quantitative Analysis

Practitioners of the new archeology emphasize quantitative methods of analysis, often using the computer both to plot large numbers of artifacts and to perform elaborate statistical analyses of the data. Martin Wobst of the University of Michigan has developed computer programs that allow the back-plotting of artifacts in three-dimensional coordinates; objects excavated from surface layers can be correlated with objects from older and deeper layers of the site, or artifacts from a given strip can be projected onto a vertical plane, so that pits or other disturbances in the site that were not apparent during the excavation can be detected.

Statistical techniques are widely used. Correlation analyses between the distributions of different artifact types often help to point out those that are functionally associated, and plots of the groups thus identified may enable the investigator to estimate the density and size of a community. Techniques such as the nested block analysis of variance method can test whether an artifact type is concentrated in one part of the site. Other tests can isolate

randomly scattered artifacts from clustered groups, and thus provide clues about their functional usage and about community structure. The development and application of these techniques by Robert Whallon, Jr., of the University of Michigan to sites in Mexico and France has allowed the determination of prehistoric activity patterns; activity areas within these sites were found to be functionally and sometimes even seasonally distinct, as indicated by plant remains that are specific to particular seasons.

Systems analysis techniques are being used by a group headed by Kent Flannery of the University of Michigan in a study of the beginnings of agriculture in the Oxaca valley of Mexico. Canal irrigation apparently began around 500 B.C., and state organization seems to have been reached between 100 B.C. and the year A.D. 1; the two processes appear to have gone hand in hand, according to Flannery, and there is no evidence that one caused the other. By documenting the processes in detail, the archeologists hope to understand why these Indians began conscious food production and changed from a nomadic to a sedentary life style. Ultimately the archeologists, who have been working in this area since 1966, hope to understand the beginnings of social stratification and the rise of the state by simulating developments over a 2000-year period.

Another example of the use of simulation models in archeology is a recent study of Ezra Zubrow of the University of Arizona. From a model of resource availability, he predicted population growth and movement within a particular valley; then the simulated population growth curves and settlement distribution patterns were checked by conducting an archeological survey of the area. Although not all of the predictions were accurate, the experiment served to focus attention on critical variables and increased the understanding of the observed settlement patterns.

Somewhat different techniques are being used by Longacre at a prehistoric pueblo called Grasshopper, in Arizona. The study concerns the behavior of human populations under stress, especially environmental stress, a problem that Longacre thinks is at the root of the evolution of culture in the southwest. In the period between A.D. 1250 and 1400, after centuries of communities of about 100 people, the pueblos suddenly grew to communities of well over 1000 people. Environmental con-

ditions were apparently very rough during this period, which Longacre thinks was one of the selective factors leading to aggregation.

Longacre and his associates are trying to pinpoint the nature of the growth during the peak period by tracing out the remains of walls and establishing where and how they joined onto adjacent rooms. From the comparison of pollens and stylistic attributes of artifacts from cemeteries with those found on room floors, the archeologists also hope to understand the social groupings of the pueblo. The Arizona group has identified three units that started out separately and grew by the addition of small units. Longacre expects, however, that it will take another 10 years to complete the analysis.

Many new archeologists believe that the character of archeological research is changing rapidly. Increasingly, for example, they think that archeological research publications will consist of reports on problems which may involve evidence from several sites, rather than the traditional site report. Stewart Struwer of Northwestern University has noted that the organization of archeological research will have to change from an approach based on the individual scholar to large interdisciplinary teams if the ambitious problems set out by the new archeology are to be solved. An example of this trend is the Southwestern Anthropological Research Group, an organization formed in April of more than 20 archeologists who have agreed to work cooperatively for a 10 year period on the general problem of why people live where they do.

One impediment to these changes is that archeological research is funded largely on a project rather than a program basis, and Binford notes that it is still easier to get money for excavation than for analysis of data. Nonetheless, the new archeology offers the hope that the perspective of man's past can increase the understanding of cultural change.

In addition to the new questions and new methodologies that are being attempted in archeology, improved dating techniques and new physical instrumentation are being used by old and new archeologists alike. These new tools for archeological research will be the subject of a later article.

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References

1. L. R. Binford, *Am. Antiquity* 28, 217 (1962).
2. W. A. Longacre, in *Bull. Am. Anthropol. Assoc.* 3 part 2, 126 (1970).