ing and data-analysis system with feedback features, making it a true self-experimenting system." Sentencing, for example, "could be considerably improved by computerization." Myths would be replaced by hard facts. We could then ask if the system is doing what we want it to do.

Konečni and Ebbesen see their position as unlikely to be influential in legal circles. "Legal Luddites" benefit from the status quo and are afraid of social science; prosecutors, defense lawyers, and judges "share similar values and distrust of applying scientific procedures to the law."

What can one who is properly, but not unduly, skeptical of the claims of both lawyers and social scientists gain from these books? They should be read together to gain the full flavor of their differences, and such a consideration of them offers much to ponder. Though we claim "a government of laws and not of men," the reality is discretion at point after point in the criminal justice system. Though we honor individual rights, the reality is mass processing, which almost inevitably turns discretion into rules of thumb. Witnesses can be mistaken and jurors can be biased. All actors in the system, in some measure, respond to self-interest. Many legally trained people want to play by ear, making use of what they call common sense rather than rigorous logic.

Nonetheless, both books can be questioned. Both suffer from having a psychological perspective that tends to underplay broader structural factors. The more traditional research reported in the Kerr and Bray book often fails to reflect operations of the total legal system. For example, a great deal of research by psychologists shows that eyewitness testimony may be unreliable. Undoubtedly the risk is real, and this research has prompted more care by police and more challenges from defense lawyers. Yet, as Wallace Loh has stressed (79 *Mich. L. Rev.* 659 [1981]), showing the fallibility of witnesses in a laboratory does not establish that lawyers engaged in plea bargaining or jurors making decisions are often misled. Moreover, jury studies seldom deal with the impact of socialization to the role or with the responsibility of deciding to send someone to jail. Perhaps more important, most criminal cases are diverted to juvenile procedures or plea bargaining. Those tried before juries are likely to be special. Yet unless these special kinds of cases are presented to experimental juries we may learn from simulations only how a jury might react to a type of case that a jury would never see. Finally, police often are under pressure to make certain kinds of arrests and not others, lawyers need to make a living and most criminal defendants cannot pay high fees, public defenders face heavy work loads, prosecutors are elected and need to win cases to guard their reputation, and judges need to keep their dockets moving and may be reluctant to send a convicted defendant to an overcrowded prison. Few of these considerations are recognized in research by psychologists, but there is reason to think they influence a great deal of what happens.

The essays in Konečni and Ebbesen also fail to recognize that what happens at one point in the system may influence and be influenced by what happens at other points. For example, police may not make an arrest if they think that prosecutors will not push for adequate sentences, judges will be too lenient, or parole boards will let out those convicted too soon. Sentencing hearings may usually be purely ceremonial, but they offer a chance to spot mistakes so often associated with mass processing or to add information relevant to the rules of thumb that guide the recommendations of probation officers. The chance that they could be embarrassed at these hearings may itself prompt probation officers to be more careful in making recommendations. Moreover, if prosecutor, defense lawyer, and probation officer all have done their jobs before the hearing, there may be little left to say. If judges seldom accepted the recommendations of probation officers and if hearings were points of decision-making, the system would not be working well.

Konečni and Ebbesen's view of the boundaries of the criminal justice system seems too narrow. Their model reflects the statute book and omits the press and television, elites in the community, the bar, and those involved in politics. Prosecutors, for example, court the press in trying to build and protect their reputations. The powerful can sanction police who too zealously enforce certain laws. Judges, too, are often elected and respond to pressure to crack down on crime. The rituals of the system may help legitimate both the law and society. At least some of those not directly involved with the criminal justice process may be reassured that something is being done about crime and that what is being done is fair.

Legal rules and processes, dismissed by Konečni and Ebbesen as ritual, may be our only insulation from politics and power, protecting whatever rationality and fairness there is in the system. The usual complaint against judges and lawyers is not that they are redundant but that their concern with due process and the rights of the accused makes the system inefficient. Perhaps the increased availability of public defenders, the innovations of the Warren court directed at police behavior, and the coming of due process to prison discipline have also proved to be empty rituals, swallowed up and transformed by the criminal justice system. But one reading Konečni and Ebbesen would be unaware of the great changes in rules and processes of the past 25 years. To agree that decisions in the system are not determined by legal rules is not to accept that doctrine has no influence. A broader focus might have suggested the need to account for the impact, if any, of these developments.

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Political Developments in Prehistory

The Transition to Statehood in the New World. Papers from a conference, Clinton, N.Y., Jan. 1979. GRANT D. JONES and ROBERT R. KAUTZ, Eds. Cambridge University Press, New York, 1981. x, 254 pp., illus. $27.50. New Directions in Archaeology.

The 15th of April has just passed as I write this review, and most Americans have dispatched their annual tribute to representatives of our administrative chiefs. Taxes have not always been as certain as death. They are a product of comparatively recent political centralization that has a history covering only a small fraction of the archeological record.

This volume is a collection of papers that examine the general problem of political centralization and focus on archeological data from the New World. Jones and Krautz provide an admirable introduction. They review the venerable problem of definition of "the state,"

summarize and partially synthesize the disparate views of individual contributors, and present their own views on the potential role of ideology in the process of state formation. The succeeding chapters are grouped by their emphasis on political, ecological, or ideological variables.

A number of the authors contrast consensus and conflict models of political centralization, the former emphasizing positive integrative functions of hierarchy, and the latter focusing on forced dependency. The contrast is somewhat distorted here, as consensus often seems to imply a rapturous, if unlikely, embrace of dependency and exploitation whereas conflict evokes a population dragged despite valiant struggle into the *same condition*.

Robert L. Carneiro, who is very much of the Sturm und Drang school of state formation, provides an extensive discussion of chiefdoms as precursors of states. Chiefdoms, according to Carneiro, are multiple community systems under the permanent control of a paramount chief. They thus typically have two-level control hierarchies that are less vertically complex than those of states.

Carneiro considers the appearance of chiefdoms, the transcendence of local autonomy, to have been a critical qualitative transformation. He reviews models of chiefdom origins and rejects technological innovation, ideological determinism, social status differentiation, and control of matériel pooling and redistribution as causal processes.

Carneiro generates chiefdoms using the same mechanism he used in his influential model of state formation—warfare. Increase in population density within environmentally or socially circumscribed areas leads to competition for land, warfare, and multiple community systems through either conquest or defensive aggregation. Carneiro does not see the absence of evidence for warfare as hindering the use of the model, as he notes that simple threat of hostilities may be enough to generate chiefdoms. This makes empirical evaluation a bit more difficult.

Neighborly dispute is pervasive in human societies and was undoubtedly important in particular cases of chiefdom development. I doubt, however, that the population-growth–circumscription–competition model describes a general historical process for the transition to either chiefdoms or states. Societies at a given level of development seem to have many more similarities in organizational structure than they do in specific historical trajectories.

Jonathan Haas and Carneiro share an emphasis on conflict but disagree on its source. Haas sees intra- rather than intersocietal conflict as the key to state formation. Governments develop to forcefully suppress the active hostility of the economically exploited majority of a population in a stratified society.

Haas examines the archeological record of Mesoamerica and the Andean region for evidence of economic stratification, class conflict, and centralized application of force. Despite some measurement problems such as taking a nonuniform distribution of access to resources as evidence of stratification, he concludes that he cannot reject the presence of these phenomena in what others have called early states.

Few would deny that early states were economically stratified, that conflict of interest existed among strata, or that negative sanctions were employed by ruling elites to ensure social control. The problem is one not of the existence of these phenomena but of their relative magnitudes, interrelationships, and causal importance. It increasingly appears that the coercive ability of early states was less than many have thought and that social control was more a product of the creation of relationships of general dependency on the operation of administrative hierarchies.

Mark N. Cohen extends his earlier work on the origins of agriculture to consideration of political centralization. His general position parallels that of Carneiro. Post-Pleistocene population growth led to saturation of the environment, restriction of mobility for hunting and gathering, decrease in the reliability of wild resources, and finally sedentarization and food production. Cohen then details a variety of new system constraints, prominently increased vulnerability to short-term fluctuations in agricultural yields, that would favor political centralization in part as an ecological and social buffering mechanism.

Population growth was undoubtedly a precondition for the emergence of complex societies. There seems, however, to be a great deal of variability in the size and the population-to-resource ratios of early complex societies. This suggests that centralization may be less articulated with resource availability than many would have us believe. Cohen briefly addresses this problem by noting that, once sedentarization had occurred, centralization may have been due to locally varying processes independent of continued population growth or pressure. He suggests that differences in the degree of centralization achieved by early complex societies may be attributed to essentially stochastic variation within the more general centralizing process. This absolves him from accounting for specific cases of state development.

The tendency of archeologists to ascribe residual variability to the operation of stochastic processes markedly narrows the gulf between our theoretical aspirations and our analytical achievements. Most scholars would probably prefer to wait a while before relegating state formation to the realm of random events.

Cohen sees his population growth model as general and evolutionary in contrast to other recent approaches that he rejects as particularistic and historical. A number of these alternatives focus on the general properties of hierarchically structured systems rather than seek case-to-case similarities in demographic history, exchange systems, productive technologies, and the like. Proponents of such views, perhaps most notably Kent V. Flannery, will be surprised to learn from Cohen that they are historical particularists.

Richard S. MacNeish has materialist credentials equal to those of Carneiro, Haas, and Cohen but a very different approach to the problem. His chapter stands apart in giving the reader a better appreciation of the complexities of the archeological data base than do the others in the volume. He presents a detailed consideration of reconstructed culture histories from Mesoamerica and the Andean area, with asides on the Near and Far East. MacNeish find these sequences to be sufficiently similar to be divisible into 12 developmental phases. Though his culture histories are likely to elicit comment from other regional specialists, it is interesting that the similarities he finds are more convincing for the structure of settlement systems than for the specific historical processes generating them.

The last three chapters in the volume address the potential role of ideology in the development of complex societies. Michael D. Coe makes an eloquent plea for more explicit consideration of religion in conjunction with the usual social, political, and economic variables. He makes a case for significant pan-Mesoamerican religious parallels and provides an outline of this system based largely on the Aztec belief system at the time of the Spanish Conquest. He then shows how specifics of the historical record are un-

derstandable in an ideological context. The most famous example, of course, is the Aztec reception of the Spanish under Cortés, whom they took for good iconographic reasons to be the returning god Quetzalcoatl. Coe makes the particularly interesting observation that the first real iconography in Mesoamerica was directly associated with early social stratification. Certainly, legitimation of hierarchical position was an important issue in early complex societies; one that involved necessary ideological transformations. How such transformations might be achieved is both important and poorly understood.

Richard W. Keatinge sees religion as providing a mechanism for manipulation of populations in emerging centralized systems. He draws an example from Peru, where the spread of ideological elements associated with the Chavín art style over much of the region may have been important in generating relative ideological uniformity that facilitated expansion of the later Inca empire.

Finally, David A. Freidel takes a more ambitious position in arguing that it is "cultural reality," systems of belief, that structures social action. He provides a detailed and interesting case for the association of sociopolitical and ideological variability over both time and space in the Maya area. Freidel's and related work makes it increasingly clear that the material expressions of ideology reflect the storage, transmission, and manipulation of information that may be critical to processes of stability and change in societies of all degrees of complexity.

It is interesting that several contributors remark upon the apparently discontinuous and rapid change that often characterizes the development of complex societies. This suggests the presence of threshold values for significant alteration of systems already far from equilibrium. We might do well to begin consideration of such concepts as dissipative structures in our search for general theory of the evolution of social systems.

The reader will have detected that I disagree with a number of the perspectives presented in this volume. While the presence of so many conflicting positions on state formation reflects more on our ignorance than on our theoretical sophistication, it also indicates intense interest and activity that promise progress on one of the central problems of archeology.

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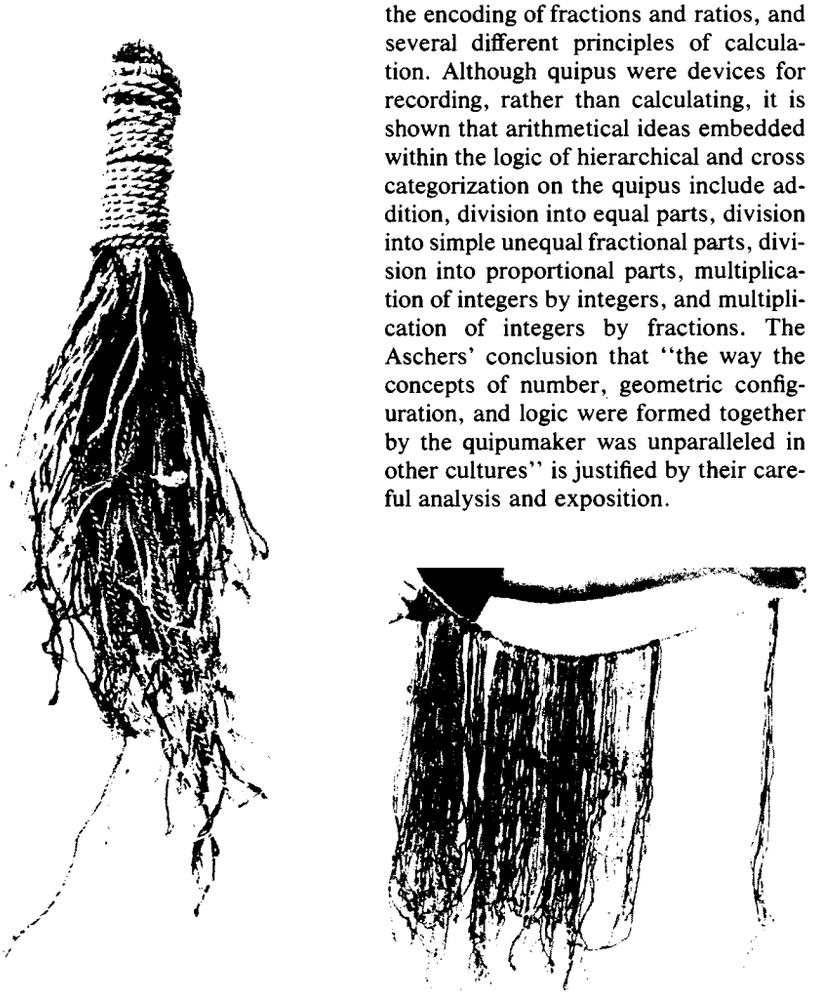
Inca Encodements

Code of the Quipu. A Study in Media, Mathematics, and Culture. MARCIA ASCHER and ROBERT ASCHER. University of Michigan Press, Ann Arbor, 1981. x, 166 pp., illus. Cloth, $18.95; paper, $8.95.

There are several characteristics that make the Inca empire unique in the history of states and empires. One distinguishing trait, it has traditionally been thought, is that it did not develop a system of writing. One of the principal contributions of Marcia Ascher and Robert Ascher's book *Code of the Quipu* is to argue convincingly that the Incas did, in fact, have a form of writing, embedded within a more general recording system based on several complex numerical-logical concepts. The system utilized pieces of wool and cotton string called quipus ("knots"). Information drawn from a wide range of contexts, such as censuses, accounts of stored products and tribute collected, and even oral histories and myths was encoded by the positioning and coloring of secondary and tertiary strings appended to a primary cord and by the arrangement of knots along these strings; Inca writing was therefore a three-dimensional system in which information was recorded by tracing figures in space with pieces of string.

To concentrate on writing in a review of *Code of the Quipu*, however, is not to accurately represent the principal focus of the book, for the Aschers are primarily interested in describing how quipus were used for recording numbers, by means of a base 10 positional system, and in establishing the place of quipus in the history of mathematics; in these goals they succeed admirably. The book is remarkable in its clear exposition of Inca and Western mathematics and in its careful exploration of the implications of mathematical concepts in the broader context of Inca culture.

There are several important numerical principles discussed throughout the book. These include the principle of position (which is central to the coding of information in quipus), the concept of zero (which the Incas had), evidence for the encoding of fractions and ratios, and several different principles of calculation. Although quipus were devices for recording, rather than calculating, it is shown that arithmetical ideas embedded within the logic of hierarchical and cross categorization on the quipus include addition, division into equal parts, division into simple unequal fractional parts, division into proportional parts, multiplication of integers by integers, and multiplication of integers by fractions. The Aschers' conclusion that "the way the concepts of number, geometric configuration, and logic were formed together by the quipumaker was unparalleled in other cultures" is justified by their careful analysis and exposition.



A completed quipu, shown rolled and unrolled. [From *Code of the Quipu*; quipu from the collection of the Smithsonian Institution]