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Monumental architecture: a thermodynamic explanation of symbolic behaviour

Bruce G. Trigger

Since 1945 many neoevolutionary social scientists have sought to explain human societies as thermodynamic systems (White 1949; Cottrell 1955). Usually in processual archaeology this has taken the more restricted form of ecosystemic analysis (Steward 1955; Binford 1962; Clark 1989). Full-blown thermodynamic approaches continue to be sustained (Adams 1988; Tainter 1988; cf. Ellen 1982: 117). Yet a growing realization of the limitations of neoevolutionism and cultural ecology to account for the diversity of human behaviour and of the contingent aspects of cultural change has given rise to a renewed emphasis on cultural relativism. There is also an increasing suspicion of economic rationalism by those who view it as embodying an unacceptable level of ethnocentrism (Hodder 1982: 93–116). The more extreme post-processual archaeologists deny that any culture can be understood other than on its own terms, since each one is a closed system of meaning that can only be comprehended hermeneutically (Shanks and Tilley 1987a, b; cf. Benedict 1934). Post-processualism has also encouraged a renewed interest in idealism and a tendency to reject materialism as a flawed or erroneous approach to understanding culture (Hodder 1986: 18–25).

It is not my intention to defend a narrow cultural ecological approach which limits itself to explaining cross-cultural regularities and ignores the diversity that is evident in human behaviour. Yet rejecting ecological determinism as a valid explanation of all aspects of human behaviour does not prevent a case from being made for ecological constraints on such behaviour. Some of the more extreme versions of post-processualism appear to be so determined to affirm cultural particularities that they overlook or deny cross-cultural uniformities (Hodder 1986: 12). In so doing, they appear to lose sight of a significant aspect of the ontological reality of what they are studying.

Monumental architecture

A striking example of such uniformity is monumental architecture, which is associated with all complex societies around the world. Monumental architecture embraces large houses, public buildings, and special purpose structures. Its principal defining feature is that its scale and elaboration exceed the requirements of any practical functions that a building is intended to perform. A palace may require large numbers of storerooms and

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accounting offices if it is to serve the needs of the king or high official who inhabits it. Yet the fact that archaeologists can so easily recognize buildings that in terms of size and quality of their construction greatly exceed what is required by such practical needs eloquently testifies to the importance of monumental structures in complex societies. Such buildings were constructed in all of the early civilizations that developed in regions such as Mesopotamia, Egypt, South Asia, China, Mexico, Peru, and West Africa. These were societies composed of endogamous ranked classes, orders, or estates (cf. Crone 1989: 101–4) and in which, while kinship remained important within classes, it was no longer the basic principle by which (except sometimes metaphorically) the whole society was organized.

While some egalitarian societies construct large, multi-family dwellings, men's houses, lineage shrines, and tribal forts, monumental architecture is generally present on a modest scale, if at all. The *ahus* of Easter Island perhaps represent in terms of size and quality of workmanship the upper limits of monumental architecture that such societies achieve (Kirch 1984: 264–78). In more complex chiefdoms, or early states, forts, shrines, and individual tombs become more elaborate and the houses of rulers are differentiated from ordinary dwellings to an increasing degree. In the early civilizations monumental architecture becomes still more ubiquitous, elaborate, and differentiated. Monumental constructions of varying sizes and degrees of elaboration correlate with increasing stratification within the upper classes. At this level of socio-political complexity, monumental architecture also becomes an integral part of what Robert Redfield (1941) called the 'great tradition', by which he meant the culture of the upper classes as distinguished from that of the lower ones.

The independent origin of monumental architecture in at least some of the early civilizations is guaranteed by the limited contacts that are archaeologically attested even between the closest of them in the initial stages of their development. It is documented even more convincingly by the considerable variation in the architectural styles and the nature of monumental structures in the early as well as the later stages of development of each civilization. For most early civilizations it is also possible to demonstrate a stylistic continuity between the art and architecture of the earliest civilizations and those of the less complex societies out of which these civilizations evolved.

While monumental architecture, by its very nature, has a better chance of surviving and being highly visible than do many other aspects of the archaeological record, in comparing the early civilizations it must not be assumed that what has survived faithfully represents what was originally present. In Egypt, Mexico, highland Peru, India, and adjacent parts of south-east Asia long-lived traditions of stone construction have ensured the survival of a large number of remarkable structures. In the arid climates of the Middle East, Pakistan, and coastal Peru, large, well-preserved structures made of brick and stamped-earth bear witness to the architectural achievements of early civilizations which for various reasons did not develop traditions of monumental stone architecture. The earliest civilizations that developed in China and those of the west African rain-forest have left as standing monuments only the stamped-earth walls that surrounded major centres and the earth platforms on which major buildings were erected. All of these buildings were constructed of wood, stamped-earth, and other materials that have not survived. Nevertheless, post moulds and other archaeological finds indicate that these civilizations constructed large

and elaborately decorated structures, which were monumental both in design and execution (Chang 1980: 90–9; Shaw 1978). In all of the early civilizations the construction of such buildings required the ability to plan on a large scale, a high degree of engineering skill, the recruitment and direction of substantial labour forces, and a well-developed artistic standard.

Yet for all of the skills that were invested in their construction, the functional range of monumental structures found in the early civilizations was very limited and reflected the evolutionary proximity of these civilizations to the simpler and more egalitarian societies from which they developed. The early civilizations provide few examples of elaborate public amenities, such as baths, stadia, gymnasia, libraries, schools, theatres, and aqueducts, which are found in the classical civilizations of Greece and Rome. Fortresses, city walls, and enclosures around public buildings indicate a concern with defence that was already present in tribal societies, but which in the early civilizations was directed increasingly against potential internal as well as external enemies. The other major sorts of monumental architecture found in early civilizations were temples, palaces, and tombs of kings and other high-ranking officials. All of these are elaborations of dwellings, intended for gods, rulers, and the exalted dead. Unlike the churches, synagogues, and mosques of some later pre-industrial cultures, the temples of the early civilizations were usually designed to be the earthly dwellings of gods rather than assembly places for communal worship. Much of the cult was conducted in seclusion inside these buildings, which in many cultures were called literally ‘gods’ houses’.

The emphasis on different types of buildings also varied from one early civilization to another and from period to period in a particular civilization. In Old Kingdom Egypt by far the largest and most elaborate buildings were the tombs of the Pharaohs. The Maya of the classic period erected funerary temples to celebrate the cult of their dead kings alongside temples dedicated to their cosmic deities (Coe 1980: 103; Schele and Miller 1986). In the Valley of Mexico, by contrast, royal interments were modest to the point of invisibility but temples and palaces were large and elaborate structures (Matos 1988). In the Shang civilization of China, the most elaborate structures were massive walls surrounding administrative centres, and the palaces and temples inside them. The Shang royal tombs were constructed inside large burial pits and capped with stamped-earth platforms, but the structures that may have surmounted these platforms have disappeared. Nevertheless, the large numbers of human sacrifices in the royal cemetery at Anyang attest to the lavish and ongoing attention that was paid to dead rulers (Chang 1980: 111–24). Elaborate administrative centres and temples dedicated to the state gods provided symbols of royal authority throughout the Inka empire. In Cuzco, the Inka capital, a fortress, temples, and palaces, which became the cult centres of dead kings, were constructed from massive stone blocks using *corvée* labour conscripted from various parts of the empire (Gasparini and Margolies 1980).

What is striking about all of these structures is their lavish scale and the expertise that highly skilled specialists devoted to their construction and decoration. The precise orientation and geometrical perfection of buildings such as the Great Pyramids at Giza have elicited the admiration and wonderment of generations of scholars. Most special purpose buildings were larger and more massive than their functions would have required. Fortifications have to be powerfully constructed to be effective, but in discussions of early

civilizations it is frequently observed that the scale and elaborateness of fortresses and enclosure walls exceeded what practical defensive considerations would have required (Adams 1977: 187; Moseley and Day 1982: 65). These structures were evidently designed to impress foreign enemies as well as potential thieves and rebels with the power of the authorities who were able to build and maintain them. In the Sumerian Gilgamesh epic, the walls of Uruk symbolized the strength of the city and of its ruler (Jacobsen 1976: 196). In palaces, the elaborate construction of storage and administrative facilities, no less than of state rooms and the ruler's living quarters, invariably exceeded what would have been required from a purely functional point of view. Even the workshops for artisans that were located within such palaces tended to be better constructed than similar workshops elsewhere. In addition to their large size, audience chambers and other public spaces within palaces were impressively decorated (Reade 1979).

Temples and upper-class tombs provide especially clear examples of structures that greatly exceed in size and quality of construction what their practical function required. All of these structures testify to the ability of powerful individuals or the state to deploy skilled craftsmen, material resources, and massive amounts of labour. These buildings were the creations of an upper class that controlled much of the surplus production of their societies and had the political power to utilize surplus labour to carry out major, non-utilitarian construction projects. They no doubt rationalized such constructions as serving various practical and supernatural ends. Moreover, they would have viewed theological goals, such as serving and winning the favour of the gods, as being highly practical. Yet even with this extended meaning, a 'practical' explanation of these constructions does not account for one of their key features: monumentality.

Why is monumental architecture universally associated with early civilizations and, indeed, with all class-based societies? Peter Wilson (1988: 179) equates buildings of any sort with privacy; palaces therefore may have provided a secluded setting within which the specialized and often secretive activities of rulers could be conducted. Wilson also sees the solidity and material permanence of structures as helping to convince the spectator of the reality of the power that brought them into existence. Architecture, and especially funerary architecture, is in Wilson's view 'ritual materialized and petrified' (pp. 134–5). As the fusion of 'permanence' and 'perfection,' monumental architecture makes power visible and hence becomes power rather than merely a symbol of it: 'It was by and through their association with these monuments that men in the office of king, and their agents, had access to power' (p. 148). I agree with Wilson that the splendour of such buildings may proclaim, and by doing so reinforce, the status of rulers, of their protective gods, and of the state. Attributing such functions to structures does not, however, explain how this result is achieved. Nor does it explain why the relative importance of such structures depends upon their size and the extent to which labour and raw materials have been lavished on their construction and maintenance. Dealing with this problem takes us back to viewing cultures as thermodynamical systems.

Least effort

Despite efforts to discredit it as Western ethnocentrism, a substantial body of data indicates that all human groups seek to conserve energy in activities that relate to the

production and distribution of food and other material resources. Such conservation is evident both in the scheduling of activities and in their spatial organization. Unlike extreme determinists (Harris 1974), I do not feel compelled to relate every detail of human subsistence practices to this principle. Some food collectors may devote large amounts of their spare time to locating and harvesting food that they esteem for its flavour but which contributes little in terms of calories or nutritional value to their diet. Yet, when it comes to providing for their basic subsistence needs, hunter-gatherers appear to seek a maximum return for their efforts. Where population densities are low, human groups hunt big game, which provides a high caloric return for the energy expended on stalking and killing it (Feit 1973), before they turn to more abundant food sources that provide a lower caloric return in relation to harvesting and processing costs (Cohen 1977). In agricultural societies, less labour intensive methods appear to be routinely preferred to ones that require a larger investment of energy to produce the same amount of food. Swidden agriculture gives way to field rotation, annual cropping, and multicropping only as increasing population densities require more food to be produced per unit of land (Boserup 1965) or the development of large population centres makes it desirable to increase agricultural production close to such cities. Karl Butzer (1976: 102–3) has demonstrated that ancient Egyptian irrigation agriculture initially exploited small, easily managed natural basins and only brought larger ones under cultivation in order to feed an expanding population.

Intensive studies of settlement patterns have demonstrated that pre-industrial societies were as much concerned as modern industrial ones to arrange their activities spatially in such a manner as to minimize the expenditure of energy involved in the movement of people, goods, and information. Settlement locations and distributions exhibit a high degree of rationality with respect to securing resources, marketing, transportation, and administration (Chorley and Haggett 1967; Smith 1976). Heavy and inexpensive items, such as roof tiles, are rarely transported overland far from their point of manufacture (Hodder and Orton 1976: 113). Aztec officials carefully calculated the production costs of materials and the energy that had to be expended in transporting them when determining the sorts of goods that progressively more distant peoples were required to pay them as tribute. In general, the farther away a tributary state was located, the higher were the unit values and the smaller the bulk and hence the lower the transportation cost of the items involved. The Aztecs also appear to have calculated the cost of securing compliance with their demands in determining the levels of tribute that they demanded (Hassig 1985).

G. K. Zipf attempted to subsume all of these forms of behaviour, together with evidence of economizing in the structure of language, under his ‘principle of least effort’. Zipf conceptualized conscious least effort as a principle that did not apply to each behavioural decision in isolation from others. Instead, he suggested that

a person in solving his immediate problems will view these against the background of his probable future problems *as estimated by himself* [and] he will strive to solve his problems in such a way as to minimize the *total work* that he must expend in solving *both* his immediate problems *and* his probable future problems. (Zipf 1949: 1)

In this fashion, Zipf sought to identify efforts to minimize risk as yet another manifestation of the principle of least effort (more energy being expended in the short term to reduce energy expenditure in the long term). It is possible that natural selection for behaviour

corresponding to Zipf's least effort has long been operative in shaping primate and carnivore feeding strategies.

There is some evidence that human beings may seek to minimize risk on a societal rather than merely an individual basis and over periods longer than individual lifetimes. Many hunter-gatherer societies appear to practise conservation methods that are intended to prevent the depletion of the plant and animal species on which they depend. In some cases such behaviour is justified on rational grounds; in others it is encoded in religious beliefs. Yet it is by no means clear that such practices are universal, since hunter-gatherers sometimes have engaged in wasteful mass kills and have played a role in the extinction of game in many parts of the world (Simmons 1989: 68–71). The depletion of a wide range of non-renewable resources by more complex societies further indicates that opportunistic exploitation rather than conservation has been a widely held ideal, especially in situations where abundant resources and rapidly changing technologies do not compel large numbers of individuals to depend on a single region or economic activity.

It also seems highly improbable that individuals predicate their calculations of least effort on the basis of perfect knowledge of the consequences of their behaviour or that they make their calculations in a detailed, as opposed to an approximate, fashion. Nevertheless, the evidence suggests that, within the general limits Zipf prescribed, the principle of least effort guided the behaviour of prehistoric hunter-gatherers, collectors, and tribal agriculturalists no less than it does that of modern economic planners. The main difference between them is that the modern planners seek to conserve the expenditure of energy in order to maximize profits, while people living in egalitarian societies generally used it to satisfy their wants with minimal personal effort (the 'lazy native' or 'Garden of Eden' syndrome). It follows from this that the principle of least effort must have been at least implicitly familiar to everyone in the early civilizations and that this principle guided the everyday behaviour of peasant men and women no less than it guided the behaviour of kings.

Conspicuous consumption

One aspect of early civilizations to which the principle of least effort does not apply is monumental architecture. On the contrary, such architecture constitutes an archetypal example of Thorstein Veblen's (1899) concept of conspicuous consumption. By this he meant wasteful spending to enhance social prestige and power. Zipf, who was impressed by Veblen's ideas, argued that for power to be acknowledged, a strong man had to express his will in ways that deviated from the generally accepted norms of human conduct and furthermore had to compel deference to be shown to his behaviour (p. 518). He further maintained that, as inequality becomes institutionalized, force is increasingly supplemented as a regulatory mechanism by prestige symbols which express wealth and power. Zipf attempted to harmonize Veblen's principle of conspicuous consumption with his own concept by arguing that, in accordance with the principle of least effort, it is always more economical to have another person do one's work than to do it oneself (p. 518). This does not, however, explain how some kinds of material creations universally come to be viewed as symbols of authority and prestige.

The rudiments of displaying power through conspicuous consumption are seen in rituals, such as the potlatch of the native peoples of the north-west coast of North America or the New Guinea pig feast, in which goods are consumed and destroyed, as well as redistributed, in large quantities (Rappaport 1969). In egalitarian societies goods are made or accumulated through the efforts of the group that seeks to win prestige by giving them away. In these situations an expenditure of energy incurs a political debt that can only be repaid through the further expenditure of energy in providing goods and services. As societies become more hierarchical and their control mechanisms more despotic, power is expressed by commanding the labour of others in the form of surplus food, *corvées*, and other more specialized services. At least some of this energy is converted into prestige symbols, which are often made of rare and valuable materials and the manufacturing of which requires the expenditure of large amounts of labour for non-utilitarian purposes (Clark 1983; 1986).

Conspicuous consumption is thus a flagrant violation of the principle of least effort. The basic concept that underlies such behaviour is as follows: if economy of effort is the basic principle governing the production and distribution of those goods which are necessary to sustain human life, the ability to expend energy, especially in the form of other people's labour, in non-utilitarian ways is the most basic and universally understood symbol of power. Monumental architecture and personal luxury goods become symbols of power because they are seen as embodiments of large amounts of human energy and hence symbolize the ability of those for whom they were made to control such energy to an unusual degree. Furthermore, by participating in erecting monuments that glorify the power of the upper classes, peasant labourers are made to acknowledge their subordinate status and their sense of their own inferiority is reinforced.

At the most elementary and general level, political power is universally perceived as the ability to control energy. No ruler can retain political power if he does not invest much of this energy in activities that help to maintain and, if possible, to expand the society that he controls. Yet the most compelling demonstration of power is the ability of a ruler to consume some of the energy he controls for non-utilitarian purposes. It is because of this that monumental architecture constitutes a universally understood expression of power and also why the basic significance of monumental architecture and luxury goods is so readily apparent to archaeologists. The savants who accompanied Napoleon's expedition to Egypt in 1798 could not read ancient Egyptian inscriptions and hence often did not know whether the stone buildings they encountered were palaces or temples. Yet they had no hesitation in viewing them as expressions of royal power (Sidhom 1988).

The early civilizations abounded with material displays of power. The upper classes bedecked themselves with jewellery that was painstakingly fashioned by highly skilled craftsmen from rare and exotic materials. These items were the embodiments of high levels of energy consumption. Upper class people were served not only by bureaucrats, who were required to manage the state, and by professional soldiers, who were necessary to protect the upper class's possessions and privileges, but also by vast numbers of personal servants, who were usually better housed, fed, and dressed than most peasants and craftsmen and who, in order to display their masters' affluence, had to perform only specialized and often trivial tasks (Zipf 1949: 520). Rulers sponsored elaborate ceremonies, which often required special equipment and in which many people were employed

as actors and participants. In the course of these rituals large quantities of foodstuffs and manufactured goods were destroyed as offerings or distributed among the participants (Murra 1962: 720).

The form of conspicuous consumption that archaeologists have studied in greatest detail is burial rituals. Post-processual archaeologists have made a strong case that burials do not reflect social organization independently of symbolic considerations; for example, they may express egalitarian ideals that are not practised in everyday life or be influenced by specific beliefs about the nature of death or hygiene (Hodder 1982: 139–46; Parker-Pearson 1982; see also Huntington and Metcalf 1979: 122). Yet in a large number of early civilizations there appears to be a strong correlation between the total amount of energy expended on individual burial rituals, of which the burial facility may be only a part, and the relative position of that individual in the social hierarchy (Saxe 1970; Brown 1971; Tainter 1978; O'Shea 1984). This suggests that egalitarian ideals may have been of very little political importance in the early civilizations, unlike the situation in some later pre-industrial societies and all modern ones (Crone 1989: 194). Finally, in the early civilizations large amounts of energy were invested in elaborating and maintaining complex systems of writing, calendrics, astrology, divination, and other religious lore, which constituted a large part of the 'great tradition'. This served to emphasize the cultural gap between the upper and lower classes, to the social and political disadvantage of the subordinate ones.

While public ceremonies involved vast expenditures of energy that were designed in part to impress ordinary people with the power of the upper classes and their patron deities, most of the daily routine of palaces and temples was witnessed only by a small coterie of officials, ritual specialists, and their servants. Yet the expenditure of energy on these activities was probably no less lavish than that on public ceremonies. Patricia Crone (1989: 114) has observed that the upper classes of pre-industrial civilizations did not distinguish their private lives from their public roles: 'a king was a king whatever he was doing'. While rumours concerning the splendid and esoteric rituals that went on in cloistered palaces and temples may have enhanced the reputation of the upper classes, the costly elaboration of this behaviour, including the decoration of burial chambers which once closed were meant never to be seen again by human beings, appears to have been intended mainly to bolster the self-image of the upper classes. John Baines (1989: 480) has pointed out that during the early phases of Egyptian civilization, even royal effigies were seldom placed where they could be seen by ordinary people. He suggests that the means, and also the message, of the early Egyptian elite culture was one of differentiation and exclusion. A good part of that message was directed to the upper classes as a means of reinforcing their self-image.

The most conspicuous exception to this exclusivity was monumental architecture, which constituted the most public material embodiment of the power of the upper classes. In contrast with public ceremonies, it was also the most enduring statement of power that a ruler could hope to make. In the normal course of events, a building might endure for centuries or even millennia. In Mesopotamia the name of the king who erected a public building frequently was stamped for eternity upon every brick. The hatred of later rulers or the urgings of public policy were rarely strong enough for later kings to demolish completely the monumental constructions of their predecessors. This did happen to the

works of Pharaoh Akhenaton in the reign of his successor Horemheb, no doubt in an effort to erase the memory of his deviant religious programme (Redford 1984). More often Egyptian kings contented themselves with removing the names of objectionable predecessors from their monuments and replacing them with their own.

Monumental architecture expresses in a public and enduring manner the ability of an authority to control the materials, specialized skills, and labour required to create and maintain such structures. In general, the larger and more ornate such buildings are, the more power they express. The scale on which public buildings were erected along the northern section of the Street of the Dead at Teotihuacan, in Mexico, is such that after walking for what seems like a long time little progress appears to have been made. As a result, even a modern visitor experiences a diminution in his own sense of power in relation to the ancient gods who were honoured in that place and the unknown rulers under whose authority these structures were erected. In all the early civilizations, power was symbolized and reinforced by the large scale on which processional ways, palaces, throne rooms, temple platforms, and royal tombs were constructed.

The same principles are not unknown to modern rulers. Adolf Hitler's architect Albert Speer (1971) quotes him as saying in respect of plans for his new Chancellery in Berlin that he needed 'grand halls and salons that will make an impression on people, especially on the smaller [visiting] dignitaries' (p. 150). Hitler was particularly delighted that, on a 230 metre walk from the entrance to the reception hall, visitors would get 'a taste of the power and grandeur of the German Reich' (p. 151). By compelling officials, visiting dignitaries, and servants to expend extra energy moving from one place to another, monumental buildings further impress people with the power of the ruler and the resources that he has at his disposal.

There is some evidence that the need to express power through the medium of monumental architecture may be greater during the formative stages of early civilizations or at times when the degree of centralized power is increasing. Childe (1945) argued that the early development of states resulted in elaborate royal burials in which rulers were interred with large amounts of wealth and often considerable numbers of slain retainers. He cited examples of this practice from the early stages of many civilizations and chiefdom-level societies around the world. He also noted that as these societies became more stable, less energy was expended on such burials and more wealth was inherited by the living. This may reflect both changing concepts of property and the increasing importance of finite quantities of wealth in such societies.

This would suggest that, in general, the largest structures tend to be erected in the early stages of civilizations or dynasties. This appears to have been the case at Teotihuacan. The largest Egyptian pyramids were erected as symbols of royal power during the period of maximum political centralization near the beginning of the Old Kingdom (Rathje 1975: 436–40). It has been argued that erecting these structures played a significant role in strengthening bureaucratic control (Mendelssohn 1974). During the reigns of Khufu and Khafre the allocation of resources for the royal burial cult appears to have reached the limit that the political organization of Egypt could bear, both kings being remembered in later times as tyrants who neglected the worship of the gods to pursue their own selfish ends (cf. Aldred 1968: 260). This was followed in the reign of Menkaure by a retrenchment in the size of royal pyramids which appears to have resulted in a stabilization of royal power.

By contrast, massive building projects went on throughout much of the New Kingdom, although most actively when rulers, such as Hatshepsut, Amenhotep III, Akhenaton, Horemheb, Seti I, Ramesses II, and Ramesses III, attempted to shift or reinforce the ideological basis of their power (Smith 1958: 128–254).

If monumental architecture plays a significant role in helping to consolidate new social, political, and economic formations, it is possible that the different types of buildings that predominated at any one period may provide insights into the social processes that were at work. The emphasis on temples in the early stages of Mesopotamian, Mesoamerican, and Peruvian civilization, which was observed but over-generalized by Paul Wheatley (1971), may indicate the need for an upper class to consolidate a hierarchical political order in which power was not yet highly centralized; the temples serving as a symbol of the collective power of the upper class. The increasing size of palaces in later stages of these civilizations may reflect a tendency towards the centralization of power in the hands of kings (Adams 1966: 142–5). As we have already noted, the emphasis on royal tombs, at the expense even of palaces, in Old Kingdom Egypt correlates with the extraordinary power that these kings exerted over the national economy. The gradual loosening of this control, beginning in the New Kingdom, is reflected in a growing emphasis on temples rather than royal tombs. The royal funerary cult was transferred from pyramid chapels to special funerary temples and in the Late Period Egyptian kings were buried in small tombs located within temple complexes (Smith 1958: 231). In the monarchical Mycenaean civilization, the most elaborate buildings were palace complexes, sometimes heavily fortified; while temples were the most prominent buildings erected by the aristocratic and ‘democratic’ Greek city states of the Classical period (Morris 1987). I would not suggest that monumental buildings are a direct reflection of social reality; on the contrary, contextual data are essential to understand the social circumstances that influenced their construction. Yet it is not unreasonable to view the palaces, temples, and monumental tombs of antiquity as expressions of shifting and competing power, just as the office towers of multinational corporations are today (Miller 1984).

Conclusion

In human societies, the control of energy constitutes the most fundamental and universally recognized measure of political power. The most basic way in which power can be symbolically reinforced is through the conspicuous consumption of energy. Monumental architecture, as a highly visible and enduring form of such consumption, plays an important role in shaping the political and economic behaviour of human beings. This explains why, as systems based on inequality evolved, monumental architecture loomed so large in the archaeological record. It further explains why, as political relations of domination changed, the type of buildings by means of which that power was expressed also altered. In advancing this explanation of monumental architecture, I am not challenging the observation that in each early civilization temples, palaces, and tombs had highly idiosyncratic meanings, which were either read into, or determined, such features as their shape, orientation, decoration, colour, and the materials out of which they were

constructed (van Zantwijk 1985). What I do claim is that a universally, if implicitly, shared understanding of the significance of energy explains their monumentality.

Zipf attempted to incorporate Veblen's notion of conspicuous consumption into his principle of least effort by arguing that it was more economical to have other people do one's work. By itself this is a feeble explanation of monumental architecture. If human beings try to maintain their society by manipulating natural forces in the most economical fashion, the ability of individuals or groups to engage in conspicuous consumption demonstrates their control over nature, while their ability to appropriate other people's labour and compel them to work harder becomes the basic symbol of power over other human beings.

Because of the particular biological mode of adaptation that human beings have evolved, every human being exists simultaneously in a material world that exists independently of his or her volition and a symbolic one that is the collective creation of a human group (Childe 1949). In this paper I have argued that energy plays a powerful role in both realms; in the one as something 'real' and in the other as a set of concepts about something 'real'. The universal recognition that the control of energy is fundamental for all aspects of human existence makes it the common currency in terms of which political relationships can be measured. Recognition that this is so expands a materialist perspective to take account of the symbolic and idealist components that loom so large in the archaeological record.

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References

- Adams, R. M. 1988. *The Eighth Day*. Austin: University of Texas Press.
- Adams, R. McC. 1966. *The Evolution of Urban Society*. Chicago: Aldine.
- Adams, W. Y. 1977. *Nubia: Corridor to Africa*. London: Allen Lane.
- Aldred, C. 1968. *Akhenaton: Pharaoh of Egypt*. London: Thames and Hudson.
- Baines, J. 1989. Communication and display: the integration of early Egyptian art and writing. *Antiquity*, 63: 471–82.
- Benedict, R. 1934. *Patterns of Culture*. Boston: Houghton Mifflin.
- Binford, L. R. 1962. Archaeology as anthropology. *American Antiquity*, 28: 217–25.
- Boserup, E. 1965. *The Conditions of Agricultural Growth*. London: Allen and Unwin.

- Brown, J. A. (ed.) 1971. *Approaches to the Social Dimensions of Mortuary Practices*. Washington: Society for American Archaeology, Memoir 25.
- Butzer, K. W. 1976. *Early Hydraulic Civilization in Egypt*. Chicago: University of Chicago Press.
- Chang, K. C. 1980. *Shang Civilization*. New Haven: Yale University Press.
- Childe, V. G. 1945. Directional changes in funerary practices during 50,000 years. *Man*, 45: 13–19.
- Childe, V. G. 1949. *Social Worlds of Knowledge*. London: Oxford University Press.
- Chorley, R. J. and Haggett, P. (eds) 1967. *Models in Geography*. London: Methuen.
- Clark, J. G. D. 1983. *The Identity of Man*. London: Methuen.
- Clark, J. G. D. 1986. *Symbols of Excellence*. Cambridge: Cambridge University Press.
- Clark, J. G. D. 1989. *Economic Prehistory*. Cambridge: Cambridge University Press.
- Coe, M. D. 1980. *The Maya*. London: Thames and Hudson.
- Cohen, M. N. 1977. *The Food Crisis in Prehistory*. New Haven: Yale University Press.
- Cottrell, F. 1955. *Energy and Society*. San Francisco: Freeman.
- Crone, P. 1989. *Pre-Industrial Societies*. Oxford: Blackwell.
- Ellen, R. 1982. *Environment, Subsistence and System*. Cambridge: Cambridge University Press.
- Feit, H. 1973. The ethno-ecology of the Wiswanipi Cree; or how hunters can manage their resources. In *Cultural Ecology* (ed. B. Cox). Toronto: McClelland and Stewart, pp. 115–25.
- Gasparini, G. and Margolies, L. 1980. *Inca Architecture*. Bloomington: Indiana University Press.
- Harris, M. 1974. *Cows, Pigs, Wars and Witches*. New York: Random House.
- Hassig, R. 1985. *Trade, Tribute, and Transportation*. Norman: University of Oklahoma Press.
- Hodder, I. 1982. *The Present Past*. London: Batsford.
- Hodder, I. 1986. *Reading the Past*. Cambridge: Cambridge University Press.
- Hodder, I. and Orton, C. 1976. *Spatial Analysis in Archaeology*. Cambridge: Cambridge University Press.
- Huntington, R. and Metcalf, P. 1979. *Celebrations of Death*. Cambridge: Cambridge University Press.
- Jacobsen, T. 1976. *The Treasures of Darkness*. New Haven: Yale University Press.
- Kirch, P. V. 1984. *The Evolution of Polynesian Chiefdoms*. Cambridge: Cambridge University Press.
- Matos Moctezuma, E. 1988. *The Great Temple of the Aztecs*. London: Thames and Hudson.
- Mendelssohn, K. 1974. *The Riddle of the Pyramids*. London: Thames and Hudson.
- Miller, D. 1984. Materialism and suburbia as material ideology. In *Ideology, Power and Prehistory* (eds D. Miller and C. Tilley). Cambridge: Cambridge University Press, pp. 37–49.
- Morris, I. 1987. *Burial and Ancient Society: The Rise of the Greek City-State*. Cambridge: Cambridge University Press.
- Moseley, M. E. and Day, K. C. (eds) 1982. *Chan Chan: Andean Desert City*. Albuquerque: University of New Mexico Press.
- Murra, J. V. 1962. Cloth and its functions in the Inca state. *American Anthropologist*, 64: 710–28.
- O'Shea, J. M. 1984. *Mortuary Variability*. New York: Academic Press.
- Parker-Pearson, M. 1982. Mortuary practices, society and ideology. In *Symbolic and Structural Archaeology* (ed. I. Hodder). Cambridge: Cambridge University Press, pp. 99–103.

- Rappaport, R. A. 1969. *Pigs for the Ancestors*. New Haven: Yale University Press.
- Rathje, W. L. 1975. The last tango in Mayapan. In *Ancient Civilization and Trade* (eds J. A. Sabloff and C. C. Lamberg-Karlovsky). Albuquerque: University of New Mexico Press, pp. 409–48.
- Reade, J. 1979. Ideology and propaganda in Assyrian art. In *Power and Propaganda* (ed. M. T. Larsen). Copenhagen: Akademisk Forlag, pp. 329–43.
- Redfield, R. 1941. *The Folk Culture of Yucatan*. Chicago: University of Chicago Press.
- Redford, D. B. 1984. *Akhenaton: The Heretic King*. Princeton: Princeton University Press.
- Saxe, A. A. 1970. Social dimensions of mortuary practices. Doctoral dissertation, Department of Anthropology, University of Michigan, Ann Arbor.
- Schele, L. and Miller, M. E. 1986. *The Blood of Kings: Dynasty and Ritual in Maya Art*. New York: George Braziller.
- Shanks, M. and Tilley, C. 1987a. *Re-Constructing Archaeology*. Cambridge: Cambridge University Press.
- Shanks, M. and Tilley, C. 1987b. *Social Theory and Archaeology*. Cambridge: Polity Press.
- Shaw, T. 1978. *Nigeria: Its Archaeology and Early History*. London: Thames and Hudson.
- Sidhom, M. (ed.) 1988. *Description de l'Égypte*. Paris: Institut d'Orient.
- Simmons, I. G. 1989. *Changing the Face of the Earth*. Oxford: Blackwell.
- Smith, C. A. (ed.) 1976. *Regional Analysis*, 2 vols. New York: Academic Press.
- Smith, W. S. 1958. *The Art and Architecture of Ancient Egypt*. Baltimore: Penguin.
- Speer, A. 1971. *Inside the Third Reich*. New York: Avon.
- Steward, J. H. 1955. *Theory of Culture Change*. Urbana: University of Illinois Press.
- Tainter, J. A. 1978. Mortuary practices and the study of prehistoric social systems. In *Advances in Archaeological Method and Theory*, vol. 1 (ed. M. B. Schiffer). New York, Academic Press, pp. 106–41.
- Tainter, J. A. 1988. *The Collapse of Complex Societies*. Cambridge: Cambridge University Press.
- van Zantwijk, R. 1985. *The Aztec Arrangement*. Norman: University of Oklahoma Press.
- Veblen, T. 1899. *The Theory of the Leisure Class*. New York: Macmillan.
- Wheatley, P. 1971. *The Pivot of the Four Quarters*. Edinburgh: Edinburgh University Press.
- White, L. A. 1949. *The Science of Culture*. New York: Farrar, Straus.
- Wilson, P. J. 1988. *The Domestication of the Human Species*. New Haven: Yale University Press.
- Zipf, G. K. 1949. *Human Behavior and the Principle of Least Effort*. Cambridge, Massachusetts: Addison-Wesley.

Abstract

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Monumental architecture: a thermodynamic explanation of symbolic behaviour

While human beings cope with the production and distribution of goods by trying to achieve maximum efficiencies in energy expenditures, the basic way they symbolize power is through the conspicuous consumption of energy, control of which is the fundamental measure of power. Conspicuous consumption occurs in the form of monumental construction, supporting large

numbers of energy consumers, production of high energy-consuming luxury goods, and an emphasis on non-useful movement (processions, needlessly large rooms, etc.). By expanding the concept of energy-use to cover conspicuous consumption as well as efficiency of production, it can be seen as a basic factor in shaping the political as well as the economic behaviour of human beings and can explain why, as systems of inequality evolve, monumental architecture becomes an increasingly prominent feature of the archaeological record. This enlarged concept would also broaden a materialist perspective on human behaviour to take account of many significant aspects of the ideational components of such behaviour that appear in the archaeological record.