1981

1981 Social Complexities in Peripheries: Problems and Models

Robert Paynter

Available at: https://works.bepress.com/robert_paynter/23/
ARCHAEOLOGICAL APPROACHES
TO
THE STUDY OF COMPLEXITY
Tainter, Joseph A.,

Wright, Henry T., Naomi Miller and Richard Redding,

SOCIAL COMPLEXITY IN PERIPHERIES: PROBLEMS AND MODELS

R. PAYNTER
Queens College, CUNY,
Flushing, N.Y., U.S.A.
INTRODUCTION

Many anthropologists have found the world-systems approach useful in considering problems of sociocultural complexity (e.g. Hopkins and Wallerstein 1977; Schneider 1977). For anthropology this marks a renewed concern for large-scale spatial processes, but with a difference. Previous interest in large-scale processes made extensive use of the concept of diffusion as a means to account for similarities. The crux of the world-systems approach is the observation that differences - as well as similarities - in economy, politics and ideology can arise through interaction over great distances. Thus the relations between people separated by space as well as time are important for understanding historical and systemic change.

There has been much work in the last decade in archaeology that reflects this renewed interest in large-scale processes - in Renfrew's phrase, studying "action at a distance". Among these contributions is, most prominently, work on characterization studies pioneered by Renfrew (e.g. Renfrew and others 1966; Pires-Ferreira 1975). Pollard and Gorenstein (1980) use ecological reconstruction to argue that the Tarascan state was importing food. And the analysis of settlement patterns developed by Johnson (e.g. 1975, 1980, this volume), Blanton (1976) and others (e.g. Steponaitis 1978; Paynter 1980) aims at identifying the spatial scale of interaction.

There are two observations that can be fairly made regarding these developments. First of all, these lines of research have indisputably succeeded in identifying the existence of such large-scale processes in both egalitarian and stratified prehistoric settings. Thus, Adams' (1974) concern that the archaeology of a decade ago was burying itself in local ecology has been proven to be well-founded, and to some extent remedied. Second, however, while there has been considerable progress in developing methods and procedures to identify action at a distance, more work needs to be devoted to elucidating the behavioral processes. I will suggest that, to this end, a world-system perspective is useful.

However, using a world-system perspective to interpret pre-Capitalist processes is no easy task. It is quite disheartening to turn to work on contemporary large-scale processes for insights concerning past large-scale spatial relations. The view presented of pre-Capitalist world systems is basically clonal - almost as if Ancient Civilizations were segmentary societies reified in both physical and structural space (e.g. Wallerstein 1974). Any spatial processes and resultant patterns are not a dynamic force driving change in either the central areas or the fringes. For these theorists, such a dynamic awaits the advent of capitalism in Early Modern Europe.

This, then, is something that archaeologists have to offer to the world-system perspective. Namely, archaeological excavation and theory suggests that there is more to past civilizations than this segmental model of empire. In part this is reflected in the idea that state origins require a number of spatially interacting high level ranked (for some, read chiefly) societies (e.g. Price 1977). This is also reflected in the familiar empirical pattern that Service (1960) elevated to the Law of Evolutionary Potential (see also Giddens 1973 for a case of independent invention) - namely, that centers tend to decline and are superceded by their peripheries. It is also found in attempts to model large-scale spatial processes, as in Flannery's (1968; Pires-Ferreira and Flannery 1976) work on long distance relations in Formative Oaxaca, Wright and Zeder's (1977) simulation of long-distance exchange processes based on models of Melanesian big-man exchange systems, Renfrew's (1975) delineation of trade relations, Hodder and Orton's (1976) simulation of artefact distributions.

As useful as these ideas might be, they have always struck me as lacking in the requisite amount of social process. They may accurately capture an aspect of a past system, but they do so in a relatively static manner. In particular, the tensions between the various actors and institutions, necessary for grasping stratified societies, do not seem to be rich enough. Without these, it is difficult to imagine the evolutionary trajectories, the changes in human relations, which correspond to the changes in the archaeological record. The tension inherent in core-periphery models, between people over the production and export of surplus, is what the world-system perspective offers to archaeological interpretations.
of past political economies. In the following, I would like to suggest some of the questions and possible models that might lead to a less *ad hoc* appreciation of some of the social relationships underlying long-distance interactions.

THE PROBLEM OF HUMAN AND ECOLOGICAL RELATIONS IN PERIPHERIES

I include my own work (1980) on the settlement patterns of peripheral areas in this criticism of being *ad hoc* and overly formal. As I will be alluding to it for examples, let me briefly outline it. I have worked on how to detect if an area is peripheral by observing aspects of its settlement pattern - including characteristics of the settlement hierarchy and land use patterns. Mostly I have worked on Western Massachusetts, USA, during the period following the American Revolution (1776) until 1850. The area, referred to as the Connecticut River Valley, changes from an agricultural periphery (supporting the British World System by supplying the British West Indies Colonies) to an important industrial center.

As I see it, the way to break out of the binds of formalism and begin to develop more general theory, is to think about expectable human relations involved in surplus production in peripheries. I start with the question of the production of surplus because the only way I understand how to avoid reductionism is to start with a limiting question. Most basically, I am interested in how surplus production is stimulated and distributed to the strikingly disproportionate advantage of a few. Or more simply, I am interested in stratified societies where the condition of unequal access to strategic resources is used to perpetuate this inequality. Obviously I am drawing on the works of such anthropologists as Wolf (1966,1969), Fried (1967), Harris (1980) and Friedman and Rowlands (1978) in considering this problem.

More particularly, I am interested in how people in fairly large areas come to produce and relinquish control over surplus to benefit others. The former surplus producing regions are peripheries; the concentrating areas are cores. Here, the work of Amin (1980), Frank (1969) and Wallerstein (1974, 1980) is an obvious guide.

The historical issues concern how and when areas become peripheries. For instance, did the process of peripheralization lead to stagnation, revolution and withdrawal, and/or replacement of the core by the periphery? In other words, the historical issues concern concrete trajectories in both time and space.

The processual issues have to do with systemic relations - institutions if you will - that are involved in surplus production. In dealing with surplus production I follow the approach that the existence of surplus is *not* the issue; all societies produce a surplus (e.g. Harris 1959; Wolf 1966). The issues concern how to compel production and export of surplus from the periphery for the benefit of the core.

In the following I discuss four sets of relations that are minimally involved in peripheral surplus production and its export:

1. The relations of the local ecology - the ultimate if not the direct source of the exported products.
2. The local primary producers - households - responsible for the production.
3. The regional elites who channel, in greater or lesser amounts, the flows from the periphery.
4. The forces driving the core areas which result in an interest in the peripheries in the first place.

I see these as components of a larger conception aimed at modeling the movement of surplus over large distances. These components are certainly not new (e.g. Redfield 1955; Steward 1955), but some of the models and characteristics may be, particularly in this combination. Furthermore, and this is really the point of the paper, when archaeologists are working in peripheries we need to be conscious of the problem of how at least these four relations affected our data. The following processual models should help, if as nothing other than foils.

LOCAL ECOLOGY

I have little to say about the importance of understanding the processes of the local ecology because this is a given in much contemporary archaeological research. It is also obviously im-
important if we are interested in the production and export of surplus, as we have to know something about the natural world from which the products are extracted. Note, this last point is not to say that the environment either determines or is the major factor of change regarding the production of surplus. It is to point out that the opportunities for surplus production are constrained, in nontrivial manners, by ecological relations. For instance, when considering the history of production in the nineteenth century in Massachusetts, it is important to know that when the forests were cleared for fuel, raw materials, and pasture and fields, that flood conditions developed. This proved disastrous for many small, water powered mills (Thorhahn and Mrzowski 1979).

Such an understanding does not arise from flotation procedures and pollen analyses alone. Modelling the local ecology is not a descriptive task exclusively. It is important to grasp the variety of relations that are possible between the components within an ecosystem. Empirical environmental data represent just one state of a given ecosystem. Others were possible with different forms of human interaction. To understand why one particular state occurred, it is necessary that the empirical data be interpreted in the light of ecosystem theory. For instance May's (1973) work on community matrices, Maynard Smith's (1974) models of predator-prey systems and Horn's (1974) theories of succession all offer largely untapped perspective on how ecosystems are structured (see also Cody and Diamond 1975; May 1976). By knowing ecosystem structure and process, we are in a better position to evaluate ecosystem constraints on human production systems. Examples of the use of such approaches in archaeology include Harris' (1972) analyses of early agricultural systems and Green's studies of frontier agriculture (1979, 1980).

LOCAL PRODUCTION UNITS

Households are important units in peripheries, both for the production of surplus for export and for the reproduction of the labor used in production (e.g. Hopkins and Wallerstein 1977). They are also often the behavioral unit creating the primary archaeological survey/excavation unit - the site (e.g. Flannery 1976). Specifying the constraints on household production is important for understanding peripheral production. Models of how households allocate work effort to various productive enterprises would enhance the interpretation of archaeological remains.

An obvious starting point is Sahlin's (1972:41-148) model of household production presented as the Domestic Mode of Production (DMP). Starting with Chayanov, Sahlin suggests that the work effort of a household is positively related to the consumer/producer ratio. Thus, as the consumer/producer ratio increases, the work effort of the household increases. Households consisting of large families with young children would have high consumer/producer ratios, while the same family will see its consumer/pro-ducer ratio drop as the children come to contribute to the production of the household.

There are problems with Sahlin's model, particularly with the idea of household production being a viable candidate for the mode of production (e.g. Minge-Kalman 1977; Paynter and Cole 1980). Without going into these negative points, I would like to suggest some modifications to this model of household production that make it more useful for studying peripheral household production.

In Sahlin's presentation, the consumer/producer ratio is basically a measure of household demand. The argument is that work effort increases to meet the increasing demands associated with reproducing the biological household. Wolf (1966) has drawn attention to other sources of demand on peasant households. Often these can be more important for driving household productive effort than the demand originating in the household biology. To consider these sources of demand, Wolf uses the idea of funds. For instance, some production must go to meeting the biological demands of the household, i.e. the caloric fund.

Production funnelled to other funds is properly considered social surplus production. For instance, some production has to be stored as seed stock or feed for animals, or used to replace worn out tools and buildings. Wolf refers to this as a replacement fund. Other production is used for local community ceremonies, such as weddings, funerals and a variety of religious and/or political events and occasions. Such surplus used to produce the costumes, food and other items associated with these events requires payments into a ceremonial fund. Finally, peasants find themselves under obligations to elites, those who control such strategic resources as
land and armed forces. Gaining access to these resources - such as using land for production or keeping the militia away from the door - is based on channelling surplus to the elites in the form of taxes, tributes, tithes, rents, etc. Wolf (1966) generally refers to these elite-directed surpluses as payments to the rent fund. (Obviously there is no a priori suggestion that these funds exist in the peasants' consciousness.)

Failure to make the payments into any of these funds is likely to put the peasant household in jeopardy. Furthermore, a household under stress is likely to be in this position because of the cumulative effects of all these sources of demand. Wolf (1966: 5-9) presents the example of German peasant households during the fourteenth and fifteenth centuries as being in such a precarious position. He notes that a 40 acre farm produced 10,200 lbs. of grain crops a year. Of this production, 3,400 lbs. went into seed stock, 2,800 lbs. went to feed the four horses, and 2,700 lbs. went in rents. This left 1,300 lbs. for household consumption (on the assumption that none went to ceremonial functions). The daily caloric budget was 1,600 calories per person, a value well below that necessary for meeting household biological needs.

How might we detect relative payments into these various funds with archaeological data? I have only some possible suggestions, as I know of no direct attempt to do such. One clue to the relative size of the rent fund may turn up in comparisons of storage facilities found in central, elite structures versus those associated with individual farmsteads. Relative input to ceremonial versus rent funds may be disclosed in ratios of effort put into maintaining publicly accessible arenas, e.g. churches, versus nonaccessible monumental structures, e.g. tombs and burial furniture, palaces, forts. Absolute payment to the replacement fund might be based on use experiments with reconstructed tools to estimate the lifetimes of the tools, and on the data used to reconstruct the local ecology, particularly regarding its successional characteristics. Many other more clever clues can be detected by areal specialists.

Specifying the funds helps keep in mind that the households we excavate as individual farmsteads resulted, in part, from their backwards linkages to the local ecology and their forward linkages to regional elites. Keeping in mind these elite linkages should help detail how the individual farmsteads participated in the political economy of peripheralization. I next turn to considering the elites.

REGIONAL ELITES

Especially in stratified societies, the issue is not whether there is interhousehold integration. Rather, it is: 'what was the nature of integration? In particular, what kinds of elites did the area have?'

Options useful for studying a periphery include elites supporting this peripheral status and elites striving to sever or renegotiate this relation. Obviously, understanding how elites alter core-periphery relations is important for understanding such empirical observations regarding the rise of peripheries and the fall of cores.

These elite strategies have been discussed at length by Schneider, Schneider and Hansen (1972), and I can only present part of their argument here. They distinguish between regional elites following a dependency strategy and elites following a development strategy. Obviously, the elites' overall goal is to stay elite, to retain their unequal access to strategic resources and their position of power. Dependency elites achieve this goal by channeling surplus from the periphery towards the core. Not all surplus will be core-directed, as the dependency elites will use some of it to maintain their position - through maintaining a military, a bureaucracy, monumental construction projects, etc. They have the support of the core if the locals try to oust them in favor of a development elite. Development elites, on the other hand, follow a strategy of maintaining their position by isolating the periphery from the effects of the core. Thus, surplus extracted from the households in the periphery will be directed back toward the periphery, either in attempts to gain locally based legitimacy, or through maintaining a local militia.

These are obviously polar strategies on a continuum and elites are likely to mix core dependency with developing regional legitimacy. However, specific historical conditions would seem to lead to the success of one strategy over another. Consider the case of first contact between more and less powerful societies. It seems a priori likely that leaders or elites in the
less powerful society would welcome such interaction as it would give them - through unequal access to the trade and force of the external polity - additional bases for maintaining their positions of prestige. Thus, dependency elites should arise in initial contact situations. The native Americans of colonial New England were quite astute at directing the firepower of the Anglos at their indigenous rivals. Of course, the Anglos expected their allies to help maintain a political economic climate conducive to Anglo colonization and fur trade (e.g. Jennings 1975; Thomas 1979). Dependency elites are likely to be found in initial contact situations.

What conditions might underlie a peripheral population's backing of a development elite and attempting, as a region, to redefine its ties to both the regional elites, and through them with the core? The literature found on peasant revolts is full of suggestions, including those found in Wolf (1969) and Friedrich (1977). One condition, found in many of these works, is the notion of an ecological crisis amongst the peasantry. When peasants are no longer able to meet their fund payments because of increasing peasant households, or a degrading environment, or escalating rent demands from the core elites, the peasants will be in an energetic bind. One solution likely to be taken, particularly in peripheries which are somewhat isolated from core military power, is to rally around a revolutionary leader and redefine the obligations due to elites, and the nature of elite interactions with the core.

An example which failed can be found in post-Revolutionary Massachusetts (Szatmary 1980). After the Revolution, due to British imperialist policies, the United States were not permitted to trade directly with the British Colonies in the West Indies. This changed the position of Massachusetts merchants in the North Atlantic economy. Previous to the Revolution, these merchants had exported foodstuffs to the West Indies in return for bills of sale which were used to obtain manufactured items from Britain. The manufactured items were then traded to the interior farmers for the staples sent to the West Indies. The system was greased by credit granted by all the participants in the exchanges. When it became clear that the Massachusetts merchants were no longer able to meet payments for manufactures, the British manufacturers stopped granting the New England merchants credit on manufactured items and called in all past loans. Payment of these loans was passed on to more remote merchants and finally to the staple producing farm households in the interior. By the mid-1780's 2,977 debt cases were heard in the interior county of Hampshire, involving roughly 30 percent of the males over 16 (Szatmary 1980:29). Fear of losing property and being jailed led the farmers into a revolt known as Shay's Rebellion. Ironically, the revolt was swiftly put down by the recent "revolutionary" merchants. Not the least of the farmers' problems stemmed from their difficulty in developing a group of leaders - development elites - to organize their legal efforts and military campaign.

In summary, peripheral areas will be engaged in the production of surplus that will find its way into the hands of regional elites. Periods of initial contact are likely to contribute to the indigenous elites cooperating with the core powers by following the strategy of dependency. Increasing demands or changes in the surplus demanded in conjunction with changes in the peripheral ecosystem, are likely to trigger a movement amongst the peripheral households to support regional elites aiming to separate and/or redefine the relations to the core areas, i.e. elites following a development strategy. Evidence for warfare, changes in the spatial distribution of the core-produced versus locally-produced items and change in regional settlement hierarchies and land use patterns, provide archaeologically recoverable evidence of change in elite strategies.

CORE PROCESSES

This brings me to the fourth set of relations that constrain the human relations in peripheries - those relations dominating the cores. Specifically, what are the human relations at the core which bring about a core interest in peripheries? What institutions develop to extract surplus and what forms of surplus are extracted from the peripheries? In other words, it is not enough to assume core-periphery interaction, it needs to be explained.

Of course, all human production requires some level of spatial process. Thus, in addressing core-periphery formation it is useful to distinguish between the hinterland of a town, which is in the immediate countryside, and the peripheries of core areas, which
are at greater distances. A circle of a day's journey around a town seems a reasonable starting point for delineating a hinterland. Johnson used circles of 25 km. radius for this purpose (in press). On the other hand, peripheries are areas that are many days' journeys from the cores. In this regard, it is interesting to note that Wallerstein uses thirty travel days as a rule of thumb diameter for large-scale spatial systems (1974). One other distinguishing characteristic is that peripheries are likely to display a range of towns of varying sizes, while the variance and mean of hinterland town sizes is likely to be small.

A full delineation of processes supporting stratification which result in core-periphery relations is a massive task. Probably the best understood political economy that has developed core-periphery relations is capitalism (e.g. Amin 1980; Wallerstein 1974, 1980). These relations are briefly sketched. The insecurity created by competition in the market generates a tendency for increasing accumulation. Surplus is extracted through the wage "bargain" between capital and labor, thus the dominant means to expand accumulation is to alter this relation to favor capital. Contact with peripheries arises in capitalists' attempts to find raw materials, markets for production (thusly averting overproduction crises), and to find easy-to-exploit laborers.

Noncapitalist accumulation processes are less well understood (e.g. Amin 1980, Hindess and Hirst 1975) and little theoretical effort has been directed at delineating core-periphery tendencies in such. Out of the many possible connections, there is one that presents an interesting parallel to capitalist accumulation.

As pointed out above, an alternative is to extract surplus, not through the wage "bargain", but rather through the payments of peasants into their rent funds. Thus, for core elite, it is interaction with tribute-paying peasants that is an important source of accumulation. The elite are often arranged in some hierarchy (either a religious or civil bureaucracy) which organizes this extractive process. As Wright pointed out yesterday, low level bureaucrats are likely to be in competition for higher positions in the bureaucracy. This is in part a response to the insecurity of depending upon a bureaucracy for gaining access to surplus (see Wolf 1966: 52). For change in the upper echelons could quite suddenly lead to unexpected changes in the bureaucratic person-

nel, or in their chances for advancement. Thus, insecurity may be endemic in tribute political economies and, while very different from capitalist insecurity, accumulation may be a solution.

It seems that bureaucrats might follow a number of strategies to not lose access to surplus, among these:

1. advancing to the point of ultimate control, thus accumulating formal power;
2. not striving to advance, but being a good follower of those in power; and
3. squirrelng away as much surplus as possible for use after their inevitable demise.

This latter strategy is likely to lead to elite interest in peripheries. Following this third strategy means gaining control over more and more peasant-produced surpluses. Since there are sharply defined constraints on peasant household production, discussed above, gaining more control will soon lead the elite to needing more peasants and more land. Thus, following the third accumulative strategy leads to a core elite's interest in extracting surpluses from distant places, i.e. peripheries.

I do not have exemplary material for this third strategy, though it is interesting to note that Finley (1973:144) contrasts Roman accumulation and capitalist accumulation in terms suggestive of spatial expansion. He refers to the former as acquisitive and to the latter as accumulation based on transforming production. Expanding accumulation via acquisition would seem to necessitate spatial expansion and the development of core-periphery relations.

The problem remains of identifying the effects of different accumulation strategies in the archaeological record. Again, I have no case material to guide me. However, capitalist accumulation strategies suggest that changes should occur in the production practices and marketing characteristics of peripheries. Thus, one might see changes in crops and minerals extracted as well as additions of more capital intensive technologies. Throughout, the area should disclose its role as a market for nonlocally produced goods. On the other hand, a periphery that is a source of additional tribute might not disclose great production changes following its incorporation. Demographic and ecological crises, evidenced in skeletal -, food consumption remains - and environmental data, would be correlated with political crises in the center. The easing of such pressure, associated with the political successes of the
particular core elite, would have no parallel in changes in local environmental conditions, such as an ameliorating climate. Again, more clever solutions await the attention of specialists in the study of particular pre-capitalist peripheries.

SUMMARY

In the above I suggest the utility of a world-system perspective for developing richer models of large-scale stratified societies. In particular I argued for considering four sets of relations when studying peripheries: the local ecology; household productive relations; regional elite relations; and core accumulation relations. I also suggested some models of these relations. At present, archaeological techniques and the literature on archaeologically studied peripheries allow for evaluating household and ecosystemic processes. Fewer analytic procedures and behavioral models exist for understanding regional and supraregional elite behavior with the archaeological record. Clearly, the dynamics and implications of the models I suggested are not fully worked out. However, my intent in suggesting them was to provoke archaeologists working in peripheries to keep at least these four questions in mind:

1. What kinds of surpluses, at what environmental costs, are available in the study area?
2. What kinds of productive demands were affecting the peasants?
3. How did regional elites manipulate their intermediary position between peasants and core elites?
4. What kinds of forces drove core elites to look for peripheries?

Refining and addressing questions about these processes seems necessary if we are to develop the comparable data needed to understand complexity in stratified systems.
Wright: I think we are all biased by the cases with which we start. The British Colonies in North America present some rather curious features as far as early industrial empires go. First, the European colonists were catapulted into a world that could not resist them, not so much because of their iron technology, which was remarkably ineffective against the American Indian, but because of the germ warfare which scourged the countryside in front of them so that there is no serious military problem of the sort that requires intensive capitalization. ... As a result, you have an interesting case, an open frontier case of imperial expansion. It is not really comparable to other open frontier cases. If you want to look at this North American system in a way which is comparable to the northern frontier of the Roman Empire before sealing off those borders in 58AD (which should be homotaxially comparable in several ways), you would have to include in your universe not just those curious protestants in New England but the plantation economies of the middle Atlantic states. These have a structural homologue in the introduction of villa systems throughout Gaul, for example. I think if you could expand your analysis of North America to include that with the kind of concepts you are using, it would be something tremendously stimulating to the people right here in little old Assendelft. To continue, though, and try to answer your question (in the paper) about archaic imperial systems and what drives them out, it is a nice idea that suggests that core elites are looking for more peasants to extract things from. But this does not seem to be the way they do it. The pattern for the expansion of the big empires, Rome, the Achaemenids, Han China: they always follow periods of very prosperous, multi-centric states competing with each other. And Cyrus or the early succession of Roman rulers proceed by taking over a series of existing states, cutting off the tops, and extracting tribute directly from the top of the states they take over.

Paynter: Very much like the Spanish in Mesoamerica.
Wright: Yes. Then follows the movement down into the local systems and then so much taking over the peasants, but reorganizing production in some kind of an estate system, encomiendas in the Spanish world, various variants of villa systems in the Roman world. What is necessary for that kind of expansion of the archaic empire is a very sophisticated military machine. Usually, in the early states, this machine is dependent on some kind of citizen-soldier arrangement, tribal levies in the Achaemenid Empire, peasant levies in the Mesopotamian Empires, peasant conscripts, citizen professional soldiers in the Roman Empire. Inevitably, that kind of successful early military machine is undermined by subsequent core political processes. We always see the shift towards decline in the extraction of soldiers through the peasantry and increasing extraction of wealth for which soldiers are hired. The mercenaryization of imperial armies or their professionalization seems to both fuel the beginning and spell the decline of Archaic Empires.

Claessen: Regarding the position of the regional elites, there are two possibilities: they may be natives or they may be foreigners. If they are placed by the core to govern somewhere else, they have an impact which differs from that of a local elite. The latter is more liable to develop a local hierarchy, and eventually to become independent of the core. The Mauryan empire is a case to the contrary: high-ranking princes of royal descent were made governors in outlying areas. They interbred with the locals and built up local lineages. As long as the core was very active, they were faithful followers, but as soon as there were problems in the center (succession, revolution), they used what they had learned from the center in the way of administration, etc., and became independent. Such variables should also be included in your model.

Paynter: One has to deal with the relationship core-periphery as a continuum. Looking at the forms of organization you find in the intermediary positions is important because they reflect the changes in the nature of the regional elite, and would thus
be useful in tracing the trajectory through time because we have to suspect that these large scale systems may not so much be changing as changing spatial location, creating what we see as structural change in a limited area.