

ARCHAEOLOGICAL INQUIRY AND SYSTEMS THEORY: SYNERGY AND CRITIQUE

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Abstract

Prior to 1960, archaeologists experienced conformity in ideologies to a greater extent, but this was discontinued with the rise of new approach in the discipline of archaeology. Archaeological inquiry was subsequently segmented into schools of argumentative parts with non-conformity of interests. Each of the segments seeking to give convincible, authentic, scientific and more valid approach to the understanding of archaeology and its discovery of human past through excavation, interpretation and analysis. This gave rise to the application interdisciplinary theories to archaeological inquiries. Systems theory is one of these theories, which seek to explain cultural relativism amongst archaeological samples. This paper however, discussed the synergy between systems theory and archaeological inquiry; the applicability and critique. It was able to identify that the nature of archaeological research has made it almost impossible to have unique theory that explains every detail in a particular archaeological inquiry.

Keywords: Archaeology, Archaeological inquiry, Archaeologist, Systems theory, Processual, Systems, Theory, Critique.

Introduction

Theory has been an underlining factor in academic researches its perception as one of the valid keys to unlocking research puzzles and academic breakthroughs (Smith, 2011). In addition, it could be used as back-ups for either pushing or pulling necessary academic arguments. "Theory has been an important issue in archaeology since the 1960's and has taken the form of a contentious field of polemical manoeuvring within the discipline and between archaeology and other social sciences" (Shanks et al, 1996, p.1). Eze-Uzomaka (2008) was of the opinion that without theory, archaeology is nothing but a mass of data and also where there is no method there may not be structure or coherence in the application of theory. For instance, "archaeological research on ancient cities and urbanism exhibits a wide range of perspectives on the use of theory. Some archaeologists pursue descriptive research with little explicit use of theory, while others embrace high-level social theory (Smith, 2011, p.167). Since 1960's archaeology as a discipline has welcomed interdisciplinary theories in its quest for valid explanations. Some sociological theories like structural functionalism, functionalism, feminism, systems theory, cultural theory, have been found useful in understanding of cultural relativism, convenience and context in archaeological inquiries. Hence culture is all encompassing and linked despite humanly-perceived dissimilarities (Ritzer & Stepnisky, 2014). Eerkens and Lipo (2007) rightly pointed out that theories are much needful in the understanding of the context and convenience of archaeological data in a given cultural setting. They went further to note that cultural transmission theory is one of the theories that explains archaeological materials in a given cultural context; hence the application of relevant theories straightens archaeological positions in cultural

studies (Eerkens & Lipo, 2007). In the same direction, Smith (2011) maintains that theories like environment-behaviour theory, architectural communication theory, space syntax, urban morphology, reception theory, generative planning theory, normative theory, and city size theory, which are not originally from archaeology, give further explanations to cultural relativity and transfer in archaeological inquiries.

Moreover, Bray et al (1975) see archaeology as the study of man's past through the material relics he left behind. This is connected with the understanding of cultural differentiations and similarities hence the extinct society cannot be interpreted in isolation of their culture. Also, Andah and Okpoko (1994) noted that more importantly, archaeologists are so much concerned with the retrieval of material remains of past activities of man by way of a systematic excavation to understand the culture of the people which are imbedded in their material remains. These remains are collected to aid in obtaining vital information about their makers and cultural activities in their various environments. Archaeology as a scientific and systematic discipline, studies man's past environment through application of systematic archaeological methods like reconnaissance, ethnography and excavation, with sophisticated equipments like sensitivity meters, Global Positioning System (GPS), scientific compass, Geographic Information System (GIS), digital cameras, etc (Okafor, 2008). Furthermore, "the developments that have taken place in archaeology since the 1960's amount to a process of rationalization of the discipline, a reaction to fact collection, the literary narrative and unexamined common-sense categories and concepts of traditional archaeology. But this rationalization has, for the most part, taken the form of methodological enquiry, a search for methods or approaches to the data, which will give a better more complete, more objective view or account of the past" (Shanks & Tilley, 1996, pp.5-6), which is the more concern of archaeology as a discipline. The understanding of culture as a system is one of the priorities in archaeological inquiries faced by archaeologists. In the other hand, system can be seen "as a set of VARIABLES so interconnected that a change in the value of one of the variables has a determinate effect on all other variables" (Mann, 1987, p.388). Mann (2008) went further to say that sociologists see society and other smaller social systems as open systems that are dependent on the external influence. In the same line of sociology, Theodorson and Theodorson (1970) observed that, a system is an organization of interrelated and interdependent parts that form a unity. Also a system is a conceptual MODEL used to facilitate investigation and analysis of complex phenomena. Theory can be described as generally accepted principles or assumptions after being tested, verified and confirmed to be used in manipulation of variables in any systematic or scientific research (Reckwitz, 2002). Human assumption develops from a mere hypothesis to a stage of paradigms, through a model and finally to a theory after passing through series of verifiable tests as it develops from one stage to another (Reckwitz, 2002).

Systems theory can said to be "the Tran disciplinary study of the abstract organization of phenomena, independent of their substance, type or spatial temporal scale of existence. It investigates both the principles common to all complex entities, and the (usually mathematical) models which can be used to describe them" (Heylighen & Jocelyn, 1992). Systems theory postulates that in a system of units, all the units work interdependently for the good of the system. No matter how insignificant a unit might look in a system, it has a unique contribution to the progress of the whole system. On the functionality of systems theory, Heylighen and Jocelyn (1992) note that systems are functional owing to the activities of interdependent units that interacts in the same environment. Finally, systems theory is among the new discoveries adopted by the early investigators, when they found it to be an

instrument in analyzing the independence of relationships, in organization by defining a new way of thinking about science and scientific paradigms. Systems theory also could serve as a linking bridge for interdisciplinary dialogue among autonomous areas of human study as well as within the area of systems science itself (Ritzer & Stepnisky, 2014). System theory, also called cybernetics (control theory) by Clarke (1968), sees culture as a system with subsystems with each part or subsystem of the cultural system functioning in different ways, even though they are inter-dependent. Simply put, the society is seen as systematically structured and linked together in such a way that once any part of the system (sub-systems) is affected, the other subsystems would also be affected (Alabi, 2001). However, this paper tends to look at the application of systems theory to archaeological inquiries with a view to understanding their synergy and areas of critique. The implication of the study is that it will open up objective arguments on the relevance and application of system theory to archaeological inquiries. This is necessary at this point when multidisciplinary research is central in academic researches across the globe.

The Synergy

Systems Theory in archaeology is the application of systems thinking in archaeological studies. The systems theory was first conceptualized in the work of Ludwig von Bertalanffy in the 1950s. It was later introduced in archaeological studies in the 1960s with the work of Sally R. Binford & Lewis Binford titled 'New perspectives in Archaeology', and also in the work of K.V. Flannery titled 'Archaeological systems theory and Early Mesoamerica'. Shanks (1996) informed that the first major application of systems theory in archaeological studies was in Renfrew's *Emergence of civilization* of 1972. However, the emergence of systems theory in the archaeological practices is as result of divergence of ideologies that arose amongst archaeologists in the middle of the 20th century. The upheaval between archaeologists has always attributed to the emergence of two schools of thought in the discipline as a result of disagreements between those interested in descriptive culture history and those interested in the study of the processes of cultural change. The 'New' archaeologists are identified with the study of the processes of cultural change, while the first school understood archaeology as the examination of past human activities which is categorized as history, and history itself has its own limitations, resources, and methods of explanation. The new school had argued that archaeologists cannot decipher completely past societies through archaeological remains without a significant assumption that every human behaviour is subjected to certain general laws and principles that operate at all levels of human cultural development. While the archaeological record reflects these laws, the only way these laws can be studied is by using the scientific method, hence, archaeology is a science in practice (Fagan, 1978).

Moreover, the discovery of the cultural studies i.e. cultural process, cultural change, etc, as a key that unlocks some archaeological questions, has helped in the free flow of archaeological inquiry (Eze-Uzomaka, 2008). This has served as a motivating factor in the introduction of systems theory archaeological inquiry. General systems theory presupposes that any setting or organization with cultural manifestations may be studied as a system so as to investigate how its components are related and how changes in some units or in their relationships produces changes in the overall system. It is necessary to note at this juncture that systems exist within a given environment, and that the concept of 'environment' in a systems approach under investigation may cause a significant change in the system or may be affected by the system as a whole (Sharer & Ashmore, 1980).

In addition, systems theory is interested in relationships and variations in relationships. In other words, it concentrates precisely on the sort of phenomena involved in explaining the process that bring changes in human culture. From the archaeological point of view the concept of 'process' refers to the causes of sequence of events that led to culture change. Over the years, Archaeologists have attempted to understand past events by way of changes in human cultures through space and time. They have employed sophisticated methodologies in this inquiry into the past such as patterning and ordering of artefacts, cross dating, ethnography, and systematic excavation and dating. Fagan (1978) noted that the primary cultural processes in archaeology are conventionally accepted to be migration and invention. Processual archaeology is understood to be the analysis of causes that led to culture change, and the analysis which involves looking at relationships between variables that could possibly lead to cultural change. It is important to note at this juncture that these possible causes are tested against actual archaeological data, which is always within the context of systems theory (Fagan, 1978).

Moreover, every human culture in a given environment is believed by archaeologists to represent a number of articulated or interlinked systems in which changes are likely to occur through series of minor and/or linked variations in one or more of these systems. It is the professional desire of archaeologists to find out the linkage between parts in both the cultural and environmental systems as reflected in the archaeological data. With this in mind, most of these archaeologists, look at diverse relationships and ever present variations in human culture using a cultural definition that stresses cultural systems that are consistently changing in response to the external and internal stimuli (Fagan, 1978). Fagan also asserts that human cultural behaviour displays properties unknown in different living systems and archaeologists study these peculiarities, and the key to this inquiry is in Flannery's phrase, *in their own way* (Fagan, 1978).

However, Flannery made a tentative remark on the application of systems theory to archaeological practice when he asserted that, "systems theory allowed archaeologists to treat the archaeological record in a completely new way. No longer did it matter what you were looking at, because you were breaking it down to its elemental system components" (Flannery, 1968). He went further to say that during archaeological inquiry; culture may be subjective as long as it is treated mathematically the same way as treating a retreating glacier (Flannery, 1968). In line with this view Fagan noted that, "human cultures consist, indeed, of a complex and constantly interacting set of variables. As archaeologists have adopted more rigorously scientific methods for studying culture, they have, included systems theory among new conceptual frame works with which to approach their data ..." (Fagan, 1978, pp.70-71). He furthered this by saying that archaeologists using systems theory would identify that cultural systems viability depending on its subsystems accordingly (Fagan, 1978).

Moreover, since society is concerned as "an intercommunicating network of attributes or entities forming a complex whole" (Clarke, 1968, p.42), modern archaeologists have found out that in their quest to reconstruct the past environment of man, a good knowledge of the culture of the people would be necessary. This made them to find it necessary to commence the process of applying systems theory to archaeological practice to enable them give a detailed and objective study of the society in their (archaeologists) attempt to reconstruct the past environment of man. Renfrew (1972), in an attempt to give a systematic picture of a society gave a diagrammatic representation of a society, showing all subsystems and their interrelatedness and dependence on each other. See Figure 1 below;

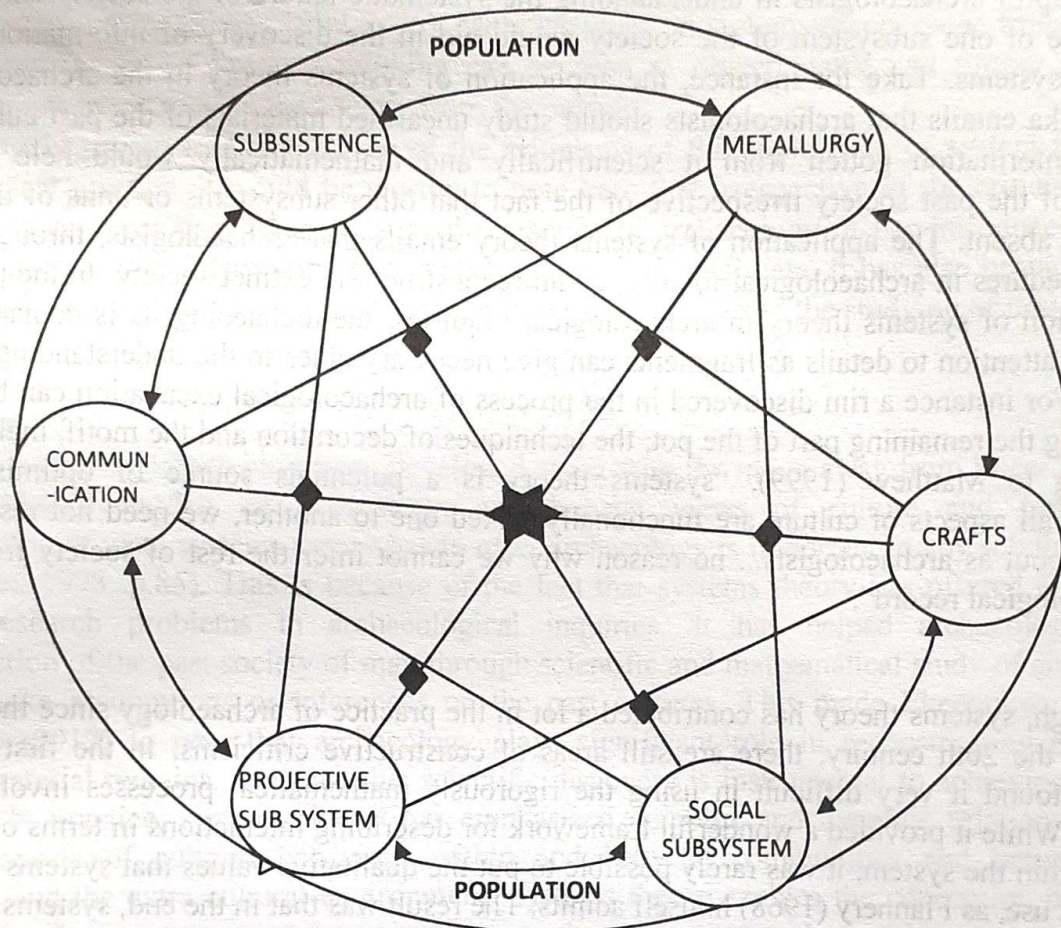


Figure 1: Renfrew's 'Culture system'

Note: All the subsystems are linked with each other and the external system environment with relations of positive or negative feedback.

(Shanks et al: 1996)

It is interesting to note that interconnections are mechanisms of negative feedback that is aimed at maintaining balance or equilibrium in a system. Also, each subsystem and the system itself are kept within assigned limits in a stable state by homeostatic mechanisms that contract any disturbance on the system (Shanks & Tilley, 1996). They furthered by giving an example that poor fishing means less fish to eat; negative feedback results in more fishing or use of food other than fish. That relation of positive feedback involve the amplification of an initial deviation, extending and increasing processes already present (Shanks & Tilley, 1996). Renfrew (1972) defines a particular variant of positive feedback as the 'multiplier effect', where a deviation in one subsystem has the effect of bringing about innovation in another (Shanks & Tilley, 1996).

Finally, since archaeology as a field has her interest in studying the past environment of man, new archaeologists since 1960, deemed it necessary to study also the culture of the past societies to get more information about the extinct society. However, the application of systems theory has helped this group of archaeologists in understanding the systematic nature of the society and how a good knowledge of one subsystem of the society would aid in the discovery of information about some other subsystems. Take for instance, the application of systems theory in the archaeological studies of Nsukka entails that archaeologists should study unearthed materials of the past culture of the people. Information gotten from it scientifically and mathematically would help in the reconstruction of the past society irrespective of the fact that other subsystems or units of the past culture may be absent. The application of systems theory entails that archaeologists, through their systematic procedures in archaeological inquiry, could reconstruct the extinct society. In the process of this application of systems theory in archaeological inquiries, the archaeologists is demanded to pay meticulous attention to details as fragments can give necessary clues to the understanding of the lost materials. For instance a rim discovered in the process of archaeological excavation can be used in reconstructing the remaining part of the pot, the techniques of decoration and the motif, maker and use. According to Matthew (1999), "systems theory is a potentials source of optimism for archaeology. If all aspects of culture are functionally linked one to another, we need not restrict in what we talk about as archaeologists... no reason why we cannot infer the rest of society from the meagre archaeological record".

The Critique

Although, systems theory has contributed a lot in the practice of archaeology since the early second half of the 20th century, there are still areas of constructive criticisms. In the first place, archaeologists found it very difficult in using the rigorously mathematical processes involved in system theory. While it provided a wonderful framework for describing interactions in terms of types of feedback within the system, it was rarely possible to put the qualitative values that systems theory requires for full use, as Flannery (1968) himself admits. The result was that in the end, systems theory was less useful in explaining change as it was in describing it.

Furthermore, systems theory postulates the predictions that a high amount of cultural regularities were found certainly overly optimistic during the early stages of processual archaeology. Ironically, this is exactly the opposite of what processual archaeologists who were hoping to adopt the principles of systems theory in the archaeological investigations, had in mind. However, it might be conceived as a complete disappointment as systems theory can still be used to describe how variables inside a cultural system can interact over a period of time.

Moreover, practically, the application of systems theory may deter the archaeologists from making further archaeological investigations on the subject under study since the available data have been proved by systems theory to be useful in reconstructing the past society of man through scientific and mathematical means. It may reduce the amount of details expected on an artefact and this has far reaching implications on the validity of archaeological interpretation of finds.

In addition, the application of systems theory in archaeological practice would introduce the use of much inferences, gestures, and assumptions, which may be biased by the mind of the archaeologists. This is because after the archaeological recovery of data, during the interpretation and analysis of data, results may be subjective of archaeologist's prejudice. "The greatest critique on

systems theory and its application to archaeological inquiry has to do with functionalism which can also be applied to systems theory. For instance, there is a fatal flaw at the heart of functional explanation" (Matthew, 1999, p.76). Furthermore, systemic arguments depend on functional linkages which are always open to doubts in specific terms. "Functionalism cannot, it is objected, explain change adequately" (Matthew, 1999, p.76). More critiques on systems theory came from the fact that political implications of Systems thinking can be seen as objectionable and further that systems theory attempts to understand the society from the outside.

Finally having looked at some of the criticisms of the application of system theory in the archaeological practice, it would be worthy to note here that irrespective of the criticisms, systems theory has done more good than harm to the practice of archaeology. It has introduced a new and more authentic way of interpreting and analyzing archaeological data. It has also brought life in the study of archaeology by way of extending archaeological inquiries to the studying of past cultures.

Conclusion

"Systems approach have been developed along with the move away from linear environment thinking toward models of ecosystems and holistic views of culture and Environment... understanding of what systems theory has to offer archaeology is important to any scholar of the past ..." (Fagan, 1978, p.85). This is because of the fact that systems theory has offered a new way of solving research problems in archaeological inquiries. It has helped archaeologists in the reconstruction of the past society of man through scientific and mathematical study of archaeological data to make assumptions or inferences on the past cultures. This made Ekechukwu (2008) and Nwankwo (2012) to note that archaeology plays significant role in reconstructing past cultures through material remains. And that this scientific discovery is instrumental to achieving sustainable societies. In practice, systems theory has emphasized complex and dynamic relationships among various aspects of cultural behaviour within and between communities and between cultural behaviour and the extra-cultural environment. Systems theory enables the conception of useful and more result-oriented conceptual framework for much modern archaeological inquiries. Also, the idea of cultural systems in archaeological inquiry reminds that every artefact has a context within the many subsystems that make up a total cultural system. It is the responsibility of archaeologists to determine the cultural context in space and time, with the use of the most rigorous scientific methodology at their disposal" (Fagan, 1978, p.74). The critical position of theories in archaeological inquiries has made Johnson to note that "of all the words at stake in archaeological discourse, 'theory' is one of the most contested, and that this contestation is part of what makes our discipline so difficult, so exciting and so intellectually vibrant" (Johnson, 2006, p.173).

In addition, it is worthy to note at this juncture that the use of systems theory in archaeological inquiries was a significant impetus and pedestrian to the rise of the New Archaeology. It invigorates the major critique against the culture-historical methods of the old archaeology. Hodder (1998) rightly pointed out that application of theories has enhanced studies in modern archaeology, establishing a clear cut difference from the old archaeology. This new approach to archaeological inquiry has proven that archaeological inquiry can be done scientifically and objectively, and that information about the past can be discovered. The critique of this system theory in archaeological

inquiry, is an evident that archaeological inquiries is a process and new methods are bound to be introduced to overtake existing paradigms.

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