Cross-Cultural Analysis of Stratification with Societal Taxonomies

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ABSTRACT

Craig Owen**:** Cross-Cultural Analysis of Stratification with Societal Taxonomies
(Under the Direction of Francois Nielsen)

Explanations about the common causes of stratification among societies often rely upon

some form of classification of the societies being studied. Two prominent theories for

classifying human societies used in social research are embodied by the works of Gerhard

Lenski and Elman Service. Both explanations of differences and similarities between

characteristics of societies are centered upon the organizing principles used to order societies.

The organizing principle of Gerhard Lenski's ecological-evolutionary taxonomy of human

societies is based upon the subsistence technology of a society and the nature of its physical

environment. In contrast Elman Service's taxonomy of human societies is based upon a

society's social organization, including its population size and territorial scope. This paper

evaluates the explanatory power of these two classificatory schemas in relation to dimensions

of stratification systems of human societies using cross-cultural data from the Standard Cross

Cultural Sample.

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LIST OF ABBREVIATIONS

EA: Refers to the Ethnographic Atlas dataset

SCCS: Refers to the Standard Cross Cultural Sample dataset

CHAPTER I

BACKGROUND AND SIGNIFICANCE

Social research is often driven by a desire to understand the causes and lessen and the consequences of economic and social inequality. Sociologists refer to the social institutions that create and maintain inequalities as systems of stratification.   Modern industrial societies possess some of the most complex forms of stratification. Researchers studying systems of stratification, therefore, often focus their inquiry on these societies.   Nevertheless the explanation of a condition of human life as pervasive as stratification requires the consideration of evidence from a sample of a broader range of societies, including pre-industrial ones.

One approach to studying the stratification process is through historical and cross-cultural studies. The scope of the data and the different fields this information is collected from creates the problem of how to organize data into a general framework. This issue is important to research because the ability to generalize from ordered phenomena forms the basis of deductive reasoning, one of the foundations of scientific inquiry (Carper et al 1980). A classical approach to organizing the data is to use societies as the unit of analysis and employ taxonomies to arrange the information on different societies in an order conducive to scientific inquiry.

Ideally a taxonomy organizes a large group of different entities into a meaningful order and represents an embodiment of social theory, though this is not always the case. To

be most useful taxonomic classification implies a systematic cause or causes of variation. In such a case the main classifying principle of the taxonomy is either responsible for, or related to the cause of, similarities within and differences between groups. Therefore, the main issue concerning the categorization of societies derives from the variety of decisions different theorists have implicitly made upon what causal factor to give primary importance.

This paper will deal with two taxonomies that are prominent in the fields of anthropology and sociology. Sociology as a discipline rarely considers a broad range of societies, but where it does it tends to rely on the taxonomy proposed by Gerhard Lenski (Lenski & Nolan 1970). Anthropology tends to rely on the taxonomy of Elman Service (Service 1962, 1975). This has resulted in somewhat inconsistent pictures about the nature and causal structure of human societies presented to students of both fields.

In addition, an explanation of human societies well known to the general public is found in Jared Diamond's *Guns, Germs and Steel* (Diamond 1999; Nielsen 2005). This book illustrates the split between the disciplines of anthropology and sociology. Diamond's explanation of the course of human societies is centered upon the role that technology and the environment play in shaping the course of human history. It is similar to the ecological-evolutionary theory of sociologist Gerhard Lenski (Lenski 1966, 1970, 1994). Despite his environmental emphasis Diamond chooses to categorize societies on the basis of the social organization according to the typology of anthropologist Elman Service (Service 1962, 1975).

The purpose of this paper is to adjudicate between the two taxonomies and to help understand better the causal nature of systems of stratification each helps illuminate. I will evaluate the taxonomies of Lenski and Service on the basis of their ability to model variation

in features of stratification and other societal characteristics between societies using comparative cross-cultural data. To do this I treat the two taxonomies as macro-sociological theories corresponding to alternative non-nested models of the development of institutional forms of social stratification. Further societal features related to conflict resolution, slavery, settlement patterns, and incidence of warfare will also be examined to evaluate the overall explanatory ability of the two taxonomies.

Review of Theories

Service developed a taxonomy of societies that focuses on a society's level of sociopolitical organization as its main classifying principle, though underlying this concept was the reliance on territorial scope and population size (Service 1962, 1975). The taxonomy includes four major societal types: (1) bands (2) tribes (3) chiefdoms and (4) states.[1] A band is a largely egalitarian association of families with fewer than 50 members. Social organization is based around kin-groups with no hierarchical ranking. A tribe represents an increase in complexity, comprising several bands with a total population between 50 and 1,000. Tribes are characterized by limited status distinctions and a decline in kin-groups as the form of social organization. Chiefdoms range in size between 1,000 and 50,000 members. The formal position of a leader is introduced in chiefdoms. States correspond to societies with populations over 50,000 organized around complex social hierarchies and a formal government (Service 1962, 1975; Diamond 1999).

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[1] Beyond the four major types there were also several subtypes: the band was divided into patrilocal, composite, and anomalous subtypes, the tribe was divided into lineal, cognatic, and composite subtypes, and the state was divided between primitive and classical subtypes. However, these types are rarely used and will not be discussed in this paper.

A few examples that might be familiar to readers to give context to these abstract terms includes the !Kung of South Africa that are categorized at the band-level of social organization who live in groups of roughly 10 to 30 people. The link between population sizes and organizational structure are not always the same, as in the case of the Aleut, the indigenous people of the Aleutian Islands, who are classified organizationally as bands. However, their community sizes were recorded between 200 and 400, placing them closer to the tribe in terms of population size. Another example of this case are the Rwala Bedouin, that live in communities similar in size to bands, though organizationally considered tribes. A final example of a society in the dataset is the Incans, classified at the upper end of organizational complexity as a state.

In contrast, Lenski developed a taxonomy that organized human societies based on the levels of subsistence technology similar the typology originally developed by Goldschmidt (Goldschmidt 1959, 1960, Lenski 2005 and Lenski & Nolan 1970). The original taxonomy organized societies on a line of technological development in subsistence technology from hunting and gathering to increasingly sophisticated methods of farming. Lenski argued that only in regions of the world suitable to plow cultivation would subsistence patterns based upon this theorized main line emerge. Accordingly, Lenski's taxonomy includes the addition of societies based upon subsistence types that were specialized to their particular environments and technological development. The taxonomy includes the following major types: (1) hunting and gathering, (2) horticultural (subdivided between simple and advanced) (3) herding, (4) fishing, and (5) agrarian.[2] Hunting and gathering societies are similar to fishing societies by the relying on resources available in the local environment, with fishing

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[2] Along with the types listed, the Lenski's typology included industrial, maritime, industrializing horticultural, and industrializing agrarian societies in the taxonomy. These additional types represent society types that are not represented in the dataset used in this study and will therefore not be discussed in this paper.

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societies using tools to exploit local fish stocks that are a more stable resource than those used by hunters and gatherers. Horticultural and agrarian societies by contrast rely on increasingly advanced methods of plant cultivation for subsistence. Advanced horticultural societies are distinguished in their methods of plant cultivation from simple horticultural societies by employing metallurgical technology. Agrarian societies are in turn distinguished by the advent of plow-based cultivation. Finally, herding societies are adapted to arid climates and use technology that enables them to raise livestock as the principle means of subsistence.

Taking the previous example societies used to give context to society types and using the Lenski taxonomy changes the classification of the !Kung to hunting and gathering and the Incans to advanced horticultural. The Aleut and Rwala Bedouin use specialized subsistence technologies adapted to their particular environments that changes their classifications to fishing and herding respectively.

Causal Logic of Taxonomies

While the classifying principles of the Service and Lenski typologies differ, the causal chain employed by both taxonomies can be viewed as equivalent. The logic of social organization as a causal factor in the Service taxonomy derives from the implications of growing populations, population densities, and social complexity. The nature of interaction between different groups within a society changes as a society's population grows. Newer social institutions emerge that change in complexity and nature to deal with emergent social problems (Luhmann 1982, Allan 2006, Fiske 1991).

An example of this process is the development of institutions for conflict resolution. In small societies where the family is the main social unit, kin groups often resolve conflict by rituals of reciprocal violence and atonement. As a society grows larger the numbers of potentially violent interactions between strangers increase exponentially. Traditional kin-based methods of conflict resolution are no longer as effective at mitigating conflict as formalized methods that come to replace them. In larger societies, judges that rely upon a codified system of laws are more often called upon to resolve disputes. This increases the complexity and stratification inherent in the social processes related to resolving conflicts (Diamond 1999). The ultimate impetus for increasing social complexity in this view is the increase in population sizes and densities.

Likewise the logic of the Lenski taxonomy is that as more technologically advanced forms of subsistence emerge, resulting increases in surpluses of food will allow for the differentiation of new occupations and the specialization of labor. The more advanced forms of subsistence will also decrease the rate of resource depletion and increase the amount of food produced per acre, allowing for more stable residence patterns and greater population densities. Therefore, different forms of subsistence permit different levels of social complexity (Lenski 1970, 2005).

The chain of reasoning that derives from the theories embodied by both taxonomies is presented in Figure 1. In this view both social complexity and subsistence technology independently influence the nature of societal features. In addition, subsistence technology has a separate impact upon the nature of social complexity through its relationship to population sizes and densities.

From this viewpoint emerges the idea of a meta-theory for the nature of social features, systems of stratification in particular. In this view, the two taxonomies and their related theories emphasize different mechanisms leading to social inequality. The Service taxonomy treats the social organization of a society as the independent variable influencing the expression of other features in a society. In contrast, the Lenski taxonomy treats social organization, and the population factors underlying this concept, as dependent upon the subsistence technology. From the standpoint of modeling the greatest amount of variation between societies, one can argue that the Service taxonomy focuses on features that are closer in the causal chain to the features of stratification of interest to researchers and thus more useful as an analytical tool. For theorists interested in the root causes of inequality across societies, the Lenski taxonomy may be favored due to its causal relationship to both systems of stratification and social complexity.

CHAPTER II

STUDY DESIGN

This paper will not attempt to adjudicate the two taxonomies solely on their theoretical

statements. The utility of taxonomies relies upon both their theoretical claims of causality

and their ability to organize knowledge on human societies in a manner conducive to the

topic of study. The following sections will develop a means of testing the relative

explanatory power of the two taxonomies in relation to issues of stratification and other

social features. It will do this by evaluating how well the taxonomies are able to model

variation between societies. Cross-cultural analysis is necessary to compare the taxonomies

as the range of variation of phenomena they predict covers a wide array of societies (Udy Jr.

1973). Each taxonomy will be treated as a theory implemented as a specific set of

independent variables. To compare the theories implicit in the taxonomies, societal features

of interest are treated as dependent variables regressed individually on the two sets of

independent variables.

Population and Sample

In this paper I analyze data from the Standard Cross Cultural Sample[3] (hereafter SCCS).

The study population in the SCCS includes 186 societies pinpointed to a particular time and

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[3] The analysis in this paper was conducted using the SCCS, with results replicated where possible using data from the Ethnographic Atlas. While not all variables used in this paper are present in the Ethnographic Atlas, the predictors of social stratification used in this paper are present in comparable form (Nielsen & Owen 2007) in both data sets and their analysis is also presented as supporting evidence in this paper.

place. A society in the SCCS refers to a specific local population that reproduces a way of life. Information about the societies was compiled from the research and reports many ethnographers working independently and originally collected into one set by Murdock and White (1969). At the present time the data set includes 2,000 variables contributed by different researchers measuring features of a society ranging from the sexual division of labor, layers of judicial hierarchy, presence of slavery, and numerous other variables. (Murdock and White 1969, Divale 2000)

One of the methodological issues of cross-cultural research, known as Galton's Problem, involves interaction between societies. Causal inference based upon correlations assumes the independence of cases. However, in the historical development of human societies similarities between them can arise because of common descent and cultural diffusion. (Gaulin and Boster 1997, Sekaran 1983, Nielsen 2005). Therefore, it is difficult to make valid causal claims from comparative research about the relationship between features of a society. The relationship between societal features may either be the outcome of functional social processes or the result of societies with a common ancestor society sharing historical similarities.

The construction of the SCCS took this issue into account by choosing societies for inclusion in the sample in a way that maximizes statistical independence of the observations. The sample was constructed by selecting from the over 1200 societies represented in the Ethnographic Atlas (Murdock 1967). Selection was carried out by grouping societies into approximately 200 "sampling provinces" that separated societies both geographically and through an assumed historical separation of at least 1,000 years. This creates clusters of similar societies from which one society was selected from each sampling province, typically

a well-documented society (Murdock and White 1969). As this paper argues that taxonomies implicitly incorporate assumptions of causation in their construction it will primarily use the SCCS for its explicit handling of this consideration.

The Lenski and Service taxonomies discussed in this paper are used to categorize pre-industrial societies. However, the processes related to increasing social complexity are theorized to hold for all human societies. Lenski identifies a society as "a politically autonomous group of people which engages in a broad range of cooperative activity" (Lenski 1970). Service uses Goldschmidt's (1959, 1960) definition of societies by conceiving the structure of society as composed of smaller social units, called groups, and recognized social positions (Service 1962). These definitions are not mutually exclusive, but rather emphasize different characteristics for defining a society. Further, these definitions do not conflict with the operationalization of society used in the SCCS. The lack of any contradictory definition of society therefore allows me to generalize from the sample of the SCCS without reference to a particular theorist's definition of society. Rather, emphasis shall be given to the operationalization of the taxonomies.

Operationalization of Taxonomies

The two societal taxonomies to be compared were constructed into sets of nominal variables to be used as dependent variables in the analysis. This form of cross-cultural analysis is consistent with an institutional research strategy that explains variation in institutional structure by focusing on concomitant variations in general measures of social organization (Udy Jr. 1973).

The operationalization of a taxonomy to explain variation in societal features is consistent with previous cross-cultural research (Petersen et al. 1982, Nolan 2003, Nielsen 2005). The set of nominal variables, each representing a type of society, represents the taxonomy. This process forms the independent variables in the analysis.

The model for the Service taxonomy is based upon an original variable in the SCCS that measures levels of jurisdictional hierarchy corresponds to the taxonomy of Service. Categories of this variable include, no levels of political authority beyond community (band), one level (tribe), two levels (chiefdom), three levels (states) and four levels (large states).

The Lenski taxonomy was constructed using several different variables measuring the contribution of different subsistence patterns to the food supply (Lenski and Nolan 1970). The *Hunting and Gathering* type of Lenski typology consists of societies where hunting and gathering embody the main subsistence pattern. The societies where farming embodied the majority of food production were split into three categories with *Simple Horticultural* societies defined by their absence of metal, *Advanced Horticultural* societies defined by the presence of metal, but absence of plow cultivation, and *Agrarian* societies defined by the presence of plow cultivation. Societies where fishing contributed to the majority of the food production were coded as *Fishing* societies, and finally societies where herding contributed to the majority of the food supply were coded as *Herding* societies. For the purposes of methods used in this study, the typology was split into six different nominal variables each coded for one of the six types of societies.

Before conducting an analysis to compare the explanatory power of the two taxonomies it is necessary to determine how much overlap there is between them.

Table 1 shows the cross-tabulation of the Lenski taxonomy with Service Taxonomy.

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The Lenski taxonomy in this table has been ordered with the four main types of society, those types not adapted to a specific environment type, listed first with the two specific environment subsistence types, fishing and herding, listed second. This is brought up to illustrate a point about the differences between the two taxonomies. The taxonomy of Service is a uni-dimensional concept, with ordered rankings of social complexity from lower to higher. In contrast, the taxonomy of Lenski is bi-dimensional, including both a concept of ordered ranking of technology from simple to advanced forms, but also a dimension for the environmental context. This presents the issue of where to place the society types with specialized subsistence technology in relation to those forming the main-line based upon plow cultivation.

The table could have been constructed to rank the Lenski taxonomy in terms of population size to better correspond to the Service taxonomy, or it could have been ranked in terms of the relative levels of technology needed for any particular type of subsistence pattern. The result of these two methods of classification would place fishing societies in between hunting and gathering and simple horticultural societies. However, herding societies would either be placed between fishing and simple horticultural (with regards to sustainable population size) or between advanced horticultural and agrarian (with regards to technological level). This is due to the fact that while herding societies support less dense populations they also require technology that is developed in what has been termed the Secondary Products Revolution. The theory associated with SPR assumes that certain technologies developed that permitted both plow based cultivation and subsistence based upon herding c. 4,000 to 3,500 BCE in the Middle East. As a result, two distinct forms of subsistence developed to exploit different ecological niches (Sherratt 1981, 1997, Nielsen 2005). For the purposes of this paper Table 1

illustrates that the taxonomies of Service and Lenski do not necessarily correspond to each other.

The data presented in the table demonstrates a substantial, but not perfect, correlation between the two models of societies. Therefore, although the taxonomies are based upon a similar causal chain, their different emphases of organization will produce different results when used to explain features of social stratification systems.

Operationalization of Societal Features

The features that this paper will use to evaluate the taxonomies upon are: a measure of overall stratification, institutional forms of conflict resolution, slavery, settlement patterns, and warfare. Both the theories of Lenski and Service assume that these features are associated with societal complexity. The operationalization of these concepts will, in most cases, be dealt with dichotomously on the basis of presence (coded 1) or absence (coded 0) of the particular feature in a society. The exceptions to this general scheme are noted and include those variables that use scale measures.

Stratification involves the hierarchical arrangement of groups within a society. The basis of stratification in a particular society ranges from occupational to ethnic groups and other categories humans construct to differ themselves from each other. Two indicators measuring the presence of purely class based stratification and one measuring the presence of social stratification are used as the main measures of stratification. *Class stratification* is based upon a scale variable in the SCCS that scores a society from absence of status differences among freeman to presence of complex class systems. This variable is recoded into a dichotomous variable measuring the presence of class-based stratification. The *social*

stratification scale incorporates the concepts of both ethnic and class-based stratification along with the presence or absence of slavery. This variable is pre-coded in the SCCS using a five point scale.[4] [For previous research using this variable see Gaulin and Boster 1990, Sanderson et al 2005.]

Slavery is a particular form of stratification that involves the forcible domination of one group by another. The practice of slavery also increases with increasing societal complexity, although this trend begins to reverse in agrarian societies. *Slavery* is a dichotomous measure of whether a society currently practices slavery. [For previous research using these variables see also Nielsen 2005.]

Conflict between different groups is a pervasive feature of society. A dichotomous indicator of *violence* in a society will be used to capture the presence of moderate or frequent interpersonal violence. This measures the presence of social conflict that requires methods for resolution. Conflict is dealt with through a range of practices depending on the society type. One type of practice involves the institutionalization of means for resolving conflict. This practice can take the form of a specialized police force or the use of judges and laws to mediate disputes. Two dichotomous indicators are used measuring the presence or absence of *formalized police forces* and of a *formal judiciary*, respectively.

Conflict also exists between different societies and often takes the form of warfare and military conquest. *Warfare* is an indicator showing the presence or absence of warfare in a society pre-coded in the SCCS. [A study of warfare in pre-industrial societies using the SCCS measures of warfare with the Lenski taxonomy and population pressure as

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[4] A composite variable for social stratification was constructed to check the coding reliability of the pre-coded variable. I constructed this variable using indicators of the concepts of slavery, caste and class stratification present in the SCCS to construct a variable using the same scale as the pre-coded social stratification variable. A correlation of 0.95 was found between the variables, indicating a high degree of reliability in the original coding.

independent variables is described in Nolan 2003.] In this study I will expand Nolan's

analysis of presence of warfare to include other taxonomies as independent variables.

With increasing societal complexity the settlement patterns of a group change from forms

of nomadism to fixed settlements of increasing size (Diamond 1999). Two pre-coded

measures of settlement patterns are used to capture this process. *Settlement patterns*

measures the degrees of nomadism or sedentarism on a five-point scale of increasingly

sedentary residence. *Fixity* measures the degree of complexity of settlement patterns, from

nomadism to several complex settlements, along an eight-point scale.

Table 2 presents predictions made about trends across types of societies implicit in each

taxonomy. Appendix A documents the original codes for the variables used in this analysis

and Appendix B explains any recoding.

Analytical Techniques

The societal features are treated in the analysis as dependent variables. The different

taxonomies are treated as independent variables. The purpose of the analysis is to compare

the proportions of explained variation in the dependent variables achieved on the basis of the

different models[5].

The theoretical statements of each supporting theory are compared based on how the two

taxonomies predict the data using various forms of analysis common to social research. A

first stage of the analysis examines how closely the patterns predicted by each theory (Table

2) match the actual data. In a second stage of analysis logistic, multinomial logistic, and

linear regression will also be used to compare the two taxonomies. The operationalization of

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[5] The addition of other independent variables to maximize the proportion of explained variation in all models is
not necessary as the purpose of the paper is not to attempt to account for all variation, but to compare how the
taxonomies account for variation in societal feature between societies. (Lee and Stone 1980, Udy 1973).

the two taxonomies treats them as *non-nested* models. Previous cross-cultural research has

tested for relationships between independent and dependent variables using comparisons of

the R-squared or pseudo R-squared (Nielsen 2005) and correlations coefficients and

comparison of means (Petersen et al. 1982, Lee and Stone 1980, Nolan 2003). A comparison

of non-nested models can also be conducted using Bayesian Information Criterion goodness

of fit tests (Raftery 1995). In this paper I first use a comparison of R-squareds and pseudo

R-squareds between the different models in a summary table to identify trends. I then

conduct a more in-depth analyses of specific variables using goodness of fit tests and a

comparison of the results from logistic and regression analysis.

CHAPTER III

RESULTS AND ANALYSIS

One method of examining the relationship between society type and social characteristics is to represent the data in table form equivalent to Table 2. The variables chosen for this analysis are dichotomous to make it possible to show the percentage of societies in each grouping that possess the social feature. For the taxonomies to be useful to social theory, the percentages of each society type possessing a given social feature should match the directional statements presented in Table 2. Table 3 presents information from the data set related to the variables measuring stratification and institutional conflict resolution.

The table represents one way of using a taxonomy to organize data about societies. Both taxonomies are shown to organize societies in a manner that also reveals information about societal features consistent with the predictions of their supporting theories. For example, in both taxonomies presence of *class stratification* increases monotonically from smaller societies to relatively more complex ones. Likewise, the incidence of *slavery* has a curvilinear relationship with societal complexity, increasing in frequency from small Hunting and Gathering societies to a point corresponding to Advanced Horticultural societies and then showing a decreasing frequency (Lenski 1966).

Despite these similarities in explaining the directional relationships of societal features, there are conspicuous differences between how the two taxonomies organize the data. The Lenski taxonomy shows lower percentages of societies possessing class-based stratifications

and slavery at the level of hunter-gatherer than does the Service taxonomy with it's corresponding society type, the band. This is partly the result of the more inclusive nature of the category of band in the Service taxonomy. From the previous societal examples, both the Aleut and the !Kung are considered to be organizationally bands, despite utilizing different subsistence technologies. Fishing societies like the Aleut are also shown to have higher incidences of systems of stratification.

A summary of the logistic, multinomial logistic, and linear regression models used in this paper is presented in Table 4. The table summarizes the results of logistic regression for dichotomous variables (*police, judiciary, violence, class, slavery*, and *warfare*) and ordinal logistic regression for the scaled variables (*social stratification, settlement* and *fixity*).

Both taxonomies fail to show a statistically significant relationship between levels of violence and society type. Despite the lack of a relationship between violence and society type, there is a strong relationship between institutional forms of conflict resolution measured in the presence of *police and judiciary* and society type shown by both taxonomies. This indicates that the presence of formalized means of conflict resolution have a relationship to the causal mechanisms emphasized by both taxonomies separate from a relationship to the assumed impetus violence presents for such institutions.

The Lenski taxonomy does show a noticeable advantage in the predictive efficiency for *settlement patterns* and *fixity of residence*. A reference to the example societies of the Aleut and !Kung can demonstrate the reason for this closer relationship. Both groups are organizationally bands, however, the reliance on hunting and gathering for subsistence requires the !Kung to consistently move when resources are depleted in their local vicinity. In contrast, the Aleut's reliance on fish stocks, which are less easily depleted, allows for

more permanent settlements. Similarly, other forms of subsistence technology include

implicit assumptions of settlement patterns, with herding societies such as the Rwala

Bedouin more likely to be nomadic than horticultural societies such as the Incans, who's

reliance on the cultivation of land requires more permanent settlements.

The Service taxonomy shows a somewhat stronger predictive efficiency with regards to

socio-political features, police and judiciary. In contrast, the Lenski taxonomy has a stronger

predictive efficiency with regards to variables related to features of stratification and

settlement patterns. The Service and Lenski taxonomies also demonstrate similar predictive

efficiency with regards to the scale of *social stratification*. However, the taxonomies do

show a noticeable in predictive efficiency related to class *stratification* and *slavery*. This

finding contrasts the differences in predictive efficiency of the Lenski and Service taxonomy

with regards to the component concepts of social stratification as compared to a global

concept of stratification.

Supporting Analysis of Stratification Indicators from Alternative Dataset

A secondary analysis of the predictors of social stratification that are present in both the

Ethnographic Atlas (hereafter EA) and the SCCS was conducted to evaluate if the findings

are consistent in the less rigorously constructed EA. The results of this analysis are presented

in Table 5, with the results from the previous analysis using the SCCS presented in

parentheses for comparison.

The results for both the Service and Lenski taxonomy show a relationship between the

predictors of social stratification and societal features that is typically stronger in the SCCS

than in the EA. The previously presented findings from the SCCS are restated in parentheses

below the findings from the EA to facilitate comparison. These findings do not suggest that measures of association in the EA are inflated due to correlation of errors between societies related through common descent or cultural diffusion. (Nielsen & Owen 2007). Despite this difference, the directional relationships appear to remain fairly consistent across datasets, with the exception of class stratification. As Lenski's emphasis on the role of subsistence technology is a form of materialism, similar to Marxian theory, as opposed to the more culturally influenced theory of Service, this could indicate a source of further research. However, for the purposes of this paper the general consistency indicates that the findings in both data sets are fairly equivalent, with the acknowledgment that the findings merit a research into the question of the role of materialism that cannot be addressed by this paper.

Analysis of Social Stratification

The scale indicator of *social stratification* was analyzed through an interpretation of means, odds ratios, and the Bayesian Information Criterion. Table 6 presents the results of a mean analysis that show the expected monotonic trend of increasing social stratification predicted by the Service Taxonomy. However, the Lenski taxonomy requires a more nuanced interpretation of the data. Disregarding the special subsistence types of herding and fishing, the Lenski taxonomy shows the same monotonic increase in social stratification. The inclusion of the specialized subsistence types into the analysis presents more information. Fishing societies, regarded as falling between hunter-gatherer and simple horticultural in terms of social complexity nevertheless have a higher mean value of social stratification. Herding societies, however, are analogous in terms of technological requirements to agrarian societies, but represent much lower population densities. Herding

societies are shown to have a lower mean stratification score than advanced horticultural. These results lend some weight to the independent effects of population density and settlement patterns over technological level.

These same patterns are also noticeable through an interpretation of the odds ratios presented in Table 7. The Service Taxonomy presents the same monotonic increase in the odds of increased social stratification from one society type to another. However, the Lenski taxonomy again shows an increase in the odds of social stratification from advanced horticultural to agrarian societies. Fishing societies show higher odds of social stratification than do simple horticultural societies and agrarian societies show the highest odds of social stratification than any other society type.

Despite the findings of the Lenski taxonomy, a comparison of the two taxonomies on the basis of a BIC test slightly favors the Service taxonomy indicating that model fits the data better. However, both taxonomies have the same reported predictive efficiency found by the pseudo R-squared. Given these results, while the BIC test indicates that the Service taxonomy may fit the data marginally better, in part due to penalizing the Lenski taxonomy for using more categories, the interpretation of the means and odds ratios show that the Lenski taxonomy presents a higher dimensional story of social stratification.

A final analysis of model fit for social stratification was conducted by decomposing the variable into its component parts of class, endogamy, and slavery. Table 8 presents the data on tests of model fit for both taxonomies using the BIC and r-squared to evaluate each taxonomy's explanatory power in relation to each component of social stratification. The Lenski taxonomy is consistently lower on the BIC test and higher in terms of the psuedo-r-

squared in this analysis. These results indicate that the Lenski taxonomy models the

variation in the data better with regards to the components of social stratification.

CHAPTER IV

Conclusion

The interpretation of these results should not be limited to demonstrating the predictive

efficiency of one model over another. First, both taxonomies demonstrate the ability to

detect statistically significant relationships between predictors of social stratification and the

society type defined by their respective theories. This demonstrates the viability of the use of

taxonomic logic in social research. It indicates that the differences between society types

drawn in the theories of Lenski and Service are not arbitrary distinctions, but meaningfully

related to the causes and consequences of social stratification. This requires that part of the

explanation of inequality be ascribed to systematic forms of variation. The ability to assume

independence of cases in the SCCS further emphasizes this finding as the relationships

between predictors of social inequality and society types cannot be argued to be entirely or

even substantially an historical artifact as if it were the case the fit of the models would be

less for the SCCS than for EA, the set that controls less for correlated errors.

The statistically significant relationships found by both taxonomies demonstrate that they

each offer a useful form of organizing the data for societies for analysis in cross-cultural

research. This is consistent with the assumption of a causal chain starting with the different

types of subsistence technologies creating different levels of social complexity that results in

the appearance of different societal features, including varying degrees of inequality. This

places an emphasis in research on social stratification for the causal role of both material and

socio-political explanations ascribing to the notion of meta-theory combining the distinct impacts of both causal mechanisms described separately in each taxonomy.

Finally, the results of this paper tend to favor the interpretation of the data through the use of the Lenski taxonomy and the theory it embodies with regards to the components of stratification. However, the indicator used to define a global concept of social stratification demonstrated a stronger statistically significant relationship through the Service taxonomy. These two results show that the ultimate causes of social stratification, when examined in terms of component concepts, are related to the nature of a societies subsistence technology. This favors the use of arguments for material causes by theorists only interested in the nature of class or slavery without regard to other forms of stratification. Nevertheless, when considering the nature of inequality as a global concept, the role of material explanations is improved by acknowledging the role of social complexity and organization in the explanation.

Taken together as one picture, this argues that one of the root causes of social inequality in pre-industrial societies is the result of their material conditions. As societies grow increasingly in size and complexity, the forms of stratification increase in scope as well as diversity. This is in support of the argument made by Lenski (1966) that the nature of inequality in industrial societies shows greater diversity due to the increased range of possible "solutions" to societal problems afforded by their larger size and complexity, relative to, less technologically advanced societies.
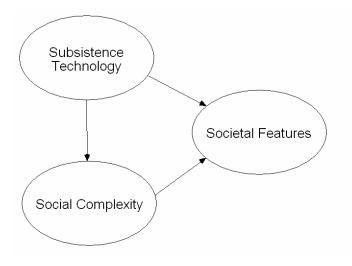
Figure 1: Causal Chain

Table 1: Comparison of Lenski Taxonomy with Service Taxonomy

	Band (0 levels)	Tribe (1 level)	Chiefdom (2 levels)	State (3 levels)	Large State (4 levels)	Row Totals
HG	24	3	0	0	0	27
SH	17	13	4	1	0	35
AH	11	10	10	7	1	39
AG	2	4	5	8	10	29
FI	9	1	1	0	0	11
HE	4	8	2	2	0	16
Column Totals	67	39	22	18	11	157

Table 2: Predictions from Lenski and Service Typologies

	Stratification	Slavery[6]	Conflict Resolution	Warfare	Settlement Pattern
Hunting-Gathering	no	no	Informal	no	nomadic
Horticultural	yes	Small to large scale	Centralized	yes	fixed
Agrarian	yes, land-base	large to small scale	laws, judges	large scale	fixed: cities
Fishing	no	no	Informal	no	fixed
Herding	yes, livestock	yes	individual, status	yes	nomadic
Bands	no	no	Informal	no	nomadic
Tribes	no	no	Informal	yes	fixed
Chiefdoms	yes	small scale	Centralized	yes	fixed
States	yes	large scale	laws, judges	large scale	fixed: cities

---

[6] Statements about slavery by the Lenski taxonomy argue for an increase in the incidence of slavery from simple horticultural to advanced horticultural, represented as small to large scale in the table. Further, a decrease in the incidence of slavery beginning at the agrarian stage is represented as large to small scale. Both statements are representing a curvilinear relationship for the incidence of slavery with a decline in incidence that begins at the agrarian stage, rather than at the industrial stage as is argued to be the case for other forms of social inequality (Lenski 1966).

Table 3: Percentage of Societies with Social Feature

	Class	Endogamy	Slavery	Police	Judiciary
Hunting-Gathering	7.41%	0.00%	3.70%	3.70%	7.41%
Horticultural (S)	48.57%	3.00%	21.88%	35.29%	35.29%
Horticultural (A)	75.00%	20.51%	84.62%	30.77%	58.97%
Agrarian	93.55%	42.86%	43.33%	80.00%	87.10%
Fishing	72.73%	0.00%	45.45%	0.00%	27.27%
Herding	81.25%	33.33%	60.00%	0.00%	73.33%
Bands	34.15%	2.50%	28.75%	9.76%	10.98%
Tribes	68.75%	21.74%	54.55%	15.56%	47.83%
Chiefdoms	73.91%	22.73%	60.87%	54.55%	90.91%
States	94.74%	31.58%	73.68%	77.78%	89.47%
Large States	100.00%	41.67%	33.33%	100.00%	100.00%

Table 4: Summary Results[7]

Societal Feature	Lenski	N	Service	N
Police	0.2403***	130	0.2441***	167
Judiciary	0.2403***	157	0.3564***	169
Violence	0.0426	109	0.0196	130
Class Stratification	0.2905***	160	0.1565***	172
Social Stratification[8]	0.2347***	160	0.2403***	184
Slavery	0.2806***	154	0.0815***	178
Settlement	0.2408***	160	0.0789***	184
Fixity	0.3086***	160	0.0772***	184
Warfare	0.0818	110	0.0982*	131

*** p< .001   ** p<.01   * p<.05

---

[7] There are differences in sample sizes (N) for each independently run regression because no effort is made to control for differences in sample sizes resulting from missing data, as no goodness of fit test relying upon sample size is used. This was done to present as much information as possible in each regression run. A separate analysis of the summary results in Table 4 that enforced equivalent samples for each paired regression confirmed that this choice did not change the directional nature of the results. Later tests that rely on sample size control for these differences.

[8] The results of social stratification may appear to differ in magnitude between this paper and the Nielsen & Owen 2007 paper discussed later, but do not differ in direction. This is because the results presented here are derived from an ordered logistic regression as compared to a linear regression used in the previous paper.   The findings do not change on the basis of the model used, therefore the use of ordered logistic or linear regression models are a matter of preference that do not impact the outcome as long as consistency is maintained throughout the paper.

Table 5: Ethnographic Atlas Results for Predictors of Stratification

Societal Feature	Lenski	N	Service	N
Social Stratification	0.1509*** (0.2347***)	681	0.1914*** (0.2403***)	920
Slavery	0.292*** (0.2806***)	789	0.0751*** (0.0815***)	1097
Class Stratification	0.147*** (0.2905***)	801	0.159*** (0.1565***)	1058
Slavery (Current)	0.0837*** (0.1190*)	789	0.006 (0.0102)	1097

Table 6: Social Stratification Scale Means

	Mean	N		Mean	N
HG	0.07	27	Band	0.52	82
FI	1.45	11	Tribe	1.38	48
SH	0.83	35	Chiefdom	2.04	23
AH	2.03	40	State	3.42	19
AG	3.16	31	Largestate	3.92	12
HE	1.50	16			

Table 7: Social Stratification Scale Ordered Logistic Coefficients

	b	odds Ratio		b	odds Ratio
HG	-	-	Band	-	-
FI	3.91***	49.97***	Tribe	1.63***	5.11***
SH	2.86***	17.46***	Chiefdom	2.77***	15.90***
AH	4.68***	108.13***	State	4.64***	103.14***
AG	6.97***	1068.87***	Largestate	6.76***	859.52***
HE	3.89***	48.83***			
Log-Likelihood	-179.48		Log-Likelihood	-179.58	
R-Squared	0.25***		R-Squared	0.25***	
BIC	404.51		BIC	399.67	

*** p< .001   ** p<.01   * p<.05

Table 8: Components of Social Stratification Goodness of Fit Tests

	Lenski		Service	
	BIC	R-Squared	BIC	R-Squared
Class	177.57	0.2558***	186.8	0.1591***
Endogamy	134.86	0.1841***	146.28	0.1382***
Slavery	179.4	0.2844***	215.7	0.0863**

Original Codes

Data Set: Standard Cross Cultural Sample

Independent Variables

Societal Taxonomies

Jurisdictional Hierarchy Beyond Local Community (Service Taxonomy)

```
 2    . = Missing data
82    1 = No levels (no political authority beyond community)
48    2 = One level (e.g., petty chiefdoms)
23    3 = Two levels (e.g., larger chiefdoms)
19    4 = Three levels (e.g., states)
12    5 = Four levels (e.g., large states)
```

Variables used in Construction of Lenski Taxonomy

Subsistence Dependence

	Gather	Hunt	Fish	Animal	Agri
0 = 0 - 5% Dependence	86	64	57	77	44
1 = 6 - 15%	51	47	55	39	11
2 = 16 - 25%	23	33	29	29	4
3 = 26 - 35%	9	19	14	19	2
4 = 36 - 45%	9	11	12	7	16
5 = 46 - 55%	4	5	11	3	36
6 = 56 - 65%	3	3	5	2	39
7 = 66 - 75%	–	2	1	1	17
8 = 76 - 85%	1	1	1	4	13
9 = 86 - 100%	–	1	1	5	4

Animal and Plow Cultivation
```
153    1 = Absent (no plow animals)
  2    2 = Not aboriginal but well established at period
           of observation
 31    3 = Prior to contract
```

```
Predominant Type of Animal Husbandry
     55    1 = Absence or near absence of large domestic animals
     30    2 = Pigs the only large domestic animals
     15    3 = Sheep and/or goats without larger domestic animals
     10    4 = Equine animals (horses, donkeys)
      3    5 = Deer (reindeer)
      5    6 = Camels, alpacas, or llamas
     68    7 = Bovine animals (cattle, mithun, water buffalo, yaks)

Presence of Metal Working
      2     . = Missing data
    102    0 = Activity absent or unimportant
     83    1 = Activity Present


Subsistence Technology
(Lenski Taxonomy, see Appendix B for construction notes)

     26     . = missing data
     27    1 = hunting and gathering
     35    2 = simple horticultural
     40    3 = advanced horticultural
     31    4 = agrarian
     11    5 = fishing
     16    6 = herding
```

Dependent Variables

Conflict Resolution

```
Police

      6     . = Missing data
    124    1 = Not specialized
      4    2 = Incipient specialization
      4    3 = Retainers of chiefs
      6    4 = Military
     42    5 = Specialized


Judiciary

      3     . = Missing data
    103    1 = Absent
      6    2 = Not local
     49    3 = Executive
     23    4 = Appointed by executive
      1    5 = Priesthood
      1    6 = Hereditary
```

Moderate or Frequent Interpersonal Violence

```
55    . = Missing data
43    1 = Absent
88    2 = Present
```

Stratification

Presence of class stratification / social classes

```
 -    . = Missing data
76    1 = Absence among freemen
45    2 = Wealth distinctions
 3    3 = Elite (based on control of land
           or other resources)
37    4 = Dual (hereditary aristocracy)
25    5 = Complex (social classes)
```

Social Stratification

```
65    1 = Egalitarian
52    2 = Hereditary slavery
19    3 = 2 social classes, no castes/slavery
20    4 = 2 social classes, castes/slavery
30    5 = 3 social classes or castes, with or without slavery
```

Caste Stratification (Endogamy)

```
  5   . = Missing data
154   1 = Absent or insignificant
 17   2 = Despised occupational group(s)
  3   3 = Ethnic stratification
  7   4 = Complex
```

Slavery

Type of Slavery

```
  6   . = Missing data
100   1 = Absence or near absence
 27   2 = Incipient or nonhereditary
  9   3 = Reported but type not identified
 44   4 = Hereditary and socially significant
```

Settlement Pattern

```
Settlement Patterns
     26    1 = Nomadic or fully migratory
     24    2 = Seminomadic
     13    3 = Semisedentary
      3    4 = Compact but impermanent settlements
     20    5 = Neighborhoods of dispersed family homesteads
     17    6 = Separated hamlets, forming a single community
     75    7 = Compact and relatively permanent settlements
      8    8 = Complex settlements


Fixity of Residence

     28    1 = Nomadic
     21    2 = Seminomadic
     20    3 = Semisedentary
     15    4 = Sedentary; impermanent
    102    5 = Sedentary
```

Warfare

```
Warfare or Fighting

     53    . = Missing data
     41    1 = absent or occasional or periodical
     92    2 = frequent or endemic
```

Appendix B

Variable Coding Description

Subsistence Technology

A society was coded as *hunting and gathering* if 65% or more of a society's

subsistence dependence is based upon the combined output hunting and gathering in the

subsistence dependence variable.

A society was coded as a *fishing* society if one of the following cases holds true: 1)

65% or more of a society's subsistence is based upon the fishing output 2) at least 46% is

based on fishing output and less than 46% is based on the combined output of hunting and

gathering, or 3) at least 36% is based on fishing output and less than 36% is based on the

combined output of hunting and gathering in the *subsistence dependence* variable.

A society was coded as a *herding* society if one of the following cases holds true: 1)

65% or more of a society's subsistence is based upon the animal husbandry output 2) least

46% is based on animal husbandry and less than 46% is based on the combined output of

hunting and gathering, or 3) least 36% is based on animal husbandry and less than 36% is

based on the combined output of hunting and gathering in the *subsistence dependence*

variable.

A society was coded as one the three farming based societies if at least 36% of its

subsistence was based upon agriculture with no more than 36% being based upon either

fishing or herding activities. In addition, a society was distinguished as an *agrarian* society

based on the presence of the plow, an *advanced horticultural* society based on the presence

of metallurgy and absence of the plow, or a *simple horticultural* society based on the absence of both metallurgy and the plow.

Conflict Resolution

Police Specialization

The police specialization variable is a dichotomous indicator measuring the presence or absence of a formal method of conflict resolution. The original variable comes from a subset of variables in the SCCS measuring political organization (Tuden and Marshall 1972) that measures the form of police specialization in a range of types from absence, incipient specialization, and three different formal groups including retainers, military police and specialized police. The decision was made to code all three formal groups as representing the presence of a formal police force. The categories for incipient specialization and not specialized recoded to indicate the absence of a formal group. This gave a final dichotomous variable with 128 cases of societies with an absence of a specialized police force and 52 cases with a specialized police force.

Judiciary

The judiciary variable is a dichotomous indicator measuring the presence or absence of another type of formal method for conflict resolution. The original variable comes from a subset of variables in the SCCS measuring political organization (Tuden and Marshall 1972) that measures the form of judiciary in a range from complete absence to five different formal groups. The conceptualization of formal types of conflict resolution does not require the establishing a distinction between different groups, just the presence. Therefore, the variable was recoded with the original category absent being retained and the other five categories

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measuring the formal type of judiciary being recoded into one category measuring the presence of a formal group.

Stratification

Class Stratification

The class stratification variable is a dichotomous indicator measuring the presence or absence of stratification on the basis of wealth distinctions. The original variable comes from the Ethnographic Atlas (Murdock 1967). This variable measured class based stratification on a five point scale starting with an absence of wealth distinctions increasing to complex social classes. The conceptualization of stratification with regards to class deals with the presence or absence of distinctions. Therefore, the original code for absence was retained, however, the four other categories of increasing wealth distinctions were recoded into one category measuring the presence. This resulted in a recoded variable with an absence of class stratification in 76 cases and the presence of some form in 110 cases.

Social Stratification

Social stratification is a composite measure of three forms of stratification, class based, caste based, and the presence of slavery. Two different measures of this were used in the paper, an original variable from the SCCS measuring social stratification on a five-point scale and a recode of three different variables to replicate the coding scheme of the original. The original measure of social stratification was an ordinal scale starting with egalitarian societies and increasing in degrees of social stratification. The recoded measure of social stratification used the original variables measuring class stratification, slavery, and endogamy

(see social stratification Appendix A for original codes and distributions) to replicate the categories, with a correlation of 0.95 between the two different codes.

A code of 0 for egalitarian societies was constructed by including cases with the following criteria: an absence of stratification among freeman, absent or insignificant caste stratification, and an absence of slavery.

A code of 1 for societies that only possess hereditary slavery was constructed by including cases with the following criteria: an absence of caste based stratification, in addition to the first criteria both the presence of hereditary slavery, and an absence of class stratification among freeman or wealth distinctions among freemen coded.

A code of 2 for societies that have two social classes and no castes or slavery was constructed by including cases with the following criteria: elites based upon control of land or other resources, hereditary aristocracy in a dual class system, in addition to either criteria 1 or criteria 2 societies that had absent or insignificant caste based stratification and an absence of slavery.

A code of 3 for societies that have two social classes and slavery and/or caste segregation was constructed by including cases with the following criteria: elites based upon control of land or other resources, hereditary aristocracy in a dual class system, in addition to either criteria 1 or criteria 2 societies that had any of the following criteria hereditary slavery, despised occupational groups, or ethnic stratification.

A code of 4 for societies that have either three social classes or a complex system of castes with or without slavery was constructed by including cases with the following criteria: complex social classes or complex castes.

Endogamy

Endogamy measures stratification on the basis of caste systems. The original variable comes from the Ethnographic Atlas (Murdock 1967). This variable measured caste based stratification on a four point scale, beginning with an absence of endogamy and increases in the scale of caste based stratification. This concept of this variable used in the paper deals with the presence or absence of any form of caste stratification. Therefore the original code of absent caste stratification was retained, however, the other three categories of increasingly complex caste stratification were recoded into one category measuring the presence of caste stratification.

Current Presence of Slavery or Former Presence of Slavery

The original variable measuring the current or former presence of slavery was based upon a scale of 1 to 4 measuring increasing forms of slavery. The concept of slavery used in this paper measured for the presence or absence of slavery. Therefore the scale was converted to a dichotomous variable indicating whether any form of slavery was present in a society. The original code of absence slavery was retained, however, the other three categories of slavery were recoded into one category measuring the presence of slavery.

Current Presence of Slavery

The variable measuring the current presence of slavery was created by a composite of the previously constructed variable measuring presence of slavery a variable measuring the former presence of slavery. The cases that were coded for presence of slavery were recoded

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to an absence for societies that were coded as only having a former presence of slavery in the original variable.

Settlement Patterns

Settlement Patterns

The variable measuring settlement patterns is an ordinal indicator. The scale increases levels of nomadism to sedentary settlements of increasing complexity. The original coding was retained for use in the paper (see settlement patterns Appendix A for original codes and distributions).

Fixity of Residence

The variable fixity of residence is another indicator of settlement patterns. This variable is differentiated from settlement patterns by only measuring scales of mobility from nomadism to sedentary settlements. No measure of settlement complexity is used in this variable. The original coding was retained for use in the paper (see fixity of residence Appendix A for original codes and distributions).

Warfare

The variable measuring warfare was originally a dichotomous indicator of warfare. The indicator included a code for societies where warfare was absent, occasional or periodical and a code for societies that had frequent or endemic warfare. The original coding was retained for use in the paper (see warfare or fighting Appendix A for original codes and distributions).

Works Cited

Allan, Kenneth. 2006. *Contemporary Social and Sociological Theory.* Thousand Oaks,
 California: Sage Publications.

Carper, William and Snizek, William. 1980. The Nature and Types of Organizational
 Taxonomies: An Overview. *The Academy of Management Review*. Vol. 5, No. 1. pp65-75

Diamond, Jared. 1997. *Guns, Germs and Steel: The Fates of Human Societies*. New
 York: Norton

Divale, William. 2000. "Pre-coded Variables for the Standard Cross-Cultural Sample,
 Volume I & II." *World Cultures* 12: 1-332

Fiske, Alan. 1991. Structures of Social Life: The Four Elementary Forms of Human
 Relations. New York: The Free Press.

Gaulin, Steven J. C. and James S. Boster. 1997. "When Are Husbands Worth Fighting
 For?" *In Human Nature: A Critical Reader*, edited by Laura Betzig, pp. 372–374. New
 York: Oxford University Press.

_____. 1990. Dowry as Female Competition. *American Anthropologist*, New
 Series, Vol. 92. No. 4. pp 994- 1005

Goldschmidt W. 1959. Man's Way: A Preface to the Understanding of Human Society.
 New York: Holt

_____. 1960. *Exploring the Ways of Mankind*. New York: Holt, Rinehart and
 Winston.

Lenski, Gerhard. 1994. Societal Taxonomies: Mapping the Social Universe. *Annual
 Review of Sociology* 20: 1-26

_____ [1966] 1984. *Power and Privalege*. Chapel Hill: University of North
 Carolina Press.

_____ 2005. Ecological-Evolutionary Theory: Principles and Application. Boulder:
 Paradigm Publishers.

Lenski, Gerhard and Nolan, Patrick 1970. *Human Societies: A Macrolevel Introduction
 to Sociology, 1st Ed*. New York

Lee, Gary and Stone, Lorene. 1980. Mate-Selection Systems and Criteria: Variation
 According to Family Structure. Journal of Marriage and the Family. Vol. 42. No. 2.
 pp319-326.

Luhmann, Niklas. 1982. *The Differentiation of Society*, translated by Stephen Holmes and Charles Larmore. New York: Columbia University Press

Murdock, George P. and Catarina Provost. 1973. "Measurement of Cultural Complexity." *Ethnology* 12: 379-392.

Murdock, George P., and Douglas White. 1969. The Standard Cross-Cultural Sample. *Ethnology* 8:329-369.

Murdock, George P. 1967. *Ethnographic Atlas*. Pittsburgh, PA: University of Pittsburgh Press.

Nielsen, Francois. 2005. "Plug-In Macrosociology for the Emerging Synthesis: Ecological Evolutionary Theory & Secondary Products Revolution." Unpublished

_____. 2004. "The Ecological-Evolutionary Typology of Human Societies and the Evolution of Social Inequality." *Sociological Theory* 22:2.

Nielsen, Francois and Owen, Craig. 2007. "Social Inequality and Subsistence Technology: Cultural Inheritance or Internal Development?" Unpublished

Nolan, Patrick. 2003. Toward an Ecological-Evolutionary Theory of the Incidence of Warfare in Preinudstrial Societies. *Sociological Theory*. Vol. 21. No.1 p 18-30.

Petersen, Larry; Lee, Gary, and Ellis, Godfrey. 1982. Social Structure, Socialization Values, and Disciplinary Techniques: A Cross-Cultural Analysis. *Journal of Marriage and the Family*. Vol. 44, No. 1 pp131-142.

Pinker, Stephen. 2002. *The Blank Slate: The Modern Denial of Human Nature.* New York: Penguin Group.

Raftery, Adrian. 1995. "Bayesian Model Selection in Social Research." *Sociological Methodology*, Vol. 25. pp 111-163.

Sanderson, Stephen; Hekcert, Alex; and Dubrow, Joshua. 2005. "Militarist, Marxian, and Non-Marxian Materialist Theories of Gender Inequality: A Cross-Cultural Test." *Social Forces.* Vol. 83 No4.

Sekaran, Uma. 1983. Methodological and Theoretical Issues and Advancements in Cross-Cultural Research. *Journal of International Business Studies*. Vol. 14. No. 2 pp 61-73.

Service, Elman. 1962. *Primitive Social Organization: An Evolutionary Perspective*. New York: Random House.

_____ 1975. *Origins of the State and Civilization*. New York: Norton.

Sherratt, Andrew. 1981. "Plough and Pastoralism: Aspects of the Secondary Products Revolution." *In Pattern of the Past: Studies in Honour of David Clarke*, edited by Ian Hodder, Glynn Isaac, and Norman Hammond, pp. 261-305. Cambridge: Cambridge University Press.

_____. 1997. *Economy and Society in Prehistoric Europe: Changing Perspectives*. Princeton: Princeton University Press.

Udy Jr., Steve. 1973. Cross-Cultural Analysis: Methods and Scope. *The Annual Review of Anthropology*, Vol 2. pp253-270.