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## The “New” Quantitative History. Social Science or Old Wine in New Bottles? (1980) \*

*Jerome M. Clubb*

Much has been written and said in recent years of the emergence of a variety of “new” histories<sup>1</sup>. To the casual observer the diversity of the new histories may seem bewildering and even convey the impression of pretentious craving for the appearance, but not the substance, of innovation. And, indeed, the new histories have provoked substantial controversy and criticism on exactly those grounds. Yet even the most cursory examination of the recent literature suggests numerous departures from the preoccupations of traditional historiography. New themes are explored, new methods employed, new sources exploited and neglected social institutions examined in new ways. Some of the elitist bias that has long been a dominant characteristic of historical research and writing has dissipated as historians have attempted to use new sources to examine the conditions and behavior of the ordinary people of the past. Above all, perhaps, a growing number, but still a minority, of historians have made increased use of quantitative methods and tools. If there is a common denominator that cuts across the varieties of the new histories, it is quantification, and it is possible to speak with accuracy of the recent emergence of a quantitative form of historical inquiry.

These new scholarly interests and endeavors have been marked by their fair share of false starts and mistaken directions. A cadre of curmudgeonly critics among historians, and even including a few practitioners of the other social sciences, have declared all such efforts barren, not history, and fated only to do violence of the literary values and the humane traditions of conventional historiography. It is certainly true that claims for the new histories have sometimes been unduly exalted and that the new approaches to the study of the past have not yet produced the revolutionary new knowledge that their more optimistic and aggressive proponents sometimes promised. Yet it is also true that these new efforts have already enriched historical studies.

The purpose here, however, is not to detail or celebrate the characteristics, accomplishments and failures of each of the new histories. To do so would require a treatise of tiresome length. In any event, numerous “state of the art” essays concerned in one way or the other with these new approaches to historical inquiry have appeared in recent years<sup>2</sup>. These essays, and the numerous works which they refer-

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<sup>1</sup> This paper draws upon two essays written in collaboration with Professor Allan G. Bogue and William H. Flanigan and published in *American Behavioral Scientist*, 21 (November/December 1977). While the present paper profits greatly from their erudition and insights, neither of them is responsible for errors of fact, judgment or interpretation which it may include.

<sup>2</sup> See, for example, Bogue, Allan G. (ed.), *Emerging Theoretical Models in Social and Political History*, in: *American Behavioral Scientist*, 16 (May/June 1973); Bogue, Allan G., and Clubb, Jerome (eds.), *History and the Social Sciences: Progress and Prospects*, in: *Ameri-*

ence, amply demonstrate both the diversity and the vitality of the new histories. The goals of the present essay are different and more modest. It is concerned with quantitative approaches to historical inquiry primarily as practiced by historians in the United States and, in the first instance, with progress toward the emergence of a social scientific history — or, more properly, with progress toward a form of historical inquiry devoted to the development of scientific knowledge of human behavior. A second concern is with obstacles that lie in the way of a form of historical inquiry so conceived and motivated.

### The “New” Quantitative History

Tables, graphs, charts and even elaborate statistical formulations have become common elements in the research reports of historians. Quantification has become an accepted, although by no means universally welcomed, element of the historical discipline. The use of quantitative methods and materials by historians has opened the way for forward steps in the advancement of historical knowledge; major contributions to historical knowledge that rest in critical ways on the application of quantitative tools and materials can be cited; and the use of those tools and materials has resulted in a literature that often appears quite unlike the product of more conventional historical research.

In view of these obvious manifestations of change within the historical discipline it may seem remarkable that, from many perspectives, the most striking developments in historical inquiry have come not from professional historians but from scholars outside the discipline. And here, perhaps to betray a parochial bias, recent comparative studies of political and societal change — whether termed modernization, development or described under some other rubric — that sweep broadly across both modern history and the contemporary era might be particularly singled out<sup>3</sup>. The ultimate value of the theoretical and conceptual formulations that have emerged from such studies is surely questionable, but it is certainly the case that they cast the politics and society of the past in new perspective, point new directions for historical research, and call into doubt long-accepted explanations of historical events. They attempt as well to present an integrated view of politics and society that is often — perhaps usually — missing from the work of historians.

The historical studies conducted by social scientists are remarkable enough in their own right. Two considerations seem more remarkable. One is the fact that social scientists have not placed greater reliance upon the work of historians but have tended instead to develop their own form of historical inquiry. A second and, for present purposes, more important consideration is the reactions of historians to these studies, at least in the United States, and including many quantitative historians. For many historians, both “new” and otherwise, the scope of such largescale

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can Behavioral Scientist, 21 (November/December 1977); and Lorwin, Val R., and Price, Jacob M. (eds.), *The Dimension of the Past: Materials, Problems and Opportunities for Quantitative Work in History*, New Haven 1972. See also Swierenga, Robert P., *Computers and American History: The Impact of the ‘New’ Generation*, in: *The Journal of American History*, 60 (March 1974); and *The New Political History: Progress and Prospects*, in: *Computers and the Humanities*, 11 (September/October 1977).

<sup>3</sup> This is not to overlook the pioneering work of such historians as Cyril E. Black.

comparative studies seems monumental, even grandiose. Critical relations seem to be merely assumed rather than demonstrated; conceptual and theoretical formulations seem excessively abstract and mechanistic and not easily operationalized in terms of historical data. Above all, perhaps, such studies seem to play too fast and loose with chronology and to lack the rich sense of time, place and specific context to which historians are accustomed. Seemingly disparate phenomena are classified, lumped together and compared apparently with little regard for temporal order or historical context. These considerations suggest differences in orientation between historians, on the one hand, and social scientists who use the past as a source of evidence, on the other. They suggest, as well, that history, even quantitative history, has moved only a little way in the direction of social science.

The basis of these differences and their significance can be partially elucidated by brief consideration of the genesis of quantitative approaches to historical inquiry. It is frequently suggested that quantitative history is characterized by a marked affinity with the related social sciences and that, indeed, these new approaches grew out of the social sciences. In fact, affinity with the social sciences is clear and explicit in terms of the use of quantitative techniques and source materials. An affinity is also present, but substantially less explicit and less clear, where conceptual and theoretical formulations are concerned. But the new quantitative history can also and perhaps more accurately be seen as a product of basic canons of traditional historical method. To a considerable degree, the new use of quantitative techniques and source materials grew out of the traditional historiographical requirement that all source materials and all relevant methods be used to gain the most detailed, complete, and objective view possible of past events, personages and situations. Put differently, the use of new techniques and source materials has meant no necessary deviation from the goal of traditional historiography — to describe and reconstruct the past “as it actually happened”. Neither does that use involve necessarily a departure from the methodological assumptions of traditional historiography, nor does it necessarily look directly toward development of scientific knowledge of human affairs.

These considerations may help to explain some of the characteristics of early applications of quantitative techniques and materials by historians. In general, quantitative historians did not escape the tendency to focus research upon limited historical episodes and problems. That tendency in turn also worked, of course, to promote an excessively compartmentalized and static view of human affairs. If anything, moreover, the higher costs of research using quantitative data and methods, as compared with more conventional approaches, led initially to concern for even more narrow and more limited research topics and to heavier emphasis upon case studies. Thus the findings produced by much of the early work were of limited or, at best, unknown generality. This is not to issue a blanket indictment of the case study approach. It is to say, however, that the early view — that multiplication of case studies in the absence of comparable methods and data and without theory would lead to general findings — was fallacious.

A more serious legacy of traditional historiography was in the areas of concept and theory. As David Potter observed in 1963:

Orthodox or formal historical method was shaped at a time when men believed that a body of data would reveal its own meaning and would interpret itself, if only it were

valid or authentic and were arranged in time sequence. The central problem of method, therefore, was to validate the data rather than to interpret them. Hence the problem of historical interpretation was neglected; indeed its very existence as a problem was denied at the theoretical level, and the principal questions which the problem of interpretation ought to have posed were left to nonhistorians. Thus the problem of causation has been left to the philosophers; the problem of human motivation has been left to psychologists; the problem of social organization has been left to the sociologists.<sup>4</sup>

Thus valid understanding of historical events, processes and persons could be gained simply by consulting all relevant sources — or, through “emersion in the sources” as it is still often put. Causal relations were seen as self-evident or asserted on the basis of intuition; human attitudes and motivation were also seen as self-evident or identifiable essentially through processes of empathy. Interpretation, systematic theory and generalization were unnecessary. To a considerable degree the early quantitative historians retained these views and assumptions, and it is by no means the case that they have yet entirely disappeared.

The impact of these assumptions was readily observable in much of the early work of quantitative historians. Energy was invested in acquiring conversance with the tools of quantification. Emphasis was placed, however, on techniques of data analysis, and for many data analysis was apparently simply an alternative means to “emersion in the sources”. But despite investment of energy, familiarity with techniques of data analysis was usually gained through self-training and in essentially “cookbook” fashion. Outside the field of economic history, neither training opportunities, the curriculum in history, nor the structure of professional rewards were such as to encourage acquisition of meaningful formal training in mathematics and related areas. The consequence was that the properties of statistical procedures were often not fully understood with the further result that all too frequently applications of those procedures were naive and erroneous.

Too little attention was directed to problems of conceptualization, measurement and inference. It was not fully recognized that selection of appropriate statistical models requires conceptualization of the historical processes and phenomena of concern. In the absence of that conceptualization, inappropriate statistical models were frequently applied. Much of the early work of quantitative historians involved a marked tendency to, in effect, “reify” empirical data and to treat empirical data as effectively synonymous with underlying concepts. The measurement gap — the gap between data and concept — was overlooked. Thus voting records were sometimes treated as direct measures of mass partisan attitudes or popular policy preferences, occupational or educational characteristics were taken as straightforward indications of social status or position, and change in such characteristics was taken as a direct measure of social mobility. The need for conceptualization — for auxiliary theory — to link data to concept was not recognized. Causal inferences were often

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<sup>4</sup> Potter, David M., *Explicit Data and Implicit Assumptions in Historical Study*, in: Gottschalk, Louis (ed.), *Generalizations in the Writing of History: A Report of the Committee on Historical Analysis of the Social Science Research Council*, Chicago 1963.

drawn, asserted and refuted, but without adequate empirical warrant or test and without theoretical justification<sup>5</sup>.

The early forays into quantification, in short, did not free historians from the assumption of nineteenth century “scientific” historiography that data are somehow self-interpreting. Like their more conventional colleagues, quantitative historians tended to be essentially atheoretical, although important exceptions could be cited. It was not, of course, that theoretical formulations and generalizations were absent from their work. In fact, the actual structure of explanation in numerous quantitative historical works was provided, not by historical sources, but by generalizations and theories — by “covering laws” — drawn from common sense, personal philosophy, ideology, or an obsolete social science. Indeed, without these generalizations and theoretical formulations, meaningful and explanations of historical events could not have been constructed<sup>6</sup>. These formulations, however, were usually implicit and untested and were seldom subjected to self-conscious and critical examination.

The new economic, or “cliometric”, history — theoretically and mathematically the most elegant and advanced of the new histories — was a partial exception. In this area neo-classical economic theory was explicitly and rigorously employed as a basis for estimation and measurement, to interpret and “make sense” of historical data, and to resolve long-contested questions in economic history. On the other hand, neoclassical theory was primarily used to explain the phenomena of the past; substantially less attention was directed to using the data of the past to extend, test and refine economic theory<sup>7</sup>.

Substantial progress has been made in many of these respects. Greater attention is now given to matters of representation. The case study approach is less commonly employed, and historians less frequently claim generality for findings based upon case studies. Proficiency in the use of analytical techniques has grown, and an increasing number of historians have benefitted from formal training in the tools and methods of quantitative inquiry. In the use of these tools historians have become more sophisticated and subtle, and at least passing concern is directed to problems of measurement. Thus it is possible to speak of the emergence of a new history. Historians now attempt to gain a more complete view of the past; they are more comprehensive in their use of source material; and they are no longer satisfied with a history that merely recounts the doings of the few of power and position of the past. Rather historians have devoted greater attention to the ordinary men and women of the past, to basic but neglected social institutions, and to events and conditions at the “grass roots”.

But if we speak of central tendencies, this is a history that remains primarily dedicated to traditional historiographical goals. While historians have become more

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<sup>5</sup> For a discussion of one illustration of these problems see Clubb, Jerome M., and Allen, Howard W., *Collective Biography and the Progressive Movement: The ‘Status Revolution’ Revisited*, in: *Social Science History*, 1 (Summer 1977).

<sup>6</sup> The point of view expressed here draws upon Hempel, C. G., *The Function of General Laws in History*, in: Gardiner, Patrick (ed.), *Theories of History*, Glencoe/ Ill. 1959; Murphey, Murray G., *Our Knowledge of the Historical Past*, Indianapolis/ Ind. 1973; and Potter, *Explicit Data and Implicit Assumptions*.

<sup>7</sup> See North, Douglass C., *The New Economic History after Twenty Years*, in: *American Behavioral Scientist*, 21 (November/ December 1977).

attuned to the related social sciences, their use of generalization and theory is still largely implicit and uncritical, and the role of theory and generalization in historical explanation is as yet only partially recognized. The quantitative work of historians is primarily concerned with specific episodes and events which are selected for examination on the basis of their intrinsic historical interest. In the main, the goal of quantitative historians is to reconstruct and describe the past "as it actually happened", and reconstruction and description of past events is taken as an end in itself. On the other hand, substantially less in the way of systematic and self-conscious effort is directed to using the evidence of the past to develop generalizations and to refine and construct theoretical formulations. Whether pursued in quantitative or other ways, these goals and efforts fall short of social science and do not promise to fully realize the potentiality of historical inquiry as a means to contribute to scientific knowledge of human affairs.

It may well be that recognition of the value of quantitative methods and materials as tools of historical inquiry will lead to reorientation of the historical discipline in social scientific directions. Quantification is not, however, the only attribute of science. As yet, the use of quantitative methods and materials has led few historians, to use Charles Tilly's words, "quite outside history, in[to] that timeless realm in which situations, persons, or events plucked from the past or the present serve as tests of general statements about social life."<sup>8</sup> A new quantitative history has emerged, but that history carries us only a little way toward contribution to the development of scientific knowledge of human affairs.

This is not to say, of course, that all historians will, or should, pursue social scientific goals. The effort to develop valid and reliable descriptions and explanations of historical events is obviously a laudable intellectual enterprise in its own right. Indeed, valid and reliable reconstruction of past events and situations would be a vital component of social scientific historical inquiry. It is to say, however, that historical inquiry dedicated to scientific ends would require a further and more radical transformation than quantitative, or other, historians have yet accomplished. It is also to say that because of the central and necessary role of generalization and theory in historical explanation, elements of that transformation are required if more valid and reliable reconstruction of past events is to be achieved.

### Problems of Historical Data

Aspects of the required transformation, and broad characteristics of the form of historical studies that would be its consequence, can be readily recognized if the goals and limitations of the contemporary social sciences are considered. A central goal of the social sciences is to identify regularities in human affairs and to develop empirically refutable theoretical formulations which link together and explain those regularities. In the pursuit of this goal, however, the social sciences are constrained by sharply limited capacity to experiment where human beings are concerned. To compensate for these limitations, social scientists have recognized the necessity of examining and comparing social phenomena in a variety of situational contexts, and

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<sup>8</sup> Tilly, Charles, *Quantification in History, As Seen From France*, in: Lorwin, *The Dimension of the Past*, p. 108.

attention is devoted to comparative studies across nations, cultures, regions and subnational groups. The past affords an opportunity to extend these efforts and to examine a wider variety of human behavior in a wider variety of contexts.

Viewed in these terms, the past can be used to formulate hypotheses and to test those based upon investigation of contemporary phenomena, to examine developmental processes, to systematically trace trends and change over time, and to identify the determinants of societal change. The task of a genuinely social scientific historian would be to use the past to construct empirical social theory rather than to merely use social theory to describe and explain specific events of the past. To do so effectively, however, would require that historians give greater attention to the epistemological bases and limitations of their work. Greater and more serious attention to matters of method would also be required and not merely to matters of technique but to broader issues of measurement, design, conceptualization and inference as well. In their teaching and research historians would devote less attention to the specific facts and episodes of history and more to interpretation and theory. Substantial attention might also be directed to classification of historical and contemporary events, processes, institutions and populations in terms of properties relevant to particular theoretical formulations. By the same token, specific events and phenomena would be investigated not for their intrinsic historical interest but in terms of their relevance to theoretical concerns.

But even if reorientations of this sort are both possible and desirable, critical problems are encountered. To a considerable degree these problems relate to the characteristics and limitations of historical source materials, and, it is worth nothing, these problems are equally severe where achievement of the goals of traditional historiography are concerned. Indeed, in view of the gravity of these problems it is legitimate to ask whether historical inquiry can ever be any more than a tincture of empirical evidence combined with bits of useful theory and mixed with large elements of impression, surmise and empathetic understanding.

The source materials upon which historians must rely are virtually by definition "process-produced." It is true that historians occasionally have at their disposal data that were collected by social scientists to serve the purpose of social scientific research. As the specious present slides imperceptibly into the historical past, we can imagine that historians will turn to the rich sample survey data now being religiously collected and maintained by social science data archives. But we can also imagine that historians in the future will regard these data as no less process-produced — produced in this case by the process of social research as archaically practiced in the mid-twentieth century — and will bemoan the fact that the wrong data were collected, the wrong questions asked, and that underlying assumptions and methods were not better documented.

The central difficulty where process-produced data are concerned is, of course, that the data were not collected, compiled and preserved with the needs of researchers in mind. Rather they are simply the byproducts of ongoing social, governmental and economic processes. Historical process-produced data involve additional complexities for these are data that have been filtered and winnowed by the processes of time. Historical research, in other words, is limited not only to data — and information about data — that was once collected but also to data and information that have



survived. Historical data, in other words, are the residual process-produced data that have survived the ravages of time.

In their work historians sometimes confront an embarrassment of riches but most frequently their research must be conducted below the data poverty line. For a few problems, relevant data are voluminous indeed, and their effective use would involve a truly monumental data collection and processing effort. For most problems, however, data are at best incomplete, and for vast areas of historical concern data are virtually nonexistent. Aside from a few treasure troves, for example, data that bear on mass attitudes in the past do not exist, and statements in this area must be based on often dubious inferences from behavioral data.

Historians, of course, give great thought and attention to their sources. Indeed, source criticism is a central element of traditional historical methods. But conventional source criticism carries us only a little way. External source criticism is concerned with assessment of the authenticity of sources; internal criticism involves examination of texts to identify error, misrepresentation and inconsistency. A systematic historical inquiry that attempts to conform to scientific canons of verification and explanation requires much more knowledge of the nature and properties of sources and data.

Murray Murphey is one of the few historians who has devoted systematic attention to the characteristics of historical data and to the methods available for their use. He singles out five methodological problems that result from the characteristics<sup>9</sup> of historical data. While these problems could be summarized in various ways, Murphey's discussion is both succinct and useful. The first of these is the problem of quantity which was just alluded to. The second is the problem of aggregation. Historical data are frequently available at a level of aggregation that is inappropriate to research concerns. In the most usual case, data are available in the form of summary measures or indices or as aggregated values for population groups and geographical units. It is not, of course, that summary measures and aggregated data are useless for many of the purposes of research. In fact, such data are frequently useful indeed. It is only that a variety of research problems require disaggregated data. A third problem is that of sampling. Most — in a sense all — historical data are incomplete and can be seen as samples from total universes. In most cases, however, neither the properties of the universe nor of the sample are known. Murphey describes a fourth problem as that of "informant bias" which, put simply, is the problem of the reliability and, unlike contemporary social scientists, the historian has no opportunity to query and cross examine informants to determine reliability.

The final problem identified by Murphy is that of measurement which is part and parcel of the general problem of measurement confronted by all social scientists. In the historian's case, however, the problem is enormously complicated by the fragmentary nature of historical data and by the absence of data that bear upon the perceptions, the attitudes, and the cognitive systems of historical individuals. To these problems a sixth, that of specification, can be added, although it is really subsumed under other categories. The simple fact is that historians frequently cannot adequately specify models of historical processes or effectively test for spurious relations because appropriate data were either never collected or were not preserved. As

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<sup>9</sup> Murphey, *Our Knowledge of the Historical Past*, especially chapter 6.

a consequence, capacity to convincingly refute or support otherwise meaningful hypotheses is often sharply limited.

Again, these problems could be stated in a variety of ways, and the preceding summary may do some violence to Murphey's formulations. Even so it may serve to point the issues. We can note that Murphey's formulations seem to reflect an undue preoccupation with research that focuses upon individuals. Research at a more macroscopic level may not confront these same problems, or, at least, not with the same severity. And, as Murphey points out, some of these problems may be amenable to at least partial solution. Even at best, however, the critique is chastening. Clearly, a systematic history that pays due regard to problems of data, verification and inference cannot provide as rich or as fullsome a view of the past as is often pretended to through intuitive, empathetic and impressionistic approaches. It is clear as well that capacity to use the past as a source of evidence to test and construct social theory is similarly limited. Perhaps the first lesson to be learned is one of limitations.

This is not to suggest, however, that the limitations and fragmentary nature of historical data preclude, as has sometimes been argued, application of advanced and complex quantitative techniques. Indeed, quite the reverse is the case. The very inadequacies of historical data require more complex analytical techniques and more subtle and sophisticated applications than are required for more perfect and less obstreperous data. If anything, moreover, greater methodological expertise is probably required for fully effective research use of historical data than is required for much of the more perfect contemporary data employed by social scientists.

Certainly the limitations of historical data dictate research in new areas. Methodological research of the sort that Murphey suggests is obviously required. Areas in which methodological innovation is clearly needed are also obvious. They include techniques for sampling from incomplete records, for estimating missing data, and, most obviously, for estimating individual level relations from aggregated data. And here the picture is even more chastening. While the technical expertise of historians has steadily risen in recent years, it is still, at least in the United States, low indeed compared with that of the related social sciences. Few historians are equipped to carry out methodological research or to solve methodological problems, and unfortunately, given the nature of training programs in the universities of the United States, opportunities and inducements to acquire necessary expertise are still by no means abundant. Thus, there is need for the development of alternative sources of training including that of a "retooling" nature.

And more can be done to improve capacity to employ historical data and to facilitate better realization of the potentialities of the evidence of the past for the pursuit of social scientific goals. Accomplishment of these tasks would require that historians place greater value on prosaic but demanding activities that are now neither particularly well-regarded nor well-recognized in the distribution of professional rewards. Substantial efforts might usefully be directed to the development of systematic measures and indicators of social phenomena extending across long historical periods. These tasks would involve more than data collection; rather they would require systematic evaluation of data sources and collection and combination of data to create estimates to measure and reflect substantive and theoretical concepts. Examples of work of this sort include the historical economic indexes and

estimates developed by the National Bureau of Economic Research, the efforts of Walter Dean Burnham, and the Inter-University Consortium for Political and Social Research to create reliable estimates of mass electoral participation and behavior for the United States during the nineteenth and twentieth centuries, as well as the systematic information on the characteristics of the international state system during the same period developed by J. David Singer and his associates.

Indeed, a new form of historiography is needed, as Charles Tilly suggests in another context, one that is concerned with the nature and properties of historical sources<sup>10</sup>. Much more can be learned of the structure of social bookkeeping systems of the past. If more was known of the functions of historical administrative systems, for example, improved capacity to estimate the kinds of biases and error that are likely to characterize the data which they gathered would be gained. Most historians have encountered shifts in time series which might signify change in production levels, in the incidence of violence, or in rates of voter participation but which might also reflect no more than change in recording procedures or in definitions or classification systems. Better knowledge of the operation of social bookkeeping systems might provide clues for the interpretation of such changes. And much the same can be said of information preservation. If more was known of the functions that information preservation was intended to serve in past situations, then historians might be better equipped to estimate the representative quality and the limitations of surviving records.

Inquiry of this sort would not be limited to the formal operation and functions of historical social bookkeeping systems. More could be learned of the operation of historical taxation systems and of the means by which the tax collector could be cheated. In this way, the error and bias characteristic of production and wealth statistics might be better diagnosed. We know that in the past, as in the present, it was sometimes to the interest of police and law enforcement agencies to maximize the reported incidence of crime and violence, and at other times minimization of that incidence was to their interest. Consideration of the nature of specific historical situations might allow better assessment of the direction, if not the magnitude, of the bias likely to be characteristic of statistics of crime and violence.

Much more could be done in the way of source, or data, criticism. As an example, two historians using what amounts to an extension of methods of internal criticism have convincingly demonstrated the presence of substantial "biased underenumeration" in the data provided by the nineteenth century censuses of the United States<sup>11</sup>. Their work calls into question findings reported in a number of studies based on that source and is depressing in that respect. On the other hand, their work, and that of others, also provides grounds for optimism. At a minimum such efforts look toward identification of the categories of research that the censuses will and will not support. Thus these efforts look toward identification of limits. Obviously, if more can be learned of both the direction and magnitude of bias then pitfalls confronted in the use of the source will be reduced or eliminated. And clearly, such efforts can be extended to other categories of source materials.

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<sup>10</sup> Tilly, *Quantification in History*, pp. 110 passim. See also Narroll, Raoull, *Data Quality Control*, New York 1970.

<sup>11</sup> Sharpless, John B., and Shortridge, Ray M., *Biased Underenumeration in Census Manuscripts: Methodological Implications*, in: *Journal of Urban History*, 1 (August 1975).

More effective use of the evidence of the past would require, in other words, larger and more systematic investment of energy and talent in activities that are now often seen — quite wrongly — as preliminary and essentially ancillary to the actual research process. The requirement is not surprising for it has already been encountered in the other social sciences. Sample survey research is a case in point. What might be termed the technology of survey research has become an area of specialization, and a variety of subspecializations in aspects of that technology have appeared which range from sample and instrument design through interviewing techniques to data preparation, management and archiving. If the use of historical evidence in the pursuit of social scientific goals was taken seriously, appearance of analogous specializations and areas of specialized knowledge and activity related to historical source material might be anticipated, encouraged and rewarded.

But these can be only partial remedies for the shortcomings of historical sources. Historical data that were never collected cannot be created; data that was once collected but destroyed cannot be recreated. Even at best, the data of the past will remain incomplete and error ridden and critical variables will be lacking. The capacity of social scientists to use the data of the historical past to develop scientific knowledge of human behavior will remain similarly limited. It may be worth remembering, however, that astronomers also study phenomena that are distant in both time and space. The data of astronomy are in some ways similar to those of history. The astronomer's data is also a residue — the residual radiation from spacially and temporally distant stellar bodies that has penetrated to earth after countless filtering mechanisms have taken their toll. Astronomers have the advantage of the laws of physics which allow diagnosis of the effects of those filters and which facilitate development of compensatory information. A system of social knowledge that equals physics in rigor and precision probably cannot be expected. Even so, an improved social science would increase the utility of historical evidence for the pursuit of scientific knowledge of human affairs, and the study of the past can contribute to that improvement.

The use of quantitative methods and materials by historians has already contributed to a more comprehensive and enriched view of the past. But if historians are to join in the quest for scientific knowledge of human affairs, the agenda of change remains long and crowded, and it leads “quite outside history”. Historians may not choose to abandon the goals of nineteenth century historiography, but even the effort to create a more valid and reliable view of the past requires further and more radical transformation of their craft than has yet occurred.