Bourdieu and Science and Technology Studies:

Toward a Reflexive Sociology

David J. Hess

Citation: Hess, David J. 2011. "Bourdieu and Science and Technology Studies: Toward a Reflexive Sociology." *Minerva* 49(3): 333-348.

This was a special issue on Bourdieu edited by Mathieu Albert and Daniel Kleinman. The paper here is a final draft. Contact me for the final version.

Abstract:

Two of Bourdieu's fundamental contributions to science studies—the reflexive analysis of the social and human sciences and the concept of an intellectual field—are used to frame a reflexive study of the history and social studies of science and technology as an intellectual field in the United States. The universe of large, Ph.D.-granting graduate programs is studied in two parts. In the first analysis, relations between institutional position and disciplinary type are explored by department. A positive correlation exists between historians of science and institutional position (as higher prestige or capital). In the second analysis, attention to intellectual tastes for research topics is explored at an individual level with respect to departmental position and the individual's discipline and gender. Scholars in nonelite history of science departments have low field interest in democracy, social movements, or public participation; environment or sustainability; and gender, race, or sexuality; whereas those in history of technology programs and nonelite STS programs have a higher field interest in those areas, and historians of technology have a higher interest in class or labor issues. Among social scientists, there is a higher interest among scholars in nonelite programs in environment or sustainability and in democracy, social movements, or public participation.

Keywords: Bourdieu, inequality, science, STS

One of the central problems of field sociology is the reflexive analysis of the intellectual field. Bourdieu's studies of the French educational system and the scientific field provided a framework for understanding the intellectual field that avoided the "short circuit" of Marxist and interests analyses and the loss of attention to social structure and institutional power in agency-oriented frameworks such as actor-network theory (Bourdieu 1988, 1990, 1998). Although his approach failed to gain a large number of adherents in the history and social studies of science and technology (HSSST), an increasing number of scholars is finding value in field sociology as an alternative to both structural and actor-oriented analyses.

Bourdieu suggested that social fields, including the scientific field, are characterized by the forms and volume of capital held by agents, their strategies for action in fields, and their dispositions for action (Bourdieu 1975, 2001). There are various types of capital, including symbolic (such as the field-specific capital of recognition that scientists bestow on each other), cultural (such as expertise that an agent possess about a research field), social (accumulated social ties and networks with colleagues), temporal (control over organizational resources), and financial (such as access to research grants and other sources of funding). A field involves variable positions among agents who possess differing forms and volume of capital, are related to each other through habitus and strategies that inform relations of cooperation and conflict, and occupy positions that are the congealed outcomes of those relations as well as of extrafield relations. Thus, the concept of "field" is considerably broader than the ordinary use of the term research "field" (such as biology), although a research field can be studied as a Bourdieusian field. Likewise, the concept of "agents" can be used broadly to include individuals, networks, and organizations such as departments.

Bourdieu's analysis of the scientific field drew attention to two dimensions that are not always well conceptualized in other approaches to the sociology of scientific knowledge and institutions. First, intellectual fields tend to have dominant and subordinate positions, based on the control of capital. Second, intellectual fields tend to be characterized by producer and consumer poles, that is, by networks of researchers who produce for other producers and by those who produce more for external consumption, such as for policymakers and industry (Albert 2003; Bourdieu 1991, 1996). Although similar to the pure/applied research distinction, the producer/consumer pole distinction involves extrafield relations, such as relations between the scientific field and industry or government, a topic that has become central in the political sociology of science (Frickel and Moore 2006). Conflicts can develop over which pole dominates and where the boundaries are between what is inside and outside the field. An applied field may be designated as "outside" or at least as less worthy of study than a pure-science field.

The questions that Bourdieu raised for the study of intellectual fields are about power, that is, why some researchers, and with them their sense of priorities for future research and tastes for what is considered interesting research, are able to achieve the dominant positions in an intellectual field, and conversely why other researchers and problem areas are consigned to what some political sociologists of science have called "undone science" (Frickel et al. 2010, Hess 2009). The field perspective enables such questions to be asked not only generally, but also reflexively, as Bourdieu did for the French system of higher education. Bourdieu also suggested that field sociology could be used to problematize the research priorities of the dominant networks of a field by contrasting them with those of the subordinate networks, and especially to the extent that the analysis suggests homologies with positions in industrial and political fields (e.g., Bourdieu 1981). In the process, one could develop an understanding of the "misrecognition" that occurs when issues that appear to be purely expressions of the internal dynamics of an intellectual field are homologous with broader cultural categories that are in turn aligned with different positions in the economic and political field.

This study will use the basic conceptual framework of field sociology to explore the field dynamics of HSSST in the United States. Specifically, the project will involve the analysis of two sets of data. In the first, the leading departments of HSSST are analyzed according to discipline and institutional position to suggest that some disciplinary forms of HSSST are associated with higher and lower positions. In the second, the departments and individual researchers are analyzed according to topical research interests to suggest that some research topics are associated with lower field position.

## Discipline and Field Position

The term HSSST is used to define an intellectual field, restricted here geographically to the United States, that includes research programs generally referred to as the history of science, history of medicine, history of technology, history of industry, environmental history, and STS (science and technology studies).

Only U.S.-based programs that have a graduate curriculum in HSSST were counted. Programs were identified based on links from the History of Science Society and Society for History of Technology web sites, as well as from my own long-term knowledge of the field. Graduate curriculum was defined as offering a Ph.D. in STS, history of science, history of technology, or history of medicine, or a graduate certificate or minor in STS. Programs in social medicine, the sociology of medicine, medical anthropology, philosophy of science, philosophy of technology, and science and technology policy were not included. Likewise, STS programs not offering a doctoral curriculum were dropped. The latter included both master's and undergraduate STS programs and some of the graduate-level programs that do not yet offer a minor, certificate, or other specialized graduate curriculum. At least five core faculty in HSSST fields had to meet the inclusion criteria for a program to be counted.

Programs were classified into two groups. One group was pure history programs: Auburn, Carnegie-Mellon, Case-Western, Chicago, Delaware, Duke, Harvard, Indiana, Johns Hopkins, Lehigh, Maryland, Michigan, Minnesota, Notre Dame, Oklahoma, Penn, Princeton, Rutgers, Stanford, UC Berkeley/San Francisco, UCLA, Wisconsin, Yale (N=23). In places where there was a separate program or department in the history of science, only that program was counted. The second group was programs that offer an interdisciplinary Ph.D. in STS or a Ph.D. minor or concentration in STS (called "STS programs"): Arizona State, Cornell, Georgia Tech, Michigan, MIT, Northwestern, Penn

State, Rensselaer, UC San Diego, Virginia Tech, and Wisconsin (N=11). This selection produced a total of 34 graduate programs, which approximates the universe of leading Ph.D. programs in HSSST in the United States.

In this first part of the analysis, two variables were used for the 34 departments. Field position was defined as institutional prestige. There are various ways to determine prestige, and all are imperfect. The prestige ranking for the institution as a whole was used based on peer assessment in the 2008 edition of U.S. News and World Report on a scale of 0 to 5.0, with 2.9 and 4.9 representing the low and high scores of the set. There are several justifications for the choice. First, a more specific measure of departmental prestige is not available for STS programs. One might argue that sociology department ranking could be used as a proxy, but there is often no sociology department in the technical universities where some of the leading STS programs are housed, and the social scientists in STS programs are not restricted to sociologists. Although there are departmental data available for history Ph.D. programs, some universities have separate history of science and history departments, and some of the history of science Ph.D. programs in this sample did not appear in the ranking. Furthermore, a check on the correlation between history department prestige rankings and institutional prestige showed that it was .88 for this group. As a result, it was decided to use a single, consistent variable across history and STS programs.

A second reason for using institutional prestige is that it provides an approximate measure of the local cultural, social, symbolic, and in some cases financial capital available to the program, as well as the extent to which students and faculty have access to the halo effect of institutional location. Such resources arguably become more important in a field that is not ranked. Although “prestige” is used as a category, it was intended to provide an approximation and an accessible measure of a department’s field position in terms of access to various types of capital. Students and junior faculty at more prestigious institutions will tend to have access to the cultural, symbolic, and social capital of leaders of the research field. Furthermore, in the United States the very elite universities tend to be private universities with high endowments, and they are often able to provide better financial and intellectual resources. As Burris (2004) has shown, departmental prestige is also closely correlated with a department’s social capital in the form of networks of circulation and social exchange. Among those networks the circulation of graduate students is paramount.

Anecdotally, the author has seen institutional prestige play a role in the capacity of his own Ph.D. program (Rensselaer) to attract and place graduate students. The anecdotal experience can be quantified through an analysis of the Ph.D. placement of two of the leading STS Departments, which was conducted using publicly available information for 21 students in each program for whom subsequent placement was available through Google searches for each program. The results indicated a 40% higher placement rate of Ph.D. students into major research universities in the higher prestige program. The anecdotal finding specific to the STS field is consistent with a quantitative literature in the sociology of science on cumulative advantage effects on scientific careers, which indicate that the prestige of both the graduate program and the mentor affect scientific careers, especially the first stage of post-Ph.D. placement (reviewed in Fox 1994, 2005; Hess 1997; Long and Fox 1995).

A second measure was developed to separate out differences within programs by discipline and subdiscipline. Within each department or program, the percentage of historians of science and medical science (called "HS") to the total of historians of science, historians of technology (including medical technology), and social scientists and ethicists was calculated. (Thus, for history departments, the denominator of the HS percentage is not based on all historians in the department but only on historians who work on HSSST issues.) The calculation provided one way to separate out quantitatively history of science departments from history of technology and STS programs, which in turned were hypothesized to have different intellectual tastes for the topical variables studied in the second part of the project. The ratio was calculated based on listings of faculty as of fall 2010, for a total of 315 faculty in 34 departments. In cases where faculty covered multiple areas, an assessment was made of the primary area of research, and if the assessment was not clear, the person was not counted. In some cases, where the scholar was roughly half in history of science and half in history of technology, .5 was given to each. Thus, the measure provided a distinction within history programs between programs that are mostly history of science and medical science (HS, or a high HS score) and those that are mostly history of technology, industry, and environment (TIE, or a low HS score) without relying on an entirely subjective classification for departments and programs that were mixtures of the two. Within STS programs, the HS percentage was also calculated, and an additional percentage (percentage of all historians to all HSSST faculty in the program) was calculated.

The calculations were based on “core faculty,” defined as tenure-line faculty who were listed as members of a department or program. In large, interdisciplinary programs that had a breakdown for a steering committee and affiliated faculty, only members of the steering committee were counted. Adjuncts, lecturers, clinical or practice faculty, affiliated faculty, and emeritus faculty were not counted, but core faculty members in administrative positions were counted. Faculty in disciplines outside HSSST were not counted, such as historians and sociologists who did not study HSSST issues and faculty in fields outside history and the social sciences (such as engineers and literature faculty). Historians of medicine were classified as historians of medical science (HS) or medical technology (often for historians of pharmaceuticals), but if most of their work was on general medical issues (such as health policy), they were not counted. Philosophers were not counted unless they did work on ethics and policy, because the philosophy of science tends to be uninterested in the topical variables studied below, and their inclusion would create biases. Policy researchers were counted as social scientists, and the small number of philosophers who had research programs in ethics and policy were counted in the STS programs along with social scientists and policy researchers. The results of the first analysis are presented in Tables 1 and 2.

| History Department | Prestige of Institution | % HS | History Department | Prestige of Institution | % HS |
|---|---|---|---|---|---|
| Harvard | 4.9 | 87 | CMU | 4.1 | 20 |
| Stanford | 4.9 | 100 | Notre Dame | 3.9 | 71 |
| Yale | 4.8 | 88 | Indiana | 3.7 | 100 |
| Princeton | 4.8 | 86 | Minnesota | 3.6 | 78 |
| UCB/UCSF | 4.7 | 85 | Maryland | 3.6 | 20 |
| Chicago | 4.6 | 100 | Rutgers | 3.3 | 33 |
| Penn | 4.5 | 80 | CWRU | 3.4 | 43 |
| JHU | 4.5 | 82 | Lehigh | 3.2 | 0 |
| Duke | 4.4 | 75 | Delaware | 3.0 | 25 |
| U. Mich. | 4.4 | 50 | Auburn | 3.0 | 0 |
| UCLA | 4.2 | 100 | Oklahoma | 2.9 | 87 |
| Wisconsin | 4.1 | 69 | | | |
| | | | N = 23<br>r = . 65 | Mean:<br>4.0 | Mean:<br>64 |

Table 1. Institutional Prestige and Percentage of Historians of Science in History Departments

| STS Program | Prestige of Institution | % HS | % All Historians |
|---|---|---|---|
| MIT | 4.9 | 33 | 60 |
| Cornell | 4.5 | 21 | 36 |

| STS Program | Prestige of Institution | % HS | % All Historians |
|---|---|---|---|
| U. Michigan | 4.4 | 25 | 63 |
| Northwestern | 4.3 | 21 | 29 |
| Georgia Tech | 4.0 | 29 | 71 |
| U. Wisconsin | 4.1 | 22 | 44 |
| UCSD | 3.8 | 36 | 45 |
| Penn State | 3.7 | 8 | 16 |
| RPI | 3.5 | 6 | 19 |
| Va Tech | 3.3 | 10 | 30 |
| ASU | 3.2 | 17 | 33 |
| Mean: | 4.0 | 21 | 41 |
| N=11 | | r = .60 | r = .54 |

Table 2. Institutional Prestige and Percent Historians of Science and all Historians in STS Departments and Programs

The following hypotheses were tested: 1) there are more historians of science in the history Ph.D. programs in higher prestige institutions, and 2) among the STS programs, there are higher percentages of historians of science and all historians among the higher prestige departments. The hypotheses are based on the author's qualitative observations that the programs of the history of technology and industry tend to be in the lower prestige universities and that programs in "science, technology, and society" (which emphasize values and policy issues, sometimes called “low church” STS) tend to be in lower prestige universities. No inferential statistics were used because the tables represent the population of leading programs.

The results indicate that the average level of prestige in history programs and STS programs is the same (4.0). With respect to the first hypothesis, the correlation between institutional prestige and percentage of historians of science in the 23 history departments was moderately strong ($r = .65$). If Oklahoma and Indiana are considered outliers and taken out, then the correlation is strong ($r = .83$). However, an overall correlation does not capture another pattern: several of the programs in lower-prestige institutions are oriented toward history of technology, and conversely in the very elite universities (over 4.5 out of 5.0 in institutional prestige) there were high levels of historians of science. In other words, although there were some history of science programs in the lower-prestige universities, the highest prestige universities were homes mostly to programs with strengths in the history of science (all ≥ 80% historians of science for programs above 4.5 in institutional prestige). Likewise, in programs with fewer than 50% historians of science, the institutional prestige averaged only 2.9.

In the STS programs the percentage of historians of science was lower, even in the very elite universities, than in the history programs. The finding is to be expected because the programs are interdisciplinary. Less intuitively obvious is the pattern that on the average, STS programs had roughly equal percentages of historians of science and historians of TIE. With respect to the second hypothesis, in general in the STS programs, there is also moderate positive correlation between historians of science and institutional prestige (r = .60) and between all historians and institutional prestige (r = .54). One might conclude that hiring more historians of science would increase prestige in the HSSST field, but the conclusion would confuse correlation and causality.

In summary, the analysis suggests that there is a relationship between field position as institutional prestige and disciplinary affiliation. Other than Cornell and MIT, the PhD programs in HSSST in the United States with a high-prestige institutional position (over 4.5) are mainly history of science programs. Within the five STS programs that offer a Ph.D. in STS rather than merely a graduate certificate or minor (Arizona State, Cornell, MIT, Rensselaer, and Virginia Tech), the only notable pattern is that the MIT program has a relatively high number of historians.

There are many possible ways to group the departments; the grouping that follows is based on a distinction between the very elite and less elite institutions (using institutional prestige of 4.5 as the dividing point) and a distinction among history of science, history of technology, and STS programs (using 50% non-HS as the dividing point for history programs). The following four categories are the result:

1) History programs that specialize in history of technology, industry, and the environment (TIE). This is a group of all history programs that have fewer than 50% historians of science (Auburn, Carnegie-Mellon, Case-Western, Delaware, LeHigh, Maryland, Rutgers; N=7). They have an average institutional prestige of 3.4 and an average level of historians of science of 20%.

2) All elite history programs (prestige over 4.5, N=8). This group has an average institutional prestige of 4.7 and an average level of historians of science of 89%.

There were no programs in this group with fewer than 80% historians of science. In other words, elite history programs in HSSST are history of science programs.

3) A residual category of other history programs not included in the first two categories. These programs are mostly history of science, too, but in somewhat less prestigious institutions (N= 8, 3.9 prestige, 79% HS).

4) All STS programs (N=11, 4.0 prestige, 21% HS).

What accounts for the higher concentration of history of science programs at the most elite universities? One explanation is that history of science is an older research field that had a first mover advantage in colonizing the available institutional positions within elite universities. Founding dates are not consistently available, and the evaluation of the explanation will have to be left for future research. However, there is some evidence in support of it. For example, the Department of History of Medicine at Johns Hopkins, which claims to be the oldest of its kind, was founded in 1929, and the Department of History of Science at the University of Wisconsin, which claims to be the first independent history of science department, was founded in 1941. In contrast, the STS programs tend to be of more recent vintage. During the late 1960s faculty at Cornell and Penn State from the sciences, engineering, and humanities and social sciences gathered to explore the societal dimensions of science and technology (Cutliffe 2004, Roy n.d.). Those programs, sometimes called "Science, Technology, and Society," frequently included substantial undergraduate teaching in societal dimensions of engineering. Ph.D. programs in STS (as a transdiscipline known as "Science and Technology Studies") emerged later. Because STS programs also found a constituency in the teaching needs of engineering programs and the accreditation requirements of those programs, some are located in universities that may have strong engineering programs but are not necessarily as strong in the social sciences and history. For history of technology programs, founding dates generally are not given. Three reference points in the history of the field are the Hagley Program at the University of Delaware, which was founded in 1952; the Society for History of Technology, which was founded in 1958 and originally located at Case-Western Reserve University; and the Thomas A. Edison Project, which was founded in 1978 and is located at Rutgers University. It is possible that history of technology programs are, on the whole, somewhat more recent than history of science programs, but again the explanation of the prestige pattern based on founding date is something that will have to await further research.

## Research Topics, Discipline, and Prestige

The second part of the analysis involves assessing the interaction of research topics, discipline, and institutional prestige. The goal is to suggest an approach that can assess the extent to which some research topics in the HSSST field tend to be of lower prestige. In any research field some topics are considered more worthy of study than others, and the dominant networks of a research field can be expected to defend their notions of intellectual taste in the form of a desirable research agenda for the field. The previous analysis suggested that the study of technology among historians may be associated with lower prestige than the study of science. Likewise, in STS programs the study of policy is more concentrated among the lower-prestige STS programs that offer a Ph.D. in STS (Arizona State, Rensselaer, and Virginia Tech). Stories also circulate in the field about the negative career trajectories of Marxist, radical, and feminist scholars. A field sociological approach would encourage the study of such issues through a systematic methodology.

The second part of the analysis provides an exploration of the general hypothesis that the distinctions among prestige and discipline discussed in the first section have a relationship with distinctions of scholarly taste. To explore the hypothesis, four areas of topical interest were studied: gender, race, or sexuality (GRS); class or labor (CL); democracy, social movements, or public participation other than labor (DP); and environment or sustainability (ES). The topics were chosen to test the idea that among scholars located in more prestigious programs, the topics would be considered somewhat heterodox or uninteresting.

The first hypothesis is that there is lower interest in the research topics among programs with high levels of historians of science than programs with high levels of historians of technology, industry, and the environment (TIE) and STS programs. In other words, the topics are more “interesting” to TIE historians and to social scientists. The hypothesis is based on the following reasoning: the environmental sciences are relatively recent phenomenon and therefore not likely to be well represented in the history of science, and the other issues are not always salient in traditional areas of history-of-science inquiry such as the history of the physical and mathematical sciences. Interest in ES was also expected to be higher in the “history of technology” programs, because the departments and programs tend to include more environmental historians.

For each variable, faculty members who devoted most or all of their research time to the topic were given a score of 1, those who had at least one major project or other significant interest were given a score of .5, and those who showed no interest or very little interest were assigned 0. Faculty who expressed an interest in topical descriptions but did not have a research project documented were generally given a score of 0 unless there was evidence for substantial interest in course listings. To assess the level of interest, bio sketches, CVs, statements of research and teaching interest, course listings, and publication lists were reviewed for all faculty who met the inclusion criteria for all of the 34 departments in part I (N=315). In cases where the research interest was not clear, specific publications were reviewed. Each faculty member therefore received a score of 0, .5, or 1 for each of the four variables. The total score for the department or program on a specific variable was then divided by the number of core faculty in the department (the number rated) as defined in part I. To improve validity and reliability, the rating was conducted in multiple rounds with a spacing of several months between the second and third round.

The data are summarized in Table 3. Average faculty interest levels in GRS, CL, DP, and ES were calculated on a scale of 0 to 100 for each department, then averaged across departments. The categories of departments follow those used in the first section. Because the data represent the universe of programs as defined in part I, only means are used. With respect to the first hypothesis of disciplinary differences, the table indicates that interest in class and labor issues is low, and what limited interest that exists is concentrated among TIE historians. On the other three variables, there is a higher level of interest in the history of technology and STS programs. Interest in environmental and sustainability issues is somewhat lower in the elite history of science programs than other history of science programs. The RPI (Rensselaer) score for DP was high and an outlier, and the average was 8 rather than 12 for the STS programs when it was excluded.

Interest in gender, race, and sexuality is somewhat higher in the elite history of science departments, as is the percentage of women faculty. In other words, the elite history of science departments may be somewhat better than nonelite history of science departments at addressing both personnel and topical issues related to race, gender, and sexuality. Nonelite history of science departments included some “history and philosophy of science” departments, which tend to be focused on topics related to the history and philosophy of physics and other exact or natural sciences. Although the percentage of women in the history of technology programs is not as high a percentage as in elite history of science programs and STS programs, the history of technology programs have nonetheless done comparatively well at including GRS issues in their research portfolios. On the issue of race, HSSST is widely recognized as a field that is less diverse than comparison fields. This study identified only 8 of 315 faculty as African or African Americans, and nearly all showed interest in GRS issues. Other ethnic categories were not analyzed.

| Program Type | N | HS Percent | Women Percent | GRS* | CL* | DP* | ES* |
|---|---|---|---|---|---|---|---|
| High-prestige history (science) | 8 | 89 | 41 | 13 | 1 | 1 | 1 |
| Other history (mostly science) | 8 | 79 | 28 | 9 | 1 | 0 | 8 |
| History of TIE | 7 | 20 | 26 | 25 | 7 | 10 | 16 |
| STS | 11 | 21 | 41 | 21 | 1 | 12 (8) | 23 |

Table 3. Program Characteristics and Taste for Four Research Topics

(*0-100 scale, mean departmental score)

A second hypothesis was formulated to study the relationship between topical interests and prestige while controlling for discipline. Correlations turned out to be weak (r = -.3 to r = +.1) overall and also when broken down by historians of science, TIE historians, and social scientists. The strongest correlation coefficients were -.3 for DP and -.3 ES for social scientists; that is, interest was slightly stronger among social scientists in the lower prestige departments (consistent with the table above). A closer inspection of the social scientists for DP and ES revealed that among the five STS programs that grant a full Ph.D. in STS rather than minor or certificate, interest in DP and ES was higher in the three lower-status programs (DP above 15 and ES above 30 in each of the three cases of Arizona State, Rensselaer, and Virginia Tech) and lower in the two Ph.D. programs in high-prestige institutions (DP below 5 and ES below 20 in both of the two cases of Cornell and MIT). In other words, interest in DP and ES is more concentrated in the lower-status STS departments. The GRS scores were also somewhat higher for two of three lower-status programs, but they were close to average for STS for the elite programs. There was no pattern for the CL scores.

A visual interpretation of the field of HSSST using the dimensions of institutional prestige and disciplinary orientation, with a mapping of selected topical interests, is given in Figure 1. The categories of programs are based on the analysis of Part I, with the five Ph.D.-producing STS programs pulled out as separate entities. The diagram approximates in a simplified form the approach used by Bourdieu to represent social fields visually, and it represents a summary of much of the data presented here in tables and in the text. The field diagram uses quantitative metrics, but it is also qualitative in the sense that it draws attention to relative differences in field position rather than the magnitude of effects.

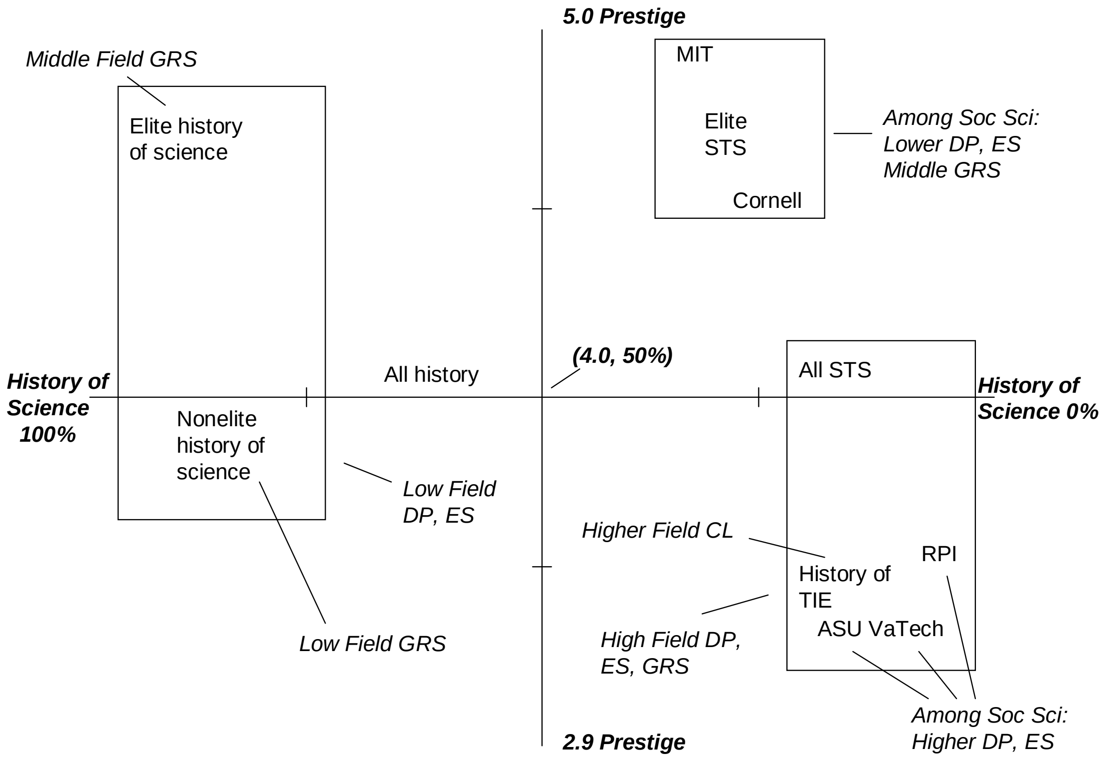


Figure 1. Selected Social and Intellectual Positions in the HSSST Field

The relational aspects of positions of agents in a field is a hallmark of field analysis, and the field map in Figure 1 approximates the mixture of nominal and higher level data used by Bourdieu. He used a technical form of statistical analysis, developed by a French school of statisticians, known as correspondence analysis. (It has some similarities with principal component analysis but uses nominal variables; see Greenacre 2007.) As he argued:

> If I make extensive use of correspondence analysis, in preference to multivariate regression for instance, it is because correspondence analysis is a relational technique of data analysis whose philosophy corresponds exactly to what, in my view, the reality of the social world is. It is a technique which "thinks" in terms of relation, as I try to do precisely with the notion of the field (Bourdieu and Wacquant 1992: 96).

One might argue instead that field analysis and multivariate regression are complementary methods, each of which provides a slightly different picture of the data. For example, in this case one could define the dependent variable as each scholar's career attainment in terms of institutional prestige, then develop a regression model with various independent variables categorized by discipline type, topical interest, and demographics (using ordinary least squares regression on Stata). The demographics that were tracked in the study were gender and assistant professor (the latter under the hypothesis that some people move to higher-prestige institutions over time and that topical interest areas may interact with cohort.) Various regression models were tested (including ones that excluded CL and all demographics), but differences were minimal among them. The variables for TIE historians and social scientists were excluded due to multicollinearity. Significance levels are given with the caveat that the sample and universe are coterminous. (See Table 2.)

Although the $R^2$ is not strong, the data are consistent with the analysis above. They suggest that the on the average, career attainment in terms of institutional prestige (on a scale from 2.9 to 4.9, where Harvard is 4.9) declines if one is not an historian of science and if one is interested in class or labor, democracy or social movements or public participation, and environment or sustainability issues. A modal nonhistorian of science who works on all of those topical issues could suffer a cumulative decrease in institutional prestige of 1.1, that is, the equivalent of being at Penn State instead of Princeton or Yale. Perhaps more typically, a social scientist or TIE historian who works on DP and ES issues would suffer a cumulative decrease in institutional prestige of .64, or the equivalent of being at Penn State instead of UCLA or Duke. Of course, there are individual exceptions, and the field is changing historically. Again, access to higher prestige departments can entail access to higher levels of capital, including the crucial capital of graduate financial assistance, which affects the capacity of an agent to reproduce an intellectual position in the field. Career attainment is not necessarily harmed by working on gender, race, and sexuality issues, and there appears to be no relationship between being female and the attainment of a position with higher or lower institutional prestige. However, the percentage of women in the data set (38%) is still below that of the population as a whole.

| **Independent Variables** | **Coefficient (Standard error)** |
|---|---|
| Historian of science (HS = 1) | .34** (.08) |
| Gender, race, sexuality (GRS = 1) | .00 (.11) |
| Class or labor (CL = 1) | -.47* (.25) |
| Democracy, SMs, or participation (DP = 1) | -.22 (.16) |
| Environment or sustainability (ES = 1) | -.08 (.12) |
| Researcher Gender (Female = 1) | .06 (.08) |
| Researcher Rank (Asst Prof = 1) | .12 (.10) |
| Constant = 3.85<br>(SER = .07)<br>N = 315<br>** p = .00, *p = .06 | F = 5.70<br>Prob > F = .00<br>$R^2$ = .12 |

Table 2. OLS Regression on Individual's Institutional Prestige

Conclusion

The analysis developed here of the HSSST field suggests that institutional prestige has a positive association with the history of science as opposed to the history of technology, industry, and the environment (TIE) and social science. Likewise, there is a weak to moderate negative association with topical interest in the environment or sustainability (ES); democracy, social movements, or public participation (DP); and class or labor (CL). A possible explanation is that TIE, DP, and CL issues are considered somewhat tainted as “applied” topics that are deemed less worthy of inquiry in high-prestige programs. ES may also be looked down upon as an applied policy field as well, but the prestige of the field may be changing within HSSST as the topic of inquiry shifts from environmental policy to the history and sociology of sustainability sciences and environmental expertise. Furthermore, some forms of DP and CL studies may also be viewed with suspicion because they may involve a stance seen as “normative.” Overall there is very low interest in class and labor issues throughout the field. Interest in class and labor is arguably much more central to the field of non-HSSST social scientists in sociology and even anthropology departments, and it is possible that HSSST social scientists develop a sense of intellectual taste that follows the patterns of historians of science rather than those of their colleagues in sociology and anthropology. In this sense, one might argue that the habitus of HSSST social scientists becomes permeated by that of the history of science. Interest in gender, race, and sexuality (GRS) is relatively evenly distributed across disciplines and programs.

Future research might explore other areas of topical interest and utilize other methods, such as a survey method and qualitative interviews. The field sociology of HSSST could also be applied comparatively across countries. For example, in Canada the one Ph.D. program in STS is at the lower-prestige York University, whereas history of science is more prominent at Toronto and McGill. However, in some countries there is less evidence for a strong ranking system or hierarchy of universities, and where the university system is primarily in public universities, the pattern for the HSSST field may be different from that of the United States. One might also study differences between public and private universities in the United States, because general differences in mission might be associated with some of the differences in intellectual taste. In short, there are many additional questions that could be studied in a reflexive study of the sociology of science.

The field sociology of the HSSST field may also provide some insights into the reception of Bourdieu's work in the field. Although the topic is too broad for consideration in detail here, some of the basic parameters can be outlined. Bourdieu's 1975 article on the sociology of scientific knowledge influenced some of the early laboratory studies (e.g., Latour and Woolgar 1986, Knorr 1977, Knorr-Cetina 1981), but his influence on the field declined over time. The decline of interest in field sociology in STS may be attributed to Bourdieu's decision to focus more on the sociology of education, but STS during the 1980s and 1990s also became focused on the negotiation of scientific knowledge among small networks. The approaches associated with constructivism tended to leave aside the analysis of social structure and power (including questions associated with democracy, social movements, and public participation) except to view them through the lens of performativity. When Bourdieu (2001) subsequently wrote on the sociology of science and scientific knowledge, his work was critical of the laboratory studies and microsociological accounts, and reviews by STS scholars of his book on science studies were correspondingly negative (Gieryn 2006, Mialet 2003, Sismondo 2005). However, in the subfields of sociology outside the sociology of scientific knowledge, the influence of Bourdieu's work, especially his analysis of fields, has been growing (Sallas and Zavisca 2007). Furthermore, in recent years the social science component of the HSSST field has begun to take up questions of institutions, democracy, and power (e.g., Frickel and Moore 2006, Kleinman 2003, Wynne 2005). Thus, the snapshot of the field of HSSST provided in this study should be understood to represent a configuration in a particular place and time that is undergoing change.

As the questions asked in HSSST and neighboring fields continue to shift, there is increasing room for reappraisal of Bourdieu's work, as is evident in some recent publications that draw on Bourdieu's work in STS (e.g., Albert 2003, Arnoldi 2007, Burris 2004, Hess 2007, Kim 2009, Kleinman 1998, Panofsky nd, Wainwright et al. 2009). New syntheses could connect field sociology with the achievements of network, social worlds, social construction, and other micro- and mesosociological approaches that have been more prevalent in STS. A Bourdieusian perspective on the fate of his work in HSSST would also suggest that much depends on the politics of intellectual reproduction, specifically how his work is taken up by younger generations of scholars. A dominant network, such as Mertonian functionalism or actor-network theory, can only remain so if it is able to produce students who continue to develop and modify it. In turn, those students must also produce students; otherwise, the network is consigned to secondary reproduction via publications and the recruitment of colleagues who are already established in the field. The capacity for reproduction is a crucial difference between the dominant and subordinate networks; both may produce students, but the second-generation capacity of the students to produce students varies. Because the volume of capital of different universities and graduate programs affects the capacity to recruit and place students, an awareness of the prestige structure of HSSST may be helpful in strategizing and studying recuperative efforts for Bourdieu's work, as well as other approaches that address issues of inequality and power in science, technology, and society.

Acknowledgements

I thank Ken Simons for comments the regression table, and the many helpful suggestions from the editors and reviewers.

References

Albert, Mathieu. 2003. "Universities and the Market Economy: The Differential Impact on Knowledge Production in Sociology and Economics." *Higher Education* 45: 147-182.

Arnoldi, Jakob. 2007. "Universities and the Public Recognition of Expertise." *Minerva* 45: 49-61.

Bourdieu, Pierre. 1975. "The Specificity of the Scientific Field and the Social Conditions of the Progress of Reason." *Social Science Information* 14(6): 19-47.

Bourdieu, Pierre. 1981. *The Political Ontology of Martin Heidegger*. Stanford University Press.

Bourdieu, Pierre. 1988. *Homo Academicus*. Stanford, Ca.: Stanford University Press.

Bourdieu, Pierre. 1990. “Animadversiones in Mertonem.” In Jon Clark, Celia Modgil, and Sohan Midgil (eds.), *Robert Merton: Consensus and Controversy*. New York: Falmer Press. Pp. 297-301.

Bourdieu, Pierre. 1991. “The History of Scientific Reason.” *Sociological Forum* 6(1): 3-26.

Bourdieu, Pierre. 1996. *The Rules of Art: Genesis and Structure of the Literary Field*. Stanford University Press.

Bourdieu, Pierre. 1998. *The State Nobility: Elite Schools in the Field of Power*. Stanford University Press.

Bourdieu, Pierre. 2001. *Science of Science and Reflexivity*. University of Chicago Press.

Bourdieu, Pierre, and Loïc Wacquant. 1992. *An Invitation to Reflexive Sociology.* University of Chicago Press.

Burris, Val. 2004. “The Academic Caste System: Prestige Hierarchies in Ph.D. Exchange Networks.” *American Sociological Review* 69(2): 239-264.

Cutliffe, Stephen. “The Emergence of STS as an Academic Field." R*esearch in Philosophy and Technology, vol. 9: Ethics and Technology*, edited by Carl Mitcham, pp. 287-301, 1989.

Fox, Mary Frank. 1994. “Women and Science Careers.” In Sheila Jasanoff, Gerry Markle, James Peterson, and Trevor Pinch (eds.), *Handbook of Science and Technology*. Thousand Oaks, CA: Sage. Pp. 205-223.

Fox, Mary Frank. 2005. “Gender, Family Characteristics, and Publication Productivity among Scientists.” *Social Studies of Science* 35(1): 131-150.

Frickel, Scott, Sahra Gibbon, Jeff Howard, Joana Kempner, Gwen Ottinger, and David Hess. 2010. “Undone Science: Social Movement Challenges to Dominant Scientific Practice.” *Science, Technology, and Human Values* 35(4): 444-473.

Frickel, Scott, and Kelly Moore, eds. 2006. *The New Political Sociology of Science: Institutions, Networks, and Power*. Madison, WI: University of Wisconsin Press.

Gieryn, Thomas. 2006. “Review of Science of Science and Reflexivity.” *Contemporary Sociology* 35: 185-187.

Greenacre, Michael. 2007. *Correspondence Analysis in Practice*. New York: Chapman and Hall/CRC.

Hess, David. 1997. *Science Studies: An Advanced Introduction*. New York: NYU Press.

Hess, David. 2007. *Alternative Pathways in Science and Technology*. Cambridge, MA: MIT Press.

Hess, David. 2009. “The Potentials and Limitations of Civil Society Research: Getting Undone Science Done.” *Sociological Inquiry* 79(3): 306-327.

Kim, Kyung-Man. 2009. “What Would a Bourdieuian Sociology of Scientific Truth Look Like?” *Social Science Information* 48(1): 57-79.

Kleinman, Daniel. 1998. “Untangling Context: Understanding a University Laboratory in a Commercial World.” *Science, Technology, and Human Values* 23(3): 285-314.

Kleinman, Daniel. 2003. *Impure Cultures: University Biology at the Millennium.* Madison, WI: University of Wisconsin Press.

Knorr, Karin. 1977. “Producing and Reproducing Knowledge.” *Social Science Information* 16: 669-698.

Knorr-Cetina, Karin. 1981. *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science*. New York: Pergamon.

Latour, Bruno, and Steve Woolgar. 1986. *Laboratory Life: The Social Construction of Scientific Facts*. Princeton: Princeton University Press.

Long, J. Scott, and Mary Fox. 1995. "Scientific Careers: Universalism and Particularism." *Annual Review of Sociology* 21: 45-71.

Mialet, Hélène. 2003. "The 'Righteous Wrath' of Pierre Bourdieu." *Social Studies of Science* 33(4): 613-522.

Panofsky, Aaron. nd. "Interdisciplinarity as Scientific Capital Exchange: The Case of Behavioral Genetics." http://www.allacademic.com//meta/p_mla_apa_research_citation/1/8/4/8/0/pages184808/p184808-1.php.

Roy, Rustum. nd. "History of the STS Program at Penn State." http://www.sts.psu.edu/contact-about/history-of-the-sts-program-at-penn-state.

Sallas, Jeffrey, and Jane Zavisca. 2007. "Bourdieu in American Sociology, 1980-2004." *Annual Review of Sociology* 33: 21-24.

Sismondo, Sergio. 2005. "Review of Science of Science and Reflexivity." *Canadian Journal of Sociology* online March-April 1-2.

Wainwright, Steven, Mike Michael, and Clare Williams. 2009. "Shifting Paradigms? Reflections on Regenerative Medicine, Embryonic Stem Cells, and Pharmaceuticals." *Sociology of Health and Illness* 30(6): 959-974.

Wynne, Brian. 2005. “Risk as Globalizing ‘Democratic’ Discourse? Framing Subjects and Citizens.” In Melissa Leach, Ian Scoones, and Brian Wynne, (eds.), *Science and Citizens: Globalization and the Challenge of Engagement*. London: Zed. Pp. 66-82.