Reprinted from Social Science Quarterly, Vol. 66, No. 4, December 1985, Copyright 1985, by permission of the University of Texas Press.

ACCREDITING KNOWLEDGE: JOURNAL STATURE AND CITATION IMPACT IN SOCIAL SCIENCE<sup>1</sup> James A. CHRISTENSON, University of Kentucky

Lee SIGELMAN, University of Kentucky

The impact of the network of journals through which scholars disseminate and accredit their ideas is compared to the prestige hierarchy of journals in sociology and political science. A comparison of prestige rankings of journals with *Social Sciences Citation Index*<sup> $\oplus$ </sup> impact scores suggests a nonlinear relationship: many reputed ''top'' journals receive inordinate credit and many new and less prestigious journals receive less credit than their impact warrants.

The institutional goal of science is the extension of accredited knowledge (Merton, 1942). In order to achieve this goal, scholars need to communicate with one another through regular, open channels. This exchange of ideas is thus an inescapable aspect of scientific research and development. The question for scholars is how and where to disseminate and thus to accredit their work.

Accredited knowledge is grounded in collegial recognition of the individual and her/his work. Not all ideas win equal acceptance, and neither do all the scholars who generate these ideas or all the institutions that house these scholars. For this reason, considerable research has been done on the stratification of scholarly fields-research designed to pinpoint the best, or at least the most reputable, scholars and programs in various fields (e.g., Allison and Stewart, 1974; Bingham and Vertz, 1983; Cole, 1983; Cole and Cole, 1973; Crane, 1965; Long, 1978; Merton, 1968; Reskin, 1977). However, the network of communications undergirding this stratification system remains little understood (Garfield, 1972). Ideally, good ideas, insights, theories, and findings would achieve the impact they deserve on the basis of their merits; but, in accrediting knowledge, the medium of dissemination may be as important as the message.

Journals, along with books, are the prime medium for accrediting knowledge. Cole (1983) observed that "we read papers in journais only after they have been evaluated [accredited] by others. We give people more credit for publishing in prestigious journals" (p. 137). But what do we mean by "accredited"? And to what extent is prestige independent of quality or impact? A paper published in a refereed journal has met the standards of that journal. As Glenn (1971:298) has noted, it is widely recognized that there are status differentials among the journals in any field. To publish a paper in certain journals may be a highly visible badge of success. If a paper appears in a "top" journal, the presumption is that it must be good. Journals, because they are refereed, provide accreditation. But some refereed journals provide much more accreditation than others.

A different form of accreditation is provided by one's peers when they make use of one's work. Seen from this perspective, good work is work that others find useful and consequently cite in their own work. Hargens and Felmlee (1984) summarized their literature review by asserting that "the number of citations to a scientist's work is often recommended as the best single indicator of scholarly recognition" (p. 686). So the accreditation of one's work can be measured in at least two ways: the prestige of the journal in which it is published and the frequency with which it is cited. Of course, work can be widely cited precisely because of where it was published, but these two aspects of accreditation are at least conceptually distinct. Our research question concerns the extent to which they are empirically distinct. How does the latter form of accreditation (citation impact) relate to the former (journal prestige)?

Questions concerning accredited knowledge have both theoretical and practical implications. A journal can achieve the status of a "top" publication outlet for reasons unrelated to the quality or impact of the articles it publishes-reasons that include, but are by no means restricted to, its sponsorship, age, the quantitative/qualitative, theoretical/empirical, and professional/practitioner orientations of its articles, the visibility of its editor and editorial boards, and its past reputation. It seems likely that journals, like departments and universities, establish images that are relatively resistant to change. Thus, journal X, a long-established, discipline-supported journal, may outrank new journal Y in terms of prestige even though Y is publishing more important articles than X is in terms of citation impact.

Many professionals are interested in the accreditation of knowledge for practical reasons. For example, the interests of librarians and information system designers stem from their assumption that the quality of a journal affects user demand for the journal. Science planners find journal ratings helpful in assessing the payoffs of various research programs and the productivity of various research ers and research teams. Journal editors and sponsors use ratings as performance indicators and tion. This research was nativity funded by the Kenneth Agri.

<sup>1</sup>Authors are listed alphabetically. Each has made an equal contribution. This research was partially funded by the Kentucky Agricultural Experiment Station.

Journal	Glenn Prestige Score <sup>a</sup>	<i>SSCI®</i> Impact Score <sup>b</sup> (Average, 1977-79)	Prestige Residua! Score <sup>c</sup>
American Sociological Review	10.0	3.367	1.662
American Journal of Sociology	9.6	2.034	2.310
Social Forces	8.1	0.971	1.645
Social Psychology Quarterly (formerly Sociometry)	7.8	0.944	1.367
British Journal of Sociology	7.8	0.535	1.688
American Anthropologist	7.7	1.815	0.582
Social Problems	7.6	1.041	1.090
American Political Science Review	7.5	1.973	0.258
Demography	7.4	1.133	0.818
Annals of the American Academy of Political and Social Science	7.2	0.425	1.174
Public Opinion Quarterly	7.1	0.851	0.740
American Economic Review	7.1	1.552	0.189
Journal of Personality and Social Psychology	7.1	2.390	-0.470
European Journal of Sociology	6.9	0.435	0.867
Behavioral Science	6.8	0.587	0.647
Rural Sociology	6.7	0.798	0.381
Human Organization	6.7	0.436	0.666
Journal of Social Psychology	6.7	0.283	0.786
Administrative Science Quarterly	6.7	2.293	-0. <b>794</b>
Milbank Memorial Fund Quarterly	6.7	1.192	0.072
International Journal of Comparative Sociology	6.7	0.171	0.874
American Behavioral Scientist	6.6	0.483	0.529
Journal of Social Issues	6.6	1.031	0.098
Social Research	6.6	0.395	0.598
Daedalus	6.5	0.958	0.056
Human Relations	6.5	0.519	0.401
Population Studies	6.5	1.017	0.009
Harvard Educational Review	6.4	2.816	-1.505
Current Sociology	6.4	0.095	0.634
Canadian Review of Sociology and Anthropology	6.4	0.233	0.525
Sociological Review	6.3	0.244	0.417
International Social Science Journal	6.3	0.230	0.428
American Sociologist	6.2	0.740	-0.073
Journal of Marriage and Family	6.2	0.988	-0.268
Journal of Conflict Resolution	6.2	0.638	0.007
Journal of Health and Social Research	6.2	1.602	-0.751
Sociology of Education	6.1	0.403	0.092

TABLE 1 Prestige, Impact, and Related Measures for Sociology Journals

planning guides. Researchers themselves want to pursue a sensible manuscript submission strategy, while department chairs and deans are faced with the need to document the quality of faculty publications in conjunction with tenure and promotion decisions, departmental reviews, and the like (Gordon, 1982).

# The Link between Reputation and Performance

In the fields of sociology and political science fairly clear-cut journal prestige hierarchies have been documented. Glenn (1971) solicited evaluations of professional journals from a sample of sociologists at Ph.D.-granting programs in the

United States, and Giles and Wright (1975) undertook a similar survey of political scientists. Glenn asked his respondents to judge 63 journals in terms of "the average importance of their contributions to the field" of sociology, instructing them to use the American Sociological Review as an anchor for their evaluations. The American Sociological Review was given an arbitrary score of 10, and respondents were told to assign a score of 5 to a journal they considered only half as important as the American Sociological Review, 20 to a journal they considered twice as important as the American Sociological Review, and so on. Giles and Wright's respondents, who rated 63 journals commonly used by political scientists, also employed a 10-point rating system, but their scale was marked by verbal descriptors (0 = poor,

Journai	Glenn Prestige Score <sup>a</sup>	<i>SSCI®</i> Impact Score <sup>b</sup> (Average, 1977-79)	Prestige Residual Score <sup>c</sup>
Sociological Quarterly	6.1	0.221	0.235
Acta Sociologica	6.1	0.174	0.272
Social Science Quarterly	6.0	0.479	-0.068
Southwestern Journal of Anthropology	6.0	NAd	NA
Sociology and Social Research	5.9	0.103	0.127
Sociology	5.9	0.694	-0.337
Sociological Inquiry	5.8	0.187	~0.039
Society (formerly Transaction)	5.7	0.198	-0.147
Sociological Perspectives (formerly Pacific Sociological Review)	5.7	0.222	-0.166
Law and Society Review	5.7	1.760	-1.375
Sociological Analysis	5.7	0.197	-0.146
Journal of Gerontology	5.4	1.316	-1.326
Journal of Research in Crime and Delinguency	5.4	0.735	~0.869
American Journal of Economics and Sociology	5.3	0.237	-0.578
British Journal of Criminology	5.3	0.394	~0.701
Gerontologist	5.3	0.877	-1.081
Crime and Delinguency	5.2	0.831	-1.145
Science and Society	5.2	0.309	-0.734
Journal of Crime Law, Criminology, and Police Science	5.1	1.921	-2.101
Phylon	5.0	0.098	-0.769
Social Biology	5.0	0.571	~1.140
Jewish Journal of Sociology	4.9	0.288	-1.018
American Journal of Correction	4.8	NA	NA
Eugenics Review	4.7	NA	NA
Journal of Negro Education	4.5	0.076	-1.251
New Society	4.5	0.065	-1.243
Federal Probation	3.8	0.326	-2.148

TABLE 1---continued Prestige, Impact, and Related Measures for Sociology Journals

\*Source: Glenn (1971).

<sup>b</sup>Source: Social Sciences Citation Index<sup>®</sup> Annual, vols. 1-3.

"This is the actual value of the Glenn prestige score, less the prestige score predicted from the regression of prestige scores on impact factor scores.

<sup>d</sup>NA: Not available.

2 = fair, 4 = adequate, 6 = good, 8 = verygood, and 10 = outstanding rather than being anchored by a prominent journal.

Sociologists' and political scientists' ratings of their professional journals, as determined by the Glenn and Giles-Wright surveys, are summarized in the first column of Tables 1 and 2, respectively. Two of the top five journals on the political scientists' list (the *American Sociology*) were the top-rated sociology journals. Sociologists, for their part, also gave high marks to the principal journals of their sister disciplines, ranking the *American Anthropologist* sixth and the *American Political Science Review* eighth.

How closely are these reputational ratings related to the actual influence or quality of these journals? "Extensive past research indicates that citations are a valid indicator of the relative quality of work" (Cole, 1983:116). Number of citations is also highly correlated with other measures of quality that sociologists of science have employed (e.g., access to resources, status of degree-granting institutions, initial appointments, mobility). However, quality in this context is defined as intellectual influence—the impact of one's ideas as accredited by others through use in their own work. Citations are a measure of quality, in that they suggest that other professionals working in the same area have found one's ideas valuable.

The Social Sciences Citation Index<sup>®</sup> (SSCT<sup>®</sup>) provides "impact factor" scores for more than 1,300 social science journals. Journals from the disciplines of psychology followed by psychiatry, economics, and law generally have higher impact scores. Sociology journals rank about 10th, with political science journals about 25th. Such differences among disciplines reflect, among other

Journal	Giles-Wright Prestige Score <sup>a</sup>	SSCI® Impact Score <sup>b</sup> (Average, 1977-79)	Prestige Residual Score <sup>c</sup>
World Politics	7.3	0.970	1.282
American Sociological Review	7.1	3.367	-0.322
American Journal of International Law	7.0	1.323	0.775
American Journal of Sociology	7.0	2.034	0.359
American Political Science Review	7.0	1.973	0.394
Journal of Politics	6.7	0,378	1.028
Comparative Politics	6.6	0.708	0.735
American Journal of Political Science	6.6	1.027	0.548
Administrative Science Quarterly	6.5	2.293	-0.293
Public Opinion Quarterly	6.5	0.851	0.551
Daedalus	6.4	0.958	0.489
Journal of Public Law	6.4	NAd	NA
Public Administration Review	6.3	0.195	0.735
British Journal of Political Science	6.2	0.708	0.335
Public Interest	6.2	2.093	-0.476
Political Theory	6.2	0.267	0.593
Law and Society Review	6.2	1.760	-0.281
International Organization	6.2	0.961	0.187
Social Forces	6.1	0.971	0.081
Political Studies	6.0	0.348	0.346
Social Science Quarterly	6.0	0.479	0.269
Sage Professional Papers	6.0	NA	NA
Government and Opposition	6.0	0.357	0.341
Politics and Society	6.0	0.412	0.308
Behavioral Science	6.0	0.587	0.206
Public Choice	6.0	0.374	0.331
Public Policy	6.0	0.766	0.101
Polity	5.9	0.175	0.347
Canadian Journal of Political Science	5.9	0.465	0.177
Journal of Conflict Resolution	5.9	0.638	0.076
International Affairs	5.8	0.814	-0.127
Comparative Political Studies	5.8	0.523	0.043
Urban Affairs Quarterly	5.8	0.544	0.031
Foreign Affairs	5.8	2.050	-0.851
Western Political Quarterly	5.8	0.300	0.174
Administration and Society	5.8	0.328	0.174
Administrative Law Review	5.8	1.235	-0.374

TABLE 2 Prestige, Impact, and Related Measures for Political Science Journals

things, the relative size and professional diversity of the disciplines.

The earliest journal impact scores SSCI published are for 1977 and are based on citations from articles published during 1975-76. A journal's impact factor score for 1977 is defined as the number of citations during 1975 to articles that the journal published during 1975-76, divided by the total number of articles the journal published during 1975 and 1976 (i.e., the ratio of citations to "citable" items for a given journal). Dividing the number of citations by the number of citable items controls for the journal's size and the frequency with which it is published. Gordon (1982) found that impact scores were highly correlated over time. For example, the correlation of impact scores between 1977 and 1978 for 59 of Glenn's journals was .84. To mitigate the possibilities of yearly fluctuations, a three-year (1977-79) average is calculated in this research for each journal. If journal prestige influences submission decisions, the prestige ratings published in the early to mid 1970s would influence publications in the mid 1970s and citation counts in the latter 1970s, the time of our assessment.

What is the relationship between citation impact and journal reputation? The Glenn and Giles-Wright reputational ratings *are* related to the SSCI impact factor scores (which are shown in the second column of Tables 1 and 2): the correlation between the Glenn (sociology) and SSCI measures is .526, and the correlation between the Giles-Wright (political science) and SSCI measures is .572. This suggests that reputations *are* perfor-

Journal	Giles-Wright Prestige Score <sup>a</sup>	SSCI® Impact Score <sup>b</sup> (Average, 1977-79)	Prestige Residuai Score <sup>c</sup>
American Politics Quarterly	5.8	0.597	0.000
International Studies Quarterly	5.7	0.581	-0.091
Publius	5.7	0.172	0.149
Asian Survey	5.7	0.446	-0.012
Political Methodology	5.6	NA	NA
Political Science	5.6	0.388	-0.078
Dissent	5.6	0.205	0.030
American Behavioral Scientist	5.6	0.483	-0.133
Political Science Quarterly	5.6	0.504	-0.146
Political Quarterly	5.6	0.134	0.071
Journal of Peace Research	5.6	0.557	-0.177
International Social Science Journal	5.4	0.230	-0.185
Journal of International Affairs	5.4	0.312	-0.233
Simulation and Games	5.3	0.268	-0.307
Annals of the American Academy of Political and Social Science	5.3	0.425	-0.399
Review of Politics	5.3	0.217	-0.277
International Interactions	5.0	NA	NA
Journal of Developing Areas	5.0	0.146	-0.536
Experimental Studies of Politics	4.9	NA	NA
Policy Studies Journal	4.8	0.106	-0.712
Orbis	4.8	0.457	-0.918
PS	4.7	0.518	-1.054
Midwest Review of Public Administration	4.2	NA	NA
National Civic Review	4.1	NA	NA
Journal of Inter-American Studies and World Affairs	4.1	0.272	-1.510
Social Science Journal	3.8	0.196	-1.765

TABLE 2-continued Prestige, Impact, and Related Measures for Political Science Journals

\*Source: Giles and Wright (1975).

<sup>b</sup>Source: Social Sciences Citation Index<sup>®</sup> Annual, vols. 1-3.

"This is the actual value of the Giles-Wright prestige score, less the prestige score predicted from the regression of prestige scores on impact factor scores.

#### <sup>d</sup>NA: Not available.

mance-based to some degree, for the journals that are perceived as most prestigious in each discipline tend to be the ones that have the greatest scholarly impact. On the other hand, these correlations are not nearly strong enough to permit us to conclude that a journal's reputation is a simple function of scholarly influence. Approximately two-thirds of the variance in the reputed quality of political science journals and three-quarters of the variance in the reputed importance of sociology journals remain unexplained by the SSCI impact scores.

The unexplained variance in journals' reputations might simply reflect the operation of random error in the reputational measures. Moreover, there is a lag of several years between the reputational measures and the impact measure. But we doubt that either random measurement error or a time lag tells the whole story. Rather, we think it quite likely that scholarly journals, like academic departments, tend to establish reputations that endure in spite of what they merit. Once a journal has been placed on a discipline's prestige ladder, it tends to retain its place because its reputation is accepted at face value and is not continuously reevaluated in light of changing circumstances.

We certainly do not claim to possess definitive proof of this interpretation, but some intriguing evidence is available. For the 56 journals for which both Giles-Wright reputational and SSCI impact data are available, the correlation between reputational scores and the *residual* in these reputational scores (the portion left over after regressing the Giles-Wright scores on the SSCI impact scores) is extremely high: r = .820. For the sociology journals, the correlation between the Glenn measure and the residual unexplained by the SSCI impact score is even higher: r = .851. (These residuals are shown in the third column of Tables 1 and 2.) These highly autocorrelated error terms suggest that in each field high-status

journals tend to have better reputations than their influence would warrant, while lower-status journals tend to have poorer reputations than their influence would warrant. Subsequent examination of scatter plots supports this argument. This is not to say that none of the highly reputable journals deserves its reputation. For example, the Giles-Wright reputational score for the American Sociological Review, 7.1, is very close to what would be predicted from a regression of Giles-Wright scores on the SSCI impact scores. Generally, however, both very good and very bad reputations tend to be exaggerations of what the impact data suggest are merited. Especially noteworthy in this regard among the political science journals are World Politics and the Journal of Politics, both of whose reputational scores are far above what would be predicted from the citation data: World Politics, whose score of 7.3 places it first among all the political science journals, has a predicted reputational score of 6.07, close to the mean on the Giles-Wright scale, and the reputational rating of 6.7 for the sixth-ranked Journal of Politics is also much higher than the predicted score (5.7). Among the journals rated by sociologists, the American Sociological Review, the American Journal of Sociology, Social Forces, and the British Journal of Sociology display the largest positive residuals, i.e., the largest "unearned" reputations, though the first two would still be very highly rated even if their ratings were exactly consonant with their influence as measured by the SSCI citation data.

In short, the residuals provide strong presumptive evidence that reputational measures of journal quality reflect persisting stereotypes rather than simply summarizing actual influence. This suggests at the very least that widely held stereotypes about some of the most prominent sociology and political science journals may need to be reconsidered. It also suggests that in thinking about the role various journals play in accrediting knowledge, it would be well to incorporate a behavioral as well as a reputational dimension.

## **Rating Sociology and Political Science Journals**

Since the prestige rankings of sociology and political science journals were published in the early 1970s, many new journals have been established, the stature of journals may have changed, and citation information has become available. This recent citation information provides behavior-based comparative data for a wide range of journals in the social sciences.

The SSCI journal impact data do pose some problems, which we need to acknowledge. One problem is that of incomplete coverage. The SSCI data base does not include several journals that are increasingly important publication outlets in sociology and political science. In political science, the list of exclusions includes *Political Behavior*, *Micropolitics*, and *Political Psychology*, to name only three examples from one relatively small corner of the discipline. If journal ratings are to be based on the *SSCI* impact scores, then being excluded from the *SSCI* data base is tantamount to being excluded from consideration altogether.

Exclusion of journals from the SSCI data base is a problem, but it is a problem of limited scope: the journals that are not included in the SSCI data base are, for the most part, journals that would not score very high in terms of impact if they were included. The truly major problem stems from the difficulty of defining the boundaries of a scholarly discipline. If we wish to determine which are the best sociology or political science journals, we must first be certain what we mean by a sociology or political science journal. This is a very difficult problem, and it is by no means peculiar to the SSCI data base; indeed, it affects every attempt to evaluate journals in any field. For example, Glenn's list of 63 journals includes several top journals from other disciplines (e.g., the American Political Science Review, the American Economic Review, and the Harvard Educational Review) as well as numerous interdisciplinary journals (e.g., Public Opinion Quarterly, Behavioral Science, and Social Science Quarterly). The SSCI, for its part, categorizes journals according to their disciplinary affiliation, but its categories are hardly authoritative. To cite only three examples, should Current History, IPW Berichte, and the Journal of Canadian Studies really be considered three of the 77 journals subsumed under SSCI's political science category?

Despite these problems, the SSCI impact data seem to us to provide a firmer foundation for assessing the quality of sociology and political science journals than any other method devised to this point. On the basis of the SSCI impact data, we get a fresh picture of the quality of several established journals. For example, Sociology and Social Research, which has been published for almost three-quarters of a century, has an impact score of only 0.103, which places it about 58th of the 66 journals in the SSCI sociology category. Similarly, the impact score of the venerable Political Science Quarterly (0.504) places it well below the other established political science journals. More dramatically, World Politics, the most prestigious journal according to the Giles-Wright ratings, has an impact score of 0.970, which would not place it among the top 10 in the Giles-Wright rating. Many regional journals also have lower impact ratings than might have been expected (e.g., Sociological Quarterly, Sociological Perspectives, and others not reported such as Sociological Spectrum and Sociological Focus)

(data not presented). And some specialized journals (e.g., Administrative Science Quarterly, Journal of Health and Social Research, Public Interest) have a greater impact than their reputations would suggest. Of course, these comments should not be taken out of the context of the SSCI impact scores upon which they are based; any problems associated with the SSCI data to measure journal quality will have to be borne in mind in interpreting journal ratings based on the SSCI data.

## Conclusion

If the medium accredits knowledge, assessment of the impact of journals that constitute the medium for the exchange of scholarly ideas demands more scrutiny than it has previously received. This study indicates that the prestige accorded many journals seems out of line with the impact these journals have had in the social science research community. The relationship between reputation and citation impact is nonlinear, best described as a sigmoid curve. A fairly clear-cut prestige hierarchy is present, but many of the most prestigious journals have less impact than might be expected, and many other journals have more impact than is attributed to them by the reputational ratings. The availability of behavior-based journal ratings should mitigate the common tendency simply to count number of articles published as a measure of scientific productivity or to limit journal evaluations to outdated reputational hierarchies. It is easy to count articles, but it is difficult to draw meaningful comparisons. We believe that impact should be weighted much more heavily than simple number of articles or stereotypic journal reputations in assessing accreditation of scholarly work.

The SSCI citation data permit scholars to evaluate the importance of journals based not on opinion but on the frequency of citations. While such assessments do not directly measure the quality of journals, frequency of citation implies scholarly acceptance, or at least acknowledgment of importance through utilization of others' work. However, the SSCI should not become the litmus test for quality of social research. Journals have prestige, but their prestige is only derived from the usefulness of the articles they publish. In the long run, individual articles and books become the litmus test of quality. But practically, most of us work within very limited time parameters. Thus, in the short run journal citation data do provide deans, tenure committees, and those studying stratification in science a more defensible and less stereotyped means of measuring "accredited" knowledge than any other method now available.

#### REFERENCES

Allison, Paul D., and John A. Stewart. 1974. "Productivity Differences among Scientists: Evidence for Accumulative Advantage," American Sociological Review, 39 (August):596-606.

Bingham, Richard D., and Laura L. Vertz. 1983. "The Social Structure of an Academic Discipline: Networks and Prestige in Political Science," Social Science Quarterly, 64 (June):275-87.

Cole, Jonathan R., and Stephen R. Cole. 1973. Social Stratification in Science (Chicago: University of Chicago Press).

Cole, Stephen. 1983. "The Hierarchy of the Sciences," American Journal of Sociology, 89 (July):111-39.

Crane, Diana. 1965. "Scientists at Major and Minor Universities: A Study in Productivity and Recognition," American Sociological Review, 30 (October):699-714.

Garfield, Eugene. 1972. "Citation Analysis as a Tool in Journal Evaluation," Science, 178 (3 November):471-79.

Giles, Michael W., and Gerald C. Wright, Jr. 1975. "Political Scientists' Evaluations of Sixty-Three Journals," PS, 8 (Summer):254-57.

Glenn, Norval D. 1971. "American Sociologists' Evaluation of Sixty-Three Journals," American Sociologist, 6 (November):298-303. Gordon, Michael D. 1982. "Citation Ranking versus Subjective Evaluation in the Determination of Journal Hierarchies in the Social Sciences," Journal of the American Society for Information Science, 33 (January):55-57.

Hargens, Lowell L., and Diane Felmlee. 1984. "Structural Determinants of Stratification in Science," American Sociological Review, 49 (October):685-97.

Long, J. Scott. 1978. "Productivity and Academic Positions in the Scientific Career," American Sociological Review, 43 (December):889-908.

Merton, Robert K. 1942. "Science and Technology in a Democratic Order," *Journal of Legal and Political Sociology*, 1 (October):115-26.

Reskin, Barbara F. 1977. "Scientific Productivity and the Reward Structure of Science," American Sociological Review, 42 (June):491-504.