

CITATION MEASURES OF THE INFLUENCE OF ROBERT K. MERTON *

Part 2.

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MERTON'S CONTRIBUTION: CONCEPTUAL OR EMPIRICAL?

With the breadth of Merton's influence beyond sociology clearly confirmed, the focus of the study shifted to several questions about the nature of his influence. Have scientists outside of sociology used Merton's work more for his empirical observations (findings) or for his concepts? What cognitive areas of his work are cited in the nonsocial sciences, and do these differ from the areas cited in the social sciences? Are the concepts for which Merton is cited distinctively Mertonian, or do they have a more general origin?

To explore these questions, a content analysis was done on 35 social science and 49 natural science articles published between 1961-1977 to determine the nature of Merton's work cited by authors in disciplines other than sociology. More natural-science articles were examined because they are so far beyond the usual sphere of influence of a sociologist.

The sample of journals was dictated by journal availability in local libraries rather than by statistical standards. Nevertheless, the articles were randomly selected within that constraint. It must be mentioned, however, that the content analysis employed here is far from the rigorous and systematic content analysis used by Cole¹ in his study of Merton's citations within sociology. Rather, the content analysis that follows should be viewed as illustrative.

TABLE 1 looks at whether Merton was cited more frequently for concepts or for findings. A "Secondary Citations" category was included here for cases in which an author cited a Merton article for something that Merton, himself, cites or quotes (e.g., W. I. Thomas or St. Augustine). Also included in this category are articles that cited Merton only in the bibliography, not in the text.

It is worth repeating that none of the articles analyzed for content are from sociology journals as such. The Social Sciences category in this table (and in those that appear later) refers to social sciences other than sociology.

From the data in TABLE 1 we see that 63% of the inspected citations in the natural sciences are for conceptual contributions while in the social sciences it is 83%. In both the natural and social sciences, then, at least two-thirds of the citations are for concepts rather than findings. This confirms the impression that Merton's major contribution has been that of a theorist.

CONCEPTS OF INFLUENCE

It is interesting to examine the specific concepts for which Merton has been cited in the natural and social sciences. Such an examination shows that his breadth of influence stems from an equally broad range of conceptual contributions. There were 31 conceptual citations in the natural science articles and 29 in the social science articles. These citations were to 26 different concepts, 10 of which were common to

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TABLE 1
DISTRIBUTION OF MERTON CITATIONS BY NATURE OF MATERIAL CITED

Science Area of Citing Journals	Concepts		Findings		Secondary Citations		Total	
	Number*	%†	Number	%†	Number	%†	Number	%†
Natural Sciences	31	63	12	24	6	12	49	99
Social Sciences (Excluding Sociology)	29	83	5	14	1	3	35	100
All Science (Excluding Sociology)	60	71	17	20	7	8	84	99

*Number of Citing Articles.

†Percent of Total.

TABLE 2
DISTRIBUTION OF CONCEPTUAL CITATIONS TO MERTON BY
COGNITIVE AREA OF CITED CONCEPT

Cognitive Area of Cited Concept	Science Area of Citing Journals			
	Natural Sciences		Social Sciences	
	Number*	%†	Number*	%†
Functional Analysis	9	29	12	42
Deviance	7	23	9	31
Sociology of Science	8	26	3	10
Professional Socialization	5	16	0	0
Other	2	6	5	17
Total	31	100	29	100

*Number of Citing Articles.

†Percent of Total.

both groups of citing articles. The natural-science articles cited an additional 10 concepts while the social-science articles cited another six.

Within this very wide conceptual range, three specific concepts tend to dominate. In the social sciences, 43% of the conceptual citations were to Merton's work on manifest and latent functions (20%), social structure and anomie (13%), and reference group theory (10%). Two of those concepts also account for 22% of the citations from the natural sciences: social structure and anomie (14%) and manifest and latent functions (8%).

Since many of the individual concepts for which Merton is cited fall into a few broad cognitive areas, it is possible to collapse the data to obtain a clearer view of the sources of his conceptual influence. TABLE 2 presents such a view. The main cognitive areas of Merton's conceptual work are listed along with the number of social- and natural-science papers that cited them. Concepts were assigned to cognitive areas as follows:

Functional Analysis: functional analysis in general; manifest and latent functions; role sets; general concept of anomie.

Deviance: social structure and anomie; conformity in group size; alienation; bureaucracy.

Sociology of Science: priority disputes; Matthew effect; information structure of science; multiple discoveries; norms of science.

Professional Socialization: anticipatory socialization; professional socialization; norms of medical culture; informal medical curricula.

Other: concepts which could not be fitted readily into the other categories, such as sex typing, self-fulfilling prophecy, discussions of Mannheim, middle-range theory, analysis of political machines.

TABLE 2 shows approximately equal levels of influence for the concepts of functional analysis (29%), sociology of science (26%), and deviance (23%) in the natural sciences. Professional socialization concepts, the target of 16% of the citing natural science papers, are not far behind.

The pattern of conceptual influences in the social sciences is considerably different. The concepts of functional analysis and deviance are clearly more dominant in the social sciences than in the natural sciences. The 31% figure for the concepts of deviance indicates that Merton's work in this area remains important despite Cole's observation of a shift in emphasis in this literature to symbolic interaction.¹

Conversely, the concepts in the sociology of science and professional socialization are considerably less important in the social sciences than they are in the natural sciences. Authors in the natural sciences tend to cite Merton's work in the sociology of science in connection with studies of historical developments in the field; he usually is cited to relate their analyses to more general principles of scientific development. The citation potential for these concepts in the social sciences is limited to the relatively few people working in the sociology of science specialty. The relatively low frequency with which they are cited reflects the relative position of that specialty within the social sciences.

None of the social-science articles examined cited Merton's concepts on professional socialization. This is in sharp contrast to the relatively strong influence of these concepts in the natural sciences. One explanation is that Merton's work in this area is exerting more influence at the practical level of curriculum development than at the theoretical level of sociological research. And, in fact, the natural-science papers that cite this particular set of concepts do so in discussions of discipline-specific educational curricula. Another, more likely, explanation is that the initial impact of these concepts upon the social sciences was felt in the field of sociology in the 1950s, when they first appeared. If so, this part of the study, which was designed to look at the nature of Merton's influence beyond sociology, and went back only through the 1960s, would show no signs of the impact.

Another point of impact that doesn't show up is Merton's concept of the self-fulfilling prophecy. One of the concepts in the *Other* category, the infrequency with which it is cited belies its widespread use. As so many concepts whose influence is particularly pervasive, Merton's self-fulfilling prophecy seems to have suffered obliteration by being incorporated into the general body of knowledge that is considered common property.

ROOTS OF CONCEPTS

The other aspect of Merton's influence that was examined has to do with the roots of his cited concepts. Are the concepts for which he is generally cited ones that are original to him or are they ideas of more general origin?

Since there is a certain element of interpretive subjectivity in this type of analysis, some examples are needed to demonstrate the types of judgments made. Typical of citations to distinctively Mertonian concepts are:

Merton's (1949) seminal essay on manifest and latent functions made it clear that intended and known functions (goals) frequently carry different consequences for a social system than unintended and unknown functions.²

This kind of consideration can be used to extend Merton's classification of type of adaption to society.³

... self-fulfilling or self-frustrating prophecies. Robert K. Merton has analyzed these predictions from a sociological perspective ...⁴

Robert Merton ... sees the priority disputes as "signposts announcing the violation of the social norms" of the scientific establishment.⁵

Merton offers the theory that anomie occurs as a result of discrepancy between culturally shared goals and the means for achieving them.⁶

... we are concerned with conflicting objectives which occur as "unanticipated consequences" ...⁷

Typical of citations judged to be more general concepts discussed by Merton are:

The concept of anomie or "normlessness," for example, has had a profound effect on modern sociology and psychology.⁸

The high delinquency rates often found in lower-class city slums and among minority groups (Sutherland & Cressey, 1966) have been used as the basis for theories attributing delinquency to lower-class mores, social disorganization, and culture conflict (cf. Cloward & Ohlin, 1960; Cohen, 1955; Glaser, 1965; Merton, 1957; Miller, 1958; Sellin, 1938).⁹

Gurr has proposed that social discontent is most often produced by decremental economies. Perhaps the decremental curve is most effective because people tend not to compare themselves to dissimilar others (Berkowitz, 1972; Festinger, 1954; Merton & Kitt, 1950).¹⁰

Temperamental differences contribute their additions to these barriers. Obviously, we do not deliberately choose the differences in our temperaments. Some of these temperamental differences have been pointed out by Roe, Ginzburg, Ginzburg, Axelrad and Herma, Eiduson and Merton, to mention a few.¹¹

... a state of anomie. This concept has been defined as a "condition of relative normlessness in a society or group" ... (Merton, 1957).¹²

... the social nature of chemical discovery stems from the work of such sociologists of science as Merton and Storer.¹³

TABLE 3
ROOTS OF CITED MERTON CONCEPTS

Concept Origin	Science Area of Citing Journals			
	Natural Sciences		Social Sciences	
	Number*	%†	Number*	%†
Merton	20	65	22	76
General	11	35	7	24
Total	31	100	29	100

*Number of Citing Articles.

†Percent of Total.

These examples show that the analysis was discriminating enough to distinguish between a citation to a general Merton discussion of anomie, a concept that did not originate with him, and a citation to a Merton discussion of anomie that attributes the

effect to a disparity between goals and the means of achieving them, which is a unique Merton extension of the concept.

The results of the analysis are shown in TABLE 3. Though the percentage of Merton concepts cited by natural-science articles is 11% lower than the percentage cited by social-science articles, Merton's own concepts accounted for substantially more than 50% of the citations in both classes of articles. These data make it clear that Merton's influence is primarily the result of work unique to him, even in the natural sciences, which are the most remote from his own discipline.

CITED WORKS

To round out the study, we decided to complement the analysis of the fields citing Merton with an analysis of the work they have been citing. TABLE 4 identifies the Merton publications that were cited in *SSCI* five or more times during the period

TABLE 4
MERTON PUBLICATIONS CITED IN *SSCI* FIVE OR MORE TIMES FROM 1969-1977

Publication	Citations
Merton, R. K. <i>Social Theory and Social Structure</i> . (New York: The Free Press, 1968). 702 pp.	1418
—, Reader, G., Kendall, P. L. (eds.). <i>The Student-Physician: Introductory Studies in the Sociology of Medical Education</i> . (Cambridge: Harvard University Press, 1957). 360 pp.	93
—, Nisbet, R. A. (eds.). <i>Contemporary Social Problems</i> . (New York: Harcourt Brace Jovanovich, 1961). 754 pp.	79
—, "Social Structure and Anomie." <i>Amer. Sociological Review</i> 3:672, 1938.	60
—, Broom, L., Cottrell, L. S. Jr. (eds.) <i>Sociology Today: Problems and Prospects</i> . (New York: Basic Books, 1959). 623 pp.	57
—, <i>The Sociology of Science: Theoretical and Empirical Investigations</i> . (N. Storer, ed.) (Chicago: University of Chicago Press, 1973). 605 pp.	57
—, "Priorities in Scientific Discovery." <i>Amer. Sociological Review</i> 22:635, 1957.	51
—, "The Matthew Effect in Science." <i>Science</i> 159:56, 1968.	49
—, "Science, Technology and Society in Seventeenth Century England." In (G. Sarton, ed.) <i>OSIRIS: Studies on the History of Learning and Culture</i> . (Belgium: The St. Catherine Press, 1938). p. 362-632.	38
—, "Bureaucratic Structure and Personality." <i>Social Forces</i> 18:560, 1939.	35
—, Gray, A., Hockey, B., Selvin, H. (eds.) <i>Reader in Bureaucracy</i> . (New York: The Free Press, 1952). 464 pp.	31
—, "The Role-Set: Problems in Sociological Theory." <i>Brit. J. Soc.</i> 8:106, 1957.	31
—, "The Self-fulfilling Prophecy." <i>Antioch Rev.</i> 8:193, 1948.	29
—, <i>On Theoretical Sociology: Five Essays, Old and New</i> . (New York: The Free Press, 1967). 180 pp.	28
—, Lazarsfeld, P. F. (eds.) <i>Continuities in Social Research: Studies in the Scope and Method of "The American Soldier"</i> . (New York: The Free Press, 1950). 255 pp.	26
—, "The Unanticipated Consequences of Purposive Social Action." <i>Amer. Sociological Review</i> 1:894, 1936.	23
—, "Singletons and Multiples in Scientific Discovery: A Chapter in the Sociology of Science." <i>P. Am. Philos. Soc.</i> 105:470, 1961.	21
—, "Behavior Patterns of Scientists." <i>Amer. Sci.</i> 57:1, 1969.	18
—, "Insiders and Outsiders: A Chapter in the Sociology of Knowledge." <i>Amer. Journal of Sociology</i> 78:9, 1972.	16

—, Barber, E. "Sociological Ambivalence." In: (Edward Tiryakian, ed.) <i>Sociological Theory, Values and Sociocultural Change</i> . (New York: The Free Press, 1963). p. 91–120.	16
— "Intermarriage and Social Structure." <i>Psychiatry</i> 4:361, 1941.	15
— "Anomie, Anomia and Social Interaction: Contexts of Deviant Behavior." In: (Marshall Clinard, ed.) <i>Anomie and Deviant Behavior</i> . (New York: The Free Press, 1964) p. 213–42.	13
—, Fiske, M., Kendall, P. <i>The Focused Interview</i> . (New York: The Free Press, 1956). 186 pp.	12
— "Resistance to the Systematic Study of Multiple Discoveries in Science." <i>Arch. Eur. Sociol.</i> 4:237, 1963.	12
— "The Role of Applied Science in the Formulation of Policy." <i>Philos. Sci.</i> 16:161, 1949.	11
— "Social Conformity, Deviation, and Opportunity-Structures." <i>Amer. Sociological Review</i> 24:177, 1959.	10
— <i>Mass Persuasion</i> . (New York: Harper & Brothers, 1946). 210 pp.	8
— "Patterns of Influence: A Study of Interpersonal Influence and Communications Behavior in a Local Community." In: (Paul Lazarsfeld & Frank Stanton, eds.) <i>Communications in Research</i> . (New York: Harper & Brothers, 1948–49). p. 180–219.	7
— "Civilization and Culture." <i>Sociology and Social Research</i> 21:103, 1936.	5
— "Discrimination and the American Creed." In: (R. M. McIver, ed.) <i>Discrimination and National Welfare</i> . (New York: Harper & Brothers, 1948). p. 99–126.	5
— "Social Psychology of Housing." In: (W. Dennis, ed.) <i>Current Trends in Social Psychology</i> . (Pittsburgh: University of Pittsburgh Press, 1948). p. 163–217	5

1969–1977, and shows how the citations were distributed. The year 1969 was included in this analysis, because the data were taken from an existing compilation of highly cited articles in *SSCI* for the 1969–1977 time period. TABLE 5 identifies all Merton publications that were cited in *SCI* during the same time period, and also shows how the citations were distributed. The citation frequencies shown in the two tables are not mutually exclusive, because we made no attempt to correct for the degree of overlap in the coverage patterns of *SCI* and *SSCI*. The two tables, therefore are not directly comparable in any way.

Nevertheless, the tables do clearly show that the books Merton wrote and edited have been, by far, the major source of his influence. They accounted for 81% of his *SSCI* citations and 76% of those from *SCI*. *Social Theory and Social Structure*, which probably contains the broadest mix of his observations and ideas, is, appropriately, the most heavily cited of his writings. It accounts for 62% of his *SSCI* citations and 57% of those from *SCI*.

CONCLUSION

Not surprisingly, then, the data emphatically confirm my intuitive judgment that the influence of Robert K. Merton ranges far beyond his home discipline of sociology. Not only is he highly cited throughout the social sciences, but the pattern of citations to his work reveals he has had a considerable impact in the natural sciences as well. The data also show that the main strength of his influence rests on his prolific production of unique sociological concepts that are widely accepted and used. However, his own research "findings" have also been widely used by others in a variety of contexts.

Besides confirming these intuitive judgments, the study results also suggest directions for additional research that would provide a more definitive picture of Merton's influence. An underlying assumption of this study and all others that make comparisons based on citation statistics is that all citations are equal. There are at least two reasons for considering that assumption to be an oversimplification.

The first is that the probability of being cited in a given field is affected by the size of the literature and the average number of references per article in the field. Since these factors vary from field to field, so does citation potential. To develop a more accurate view of Merton's influence, the frequency with which he is cited in each field should be weighted by the citation potential of the field.

The other way in which straight citation counts oversimplify reality is by failing to say anything about why authors cite someone. We scratched the surface of this

TABLE 5
MERTON PUBLICATIONS CITED IN SCI® FROM 1969-1977

Publication	Citations
Merton, R. K. <i>Social Theory and Social Structure</i> . (New York: The Free Press, 1968). 702 pp.	382
—, Reader, G., Kendall, P. L. (eds.). <i>The Student-Physician: Introductory Studies in the Sociology of Medical Education</i> . (Cambridge: Harvard University Press, 1957). 360 pp.	57
—, "The Matthew Effect in Science." <i>Science</i> 159:56, 1968.	45
—, <i>The Sociology of Science: Theoretical and Empirical Investigations</i> . (N. Storer, ed.) (Chicago: University of Chicago Press, 1973). 605 pp.	36
—, "Priorities in Scientific Discovery." <i>Amer. Sociological Review</i> 22:635, 1957.	23
—, "Behavior Patterns of Scientists." <i>Amer. Sci.</i> 57:1, 1969.	16
—, Science, Technology and Society in Seventeenth Century England. In (G. Sarton, ed.) <i>OSIRIS: Studies on the History of Learning and Culture</i> . (Belgium: The St. Catherine Press, 1938). p. 362-632.	15
—, "The Self-fulfilling Prophecy." <i>Antioch Rev.</i> 8:193, 1948.	14
—, "Singletons and Multiples in Scientific Discovery: A Chapter in the Sociology of Science." <i>P. Am. Philos. Soc.</i> 105:470, 1961.	13
—, Lazarsfeld, P. F. (eds.) <i>Continuities in Social Research: Studies in the Scope and Method of "The American Soldier"</i> . (New York: The Free Press, 1950).	11
—, Broom, L., Cottrell, L. S. Jr. (eds.) <i>Sociology Today: Problems and Prospects</i> . (New York: Basic Books, 1959). 623 pp.	11
—, Nisbet, R. A. (eds.) <i>Contemporary Social Problems</i> . (New York: Harcourt Brace Jovanovich, 1961). 754 pp.	10
—, "Anomie, Anomia and Social Interaction: Contexts of Deviant Behavior." In: (Marshall Clinard, ed.) <i>Anomie and Deviant Behavior</i> . (New York: The Free Press, 1964) p. 213-42.	8
—, "Patterns of Influence: A Study of Interpersonal Influence and Communications Behavior in a Local Community." In: (Paul Lazarsfeld & Frank Stanton, eds.) <i>Communications in Research</i> (New York: Harper & Brothers, 1948-49). p. 180-219.	8
—, "Social Structure and Anomie." <i>Amer. Sociological Review</i> 3:672, 1938.	8
—, Fiske, M., Kendall, P. <i>The Focused Interview</i> . (New York: The Free Press, 1956). 186 pp.	8
—, "The Role-Set: Problems in Sociological Theory." <i>Brit. J. Soc.</i> 8:106, 1957.	8
—, <i>On the Shoulders of Giants: A Shandean Postscript</i> . (New York: The Free Press, 1965). 289 pp.	7
—, Gray, A., Hockey, B., Selvin, H. (eds.) <i>Reader in Bureaucracy</i> . (New York: The Free Press, 1952). 464 pp.	7
—, "Resistance to the Systematic Study of Multiple Discoveries in Science." <i>Arch. Eur. Sociol.</i> 4:237, 1963.	7

—, Barber, E. "Sociological Ambivalence." In: (Edward Tiryakian, ed.) <i>Sociological Theory, Values and Socjocultural Change</i> . (New York: The Free Press, 1963). p. 91–120.	7
—, "Social Psychology of Housing." In: (W. Dennis, ed.) <i>Current Trends in Social Psychology</i> . (Pittsburgh: University of Pittsburgh Press, 1948). p. 163–217	6
—, "The Unanticipated Consequences of Purposive Social Action." <i>Amer. Sociological Review</i> 1:894, 1936.	6
—, "The Functions of the Professional Association." <i>Am. J. Nurs.</i> 58:50, 1958.	5
—, "Intermarriage and Social Structure." <i>Psychiatry</i> 4:361, 1941.	4
—, <i>Mass Persuasion</i> . (New York: Harper & Brothers, 1946). 210 pp.	4
—, <i>On Theoretical Sociology: Five Essays, Old and New</i> . (New York: The Free Press, 1967). 180 pp.	4

question by analyzing the contents of a sample of articles to determine whether Merton was being cited for his conceptual work or for his empirical findings. S. Cole dug considerably deeper, though across a narrower front, in his analysis of the deviance literature.¹ J. Cole and H. Zuckerman conducted a similar study of the sociology of science literature that added substantially to this line of research.¹⁴ Both of those studies involved an in-depth content analysis of a sample of papers that cited Merton to find out how the citing authors used his work. A similar type of analysis of citations to Merton from outside the field of sociology would elaborate in a useful way on our findings about the nature of his interdisciplinary contributions.

In their work on Merton's influence in the sociology of science, Cole and Zuckerman¹⁴ point to another research gap that is particularly pertinent to the subject of measuring the influence of Merton or any other scientist through citation analysis. They wrote: "In the absence of statistical norms on the relative frequency of different kinds of citations in the sociological literature, it is not possible to interpret the distribution observed here." They were commenting on statistics on different kinds of citations, but the observation is equally as relevant to simple citation counts that do not distinguish between the different motives authors may have for citing a given work. Though general averages of citation frequency can be used to provide some rough benchmarks that are useful in interpreting citation counts of individuals, there is an obvious need for more specific benchmarks.

It would be useful to know, for example, how frequently typical authors are cited in each of the scientific disciplines, how frequently influential authors are cited in each of the disciplines, and the average frequency with which influentials are cited from outside their fields. Anyone who provides valid answers to these types of questions will be making a significant contribution to the study of science.

The expert sociologist may well ask how an information scientist can have the hubris to discuss his intuitive judgments about Merton's influence or impact. I cannot even claim to have read all of Bob Merton's prolific work. And certainly I have only read a minuscule portion of the literature which has cited him. But for more than 15 years I have received a weekly computer report which has described for me, by title, author, and journal, every new article added to the ISI® data base that has cited Merton's work and the work of many of his students. As a consequence of examining more than 800 of these ASCA® reports,¹⁵ I feel justified in claiming a certain intuitive expertise about Merton. There is no doubt in my mind, however, that it requires the judgment of a practicing sociologist who is steeped in the literature of sociology to express an opinion on that part of Merton's influence which cannot be measured quantitatively as we have done here. It is such cognitive familiarity with the literature that enables one's peers to estimate the worth of contributions whose sources have long since been obliterated.

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