

Foreword

Traditions are not to be broken lightly, especially in their early formation, when they seem much to the good.¹ This, I suppose, is only a portentous way of saying that I too shall follow a practice, begun by Joshua Lederberg² and Derek J. de Solla Price³ in their forewords, and explicitly continued as an emerging tradition by Harriet Zuckerman⁴ in her foreword, to the preceding four volumes of these *Essays of an Information Scientist*. That embryonic tradition consists in telling how one first came to meet Eugene Garfield and the operative creatures of his prolific imagination such as the *Science Citation Index* and *Current Contents* and then, all the rest of those many technical aids to communication in science and modes of knowledge-analysis that flow in a widening stream from his Institute for Scientific Information. Let those who write the forewords to the many other volumes of essays that will issue from Gene's pen venture to depart from that tradition if they are so minded; I have neither the courage to do so nor, come to think of it, the will.

Unlike Joshua Lederberg who at once spotted Gene's pathmaking paper entitled "Citation Indexes for Science,"⁵ I confess to having overlooked it and the correlative paper by Adair,⁶ when they appeared in the mid-1950s. After all, like everyone else at the time, I had no access to the yet-to-be-invented *Science Citation Index* or ASCA (Automatic Subject Citation Alert) or any of ISI's other aids to keeping in touch with those parts of the literature of science and scholarship which one is apt to find of interest. My ignorance of what was in the making remained unimpaired until, in 1962, I received a note from

one Eugene Garfield, Director of something called the Institute for Scientific Information. That note reflects enough of what I later found to be Gene's mode of successively focused curiosity and is short enough to merit quotation in full:

3/1/62

Dear Prof. Merton:

I read with great interest your paper in the NEW SCIENTIST [?]. I think it has an interesting relationship to some of the work we are doing on Citation Indexing (see attached reprints). Recently I had a discussion with Prof. Kusch and he commented that citation indexes ought to be invaluable research tools for the sociologist. I would be interested to have your confirmation or refutation of this notion. A former colleague, G. Bedford, was a sociologist and often commented on how she might use a citation index to advantage, but never had a chance to spell this out for me. I would also be interested to know what you might consider to be the 'critical mass' of a citation index before it could really be useful to a sociologist. For the working scientist anything he finds through citation indexes may be useful. I enclose some recent examples of our experiments.

Sincerely yours,

Eugene Garfield,
Director

As I learned only later when I came to know Gene first as a colleague-at-a-distance and then as a friend, this early note of inquiry reflects several aspects of his personal style of continued inquiry. To begin with, as he reads in what we like to call "the scientific literature," he is forever alert to ideas and developments that might possibly link up with one or another of his ever-expanding interests in the art and craft of scientific information. Having mulled over the character of such possible linkages, he then acts on those possibilities by getting in direct touch with these potential colleagues. This in turn extends his social network of potential and actual collaborators. His allusion to my Columbia University colleague, the physicist Polykarp Kusch (who was not resting on his laurels after having received the 1955 Nobel price for determining the magnetic moment of the electron), illustrates how Gene sometimes brings members of that network into certain kinds of cognitive interaction, including some who had known one another independently of the linkage mediated through Gene. I don't recall, for example, that Poly Kusch and I had ever talked about a nascent Science Citation Index, let alone its potential for the sociological analysis of scientific development. Finally, and characteristi-

cally, Gene's first short note of inquiry indicates that though he wanted to reflect further on that potential, he had already given it enough thought to have identified one of the crucial prerequisites for such sociological analysis: the minimum mass or size of citation indexes required to provide for reliable and valid analysis.

My short reply to Gene did little more than reaffirm his growing belief in the sociological and historiographical potentials of what was in the first instance a newly created tool for bibliographic retrieval:

April 19, 1962

Dear Dr. Garfield:

I have just returned to find your note, and I do want to get a reply off to you before I leave on another leg of a research trip. (I should probably explain that I am on sabbatical leave this year.) As is so characteristic of him, Professor Kusch once again demonstrates his capacity to scent a good problem. After having read the offprints you were good enough to send me, I am persuaded that your materials should be a rich source for the sociologist of science. As it happens, I am now in the midst of working on a problem in this field [this "happened" to be the prerequisites and consequences of multiple independent discoveries in science] which needs precisely the kind of evidence you are putting together in your Citation Index. Perhaps we can get together on my return from the Pacific Coast in a few weeks. What would you say to that?

For reasons and circumstances that now escape me, and in spite of his immediate cordial reply, Gene and I did not in fact meet until 1969 when we were both presenting papers at the annual meeting of the American Association for the Advancement of Science in Dallas. And though, as I reported to him, I had myself not done much by way of systematic sociological use of the SCI, my colleagues Jonathan Cole,⁸ Stephen Cole,⁹ and Harriet Zuckerman¹⁰ had. By the early 1970s, growing numbers of sociologists of science were coming to make use of the *Science Citation Index* as a preeminently specialty-specific research instrument for the sociology and history of science.

There is no need for me to sketch even the outlines of the rapidly evolving grammar of citation analysis. Gene Garfield has done much of that in his monograph, *Citation Indexing* (1979),¹¹ and in his ongoing Current Comments now collected in the first five volumes of these *Essays*. As sociologists of science have noted, a series of methodological innovations in citation analysis have lately opened up new programs of research on the cognitive structures of the sciences: "co-citation analysis and the mapping of specialties over time, comparative studies of the growth of knowledge in 'hard' and 'soft' sciences and technology,

linkages between theoretical and experimental contributions, studies of cited documents as 'concept symbols' or 'concept markers,' the relations between co-citation clusters and the social structures of specialties, the extent of agreement (consensus) in various cognitive domains, and, to stop here, studies of the process by which the sources of contributions to science become obliterated through their incorporation into the structure of scientific knowledge."¹²

It would be redundant—worse, it would be downright presumptuous—for me to try to summarize these varied developments here. I need only direct the reader's attention to the essays, distributed throughout the pages of this volume as well as its predecessors, that deal with these contributions to citation analysis. I suggest that special attention should be paid to the contemplated construction of Science Citation Indexes for successively earlier periods which would provide the basic source materials for an archaeology of citation analysis. These materials could serve, on occasion, as correctives to received notions about the linkages of scientific ideas in the historical pasts of the sciences (a possibility early intimated by Gene Garfield in his seminal paper of 1955¹³ and briefly exemplified in his piece, "Would Mendel's Work Have Been Ignored if The *Science Citation Index* Was Available 100 Years Ago?"¹⁴).

These remarks preliminary to this substantial volume have centered on the significance of the methods of citation analysis for a sociological and historical understanding of the development of scientific ideas and for the social and cognitive relationships among scientists. But as readers of the volume will soon discover for themselves, the abundant curiosity of its polymathic author has led him also into an uncommonly wide range of subjects, all examined from the perspective of an informed, dedicated, and unpretentious anti-pedant. Plainly, it is a volume for browsing as well as focussed reading.

REFERENCES

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3. Price D J de S. Foreword to Garfield, E. *Essays of an information scientist*. Philadelphia: ISI Press, 1980, Vol. 3, p. v-ix.
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9. Cole J & Cole S. *Social stratification in science*. Chicago: University of Chicago Press, 1973.
10. Zuckerman H. Stratification in American science. *Sociological Inquiry* 40:235-57, 1970.
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12. Since I cannot improve upon this short list, with its attendant references, put together by Harriet Zuckerman in her Foreword to volume 4 of the *Essays of an information scientist*, I borrow it here.
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Robert K. Merton
Special Service Professor &
University Professor Emeritus
Fayerweather 415
Columbia University
New York, New York 10027