

Historical Bibliometrics: Its Purpose and Significance to the History of Disciplines

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Dictionary of Bibliometrics. By Virgil Diodato. New York: Haworth Press, 1994. 185 pp. \$34.95. ISBN 1-56024-852-1.

Bibliometrics: An Annotated Bibliography. By Mary K. Sellen. New York: G. K. Hall, 1993. 200 pp. \$38.50. ISBN 08161-19546.

Scholarly communication is exceedingly important to the understanding of the genesis and evolution of disciplines. Within and outside the academy, disciplines have emerged in diverse fields of cultural and intellectual endeavors. Since the advent of organized academic activities, disciplines have become spheres of individual and collective activity in science, technology, the humanities, and the social sciences. Societies, specialized research institutes, university departments, and conferences have emerged attesting to the continuous social formation of these activities. Often, publications include both monographs and journals, yet increasingly journals constitute the majority of published scholarship.¹ Journals emerge as vehicles of communication between scholars and scientists who, through formal and informal acculturation, accept disciplinary consensus as expressed in the journals' pages. This implicit acceptance of the major tenets of a given discipline permits communities of like-minded scholars and researchers to emerge.

Bibliometrics is essentially a quantitative analysis of publications for the purpose of ascertaining specific kinds of phenomena. Among the various data found, characteristics of materials used and intellectual content analysis of published material are generally explored through bibliometrics. The vast majority of bibliometric studies have been devoted to scientific and technological disciplines. It is important to know that since E. W. Hulme wrote his famous study in 1923, the measurement of published scholarship and scientific research has gained momentum and evolved its own nomenclature.²

From statistical bibliography to *bibliometrics* to *scientometrics* and *informetrics*, this type of analysis of publications has become instrumental for

library and information science, as well as for scholarly communication.³ Researchers can examine literatures and establish characteristics of disciplines, obsolescence of scholarship, institutional affiliations and relationships, and types of materials constituting scholarly pursuits. Within these data lie other possibilities which can be extremely useful for the historian studying the intellectual heritage and evolution of a discipline.⁴

Among the rising interest and systematic research in bibliometrics are few studies which capture the essence of bibliometrics as a phenomenon. Few soundings have effectively attempted to set in perspective the various forms and applications bibliometrics can take.⁵ As bibliometric literature is primarily journal dependent, much of its contribution is found in discrete research, itself appearing in scattered journals. An exception to this rule is *Scientometrics* which is much more focused upon monitoring sciences, both applied and pure, and technology.⁶ The International Society for Scientometrics and Informetrics was founded in Utrecht, The Netherlands, in 1994 after the fourth international conference met in Berlin in September 1993. Sponsorship and coordination of efforts in bibliometrics and a forum on an international scale have become the goals of this society.⁷ Importantly, bibliometrics has gained adherents in sociology of science and in science policy studies. However, the use of bibliometrics analysis for the humanities and social sciences has been slow to follow, an area where librarians have pioneered. Recently, scientometrics has cleaved off from bibliometrics proper to focus solely on science and technologies, where research fronts are continuously exploding.⁸

Virtually any publication can be examined bibliometrically, from the journal article, conference proceeding, technical report, to the monograph, wherever a bibliographic buttressing is in evidence. Often this takes the form of bibliographies, but most often footnotes and endnotes constitute the primary data to be examined. Authors, article or monograph titles, year of publication, and journal titles are included in a wealth of information which can then be examined further for salient characteristics. Such phenomena as intellectual influence or interdisciplinarity can be effectively gleaned from such rudimentary data.⁹ Often usage studies for collection development and analysis have been supported by bibliometric analysis of citations.¹⁰ Research fronts, trends in subjects pursued, and top producing journals and authors have become the staple of bibliometrics. Not until recently has bibliometric research turned to the mapping of scholarly communities and exploration of disciplinary cultures.¹¹

Since the importance of journals can not easily be dismissed, it is critical to ascertain their significance to the nature of disciplines. Because of their expeditious nature, journals constitute an important form of publication for the dissemination of scholarship and research. The degree to

which journals play a decisive role varies from discipline to discipline; their role is most critical in the sciences and technologies, and less so, but still important, in the social sciences and humanities. Studies indicate that different disciplines are utilizing journals and monographs differently and with varying degrees of reliance in acknowledging influence or attribution.¹² It is significant that journals are linked to the academic enterprise with considerable professional importance. Although bibliometrics represents the quantitative analysis of publication, it can also be applied in a multitude of ways depending upon focus of research and methodological sophistication. Primarily ahistorical, bibliometrics can be harnessed to study the publication record frozen in the past. To this end bibliometrics offers insight into the scholarly record bibliographically and sociologically. Consequently, the history of a given discipline can be mapped through the bibliographic record inherent in journals.

Historical Bibliometrics

What is *historical bibliometrics*; how can it be defined and applied to print culture and the study of reading in the historical context, especially scholarly periodicals? Two major areas need to be considered: (1) definition of historical bibliometrics, and (2) its constituent characteristics and applications and examples of carrying out historical bibliometrics. Historical research and bibliometrics may seem incompatible; yet, when effectively merged, they can be exceedingly effective and useful to the historian. The advantages of historical bibliometrics are such that they illuminate the less salient characteristics of published materials and their pertinence to greater concerns of historical research in intellectual history, cultural history, or history of print culture or science, among other historical subfields.¹³ Discussion of the intellectual and cultural history of periodicals and their significance to scholarly production is vital to an evaluation of the importance of historical bibliometrics as used by *Annaliste* and non-*Annaliste* historians when studying periodicals and their intellectual and social milieu.¹⁴ Framed within the wider context of intellectual communities and their importance to scholarly dissemination, bibliometrics should be of interest to scholars and librarians specializing in intellectual and cultural history as well as print culture in the main.

Definition and Examples

Historical bibliometrics may best be defined as the bibliometric study of periodicals and books published in the framework of time and space.

Publications from the eighteenth to the twentieth century form the material artifacts to be examined for references, etc. All the attributes applicable to bibliometrics of contemporary publications can be equally valid and applied to past runs of periodicals and monographs. Indeed, scholarly periodicals can be mined for authorship, institutional affiliation, and intellectual influence. Trends and other useful bibliographic phenomena can be highlighted and lend heretofore unknown knowledge of scholarly practice. Perhaps the most exciting and innovative use is the ability to establish intellectual communities through authors and their respective institutional affiliation. Using the history journal *Annales:e.s.c.*, for the years 1929–1990, the community of historians writing for this journal can be mapped into concentrations of institutional homes of authors as well as geographic dispersion (Diagram).¹⁵

$$\frac{\text{Articles from journal run 1929–1990}}{\text{signed authors and institutions}} = \frac{\text{concentrations by affiliation and geography}}{\text{institutions \& places}}$$

Further amplification of data can link gender, subjects pursued, interdisciplinary research, and type of materials used for research. When linked to other phenomena (i.e., research trends over time) a more complete picture of scholarly community and communication emerges. Set within historical context and historical scholarly consensus, the history of disciplines can be located and observed over time.

Generally, the history of book culture represents a fruitful area to apply bibliometric analysis.¹⁶ Books can be measured according to their influential impact upon published works via notes, references, and bibliographies. These raw data can be effectively measured and refined in direct relation to substantive knowledge surrounding the subject under scrutiny. Scholarly analysis can then be amplified through using these data for establishing trends and anomalies not generally observed through traditional research. Animating this type of research is the concern for veracity of data, method of gathering such data, and how it fits into the historical enterprise. Additionally, there exists the fundamental assumption that identifying characteristics of publications (i.e., journals—articles, notes, etc., and monographs—notes, bibliographies, etc.) can lead to a more complete picture of disciplinary formation and evolution. Bibliographic data derived bibliometrically should be treated as any other primary source, an analog and complement to archival material or statistical data. When subjected to the conventions of sound historical research and scholarship, historical bibliometrics should conform to the dictates of empirical analysis and theory.

Review Literature

As bibliometrics has developed, it has produced a literature large enough to merit taking stock. Several bibliographies have been produced which attest to bibliometrics' vitality.¹⁷ Most recently, Virgil Diodato and Mary K. Sellen have contributed to the research literature offering the novice and practiced bibliometrician two different works. Diodato's dictionary is a valuable cornucopia of theory and practice. Each of the 225 terms focuses upon theory, technique, method, and execution of bibliometrics. These definitions are replete with integrated examples of sample references of the most representative of studies for a given bibliometric phenomenon. From models and mathematical distributions to symbols and permutations of approaches, these definitions are accompanied by useful charts, diagrams, and tables. Unlike any other work devoted to bibliometrics, this single volume is a compendium of insight for theory and practice.

Among the unique features is the nature of the rendering of difficult and nuanced definitions in bibliometrics for the layperson or seasoned researcher. An especially useful tool, statistical formulae are presented and defined for comprehension and application. Special care of nuanced nomenclature is effectively woven with clear and precise language. Together, these features create a highly articulate reference base for bibliometrics which should constitute a major breakthrough in the standardization of bibliometric research and scholarship. Among the better-known definitions, such as Bradford's Law, Lotka's Law, or citation half-life, confusion abounds; Diodato's carefully sculpted definitions permit clarity of thought and presentation to blend. Further, such complex and often misunderstood working definitions (i.e., cocitation analysis, cocitation threshold, or bibliographic coupling) are easily and succinctly presented.

Complementing Diodato's dictionary is the annotated bibliography by Mary K Sellen. Selective and based upon the Library of Congress classification system, entries cover the universe of bibliometric research from 1970 to 1990. Entries are organized according to the disciplines in the sciences, technologies, social sciences, and humanities. Among these entries, library and information science constitutes a sizable portion. Both theoretical and applied studies constitute the majority of entries, with a concerted attempt to gather representative studies. As the majority of bibliometrics appears in journals, it is not surprising that a vast majority of entries are articles. International in flavor, greater inclusion of scholarship from *Scientometrics* and the Russian journal *Nauchno-tekhnicheskaja Infirmatisiia* could have broadened the scope and richness to be found in the bibliometric research literature in science and technology. As it

stands, it is quite clear that studies devoted to science and technology are, generally speaking, dominating the literature of bibliometrics, yet more research is being done in the social sciences and the humanities, where interesting and heretofore hidden characteristics can be effectively drawn from the data. Again, when sustained by substantive knowledge of the social science or humanities disciplines, the power of bibliometrics can not be underestimated. To this end, both the *Dictionary of Bibliometrics* and *Bibliometrics: An Annotated Bibliography, 1970–1990* are efficacious additions to the reference corpus of bibliometrics in the main.

Final Observations

Considering the tremendous growth in bibliometric literature since the late 1950s, bibliometrics has been used by bibliometricians and scholars especially interested in understanding their respective literatures. Both applied and theoretical research and scholarship elucidate the phenomena of scholarly communication and the evolution of disciplines. Disciplinary formation, research trends, and the general specialized characteristics of scholarship can be illuminated for their intrinsic purposes or for a better understanding of how scholars and others disseminate their work. Historical bibliometrics is but one possible approach to applying bibliometrics to the study of print culture as a whole or to journals and their specific cultures.¹⁸ Sociological theories of group formation and communications theories can be melded with historical knowledge of disciplinary activity.¹⁹ Applications can be effectively used for wider intellectual activity, such as journalism and scientific reporting, providing sufficient data exists and can be fruitfully mapped. Virgil Diodato's consummate dictionary and Mary K. Sellen's effective bibliography offer an open invitation to historians to pursue their examination of print culture and book and journal publishing in the main. If bibliometrics and historical bibliometrics, specifically, can be incorporated in the historian's repertoire, exciting and fruitful results can be achieved.

Notes

1. See Charles B. Osburn, "The Place of the Journal in the Scholarly Communication System," *Library Resources and Technical Services* 28 (1984): 319; Irving Louis Horowitz, *Communicating Ideas: The Politics of Scholarly Publishing*, 2nd. ed. (New Brunswick: Transaction Books, 1991).

2. See E. W. Hulme, *Statistical Bibliography In Relation to the Growth of Modern Civilization: Two Lectures Delivered in the University of Cambridge in May 1922* (London: Grafton, 1922). For a thorough exposition of bibliometrics, see Derek J. de Solla Price, *Little Science, Big Science . . . and Beyond* (New York: Columbia, 1986).

3. See Linda Smith, "Citation Analysis," *Library Trends* 30 (Summer 1981): 83–106; S. M. Lawani, "Bibliometrics: Its Theoretical Foundations, Methods, and

Applications," *Libri* 31 (1981): 294–315; I. N. Sengupta, "Bibliometrics, Informetrics, Scientometrics and Librametrics: An Overview," *Libri* 42 (1992): 75–98; and for library applications, see Robert N. Broadus, "The Applications of Citation Analyses to Library Collection Building," *Advances in Librarianship* 7 (1977): 299–335; B. M. Gupta and M. P. K. Nagpal, "Citation Analysis and Its Applications: A Review," *Herald of Library Science* 18 (Jan.–April 1979): 86–93.

4. See Victoria Rae Johnson, "Utilizing Prolific Writers and Their Interconnections when Expanding on the Histories of a Discipline: American Geography as a Case Study" (D.Ed. diss., University of Kentucky, 1992); W. Paul Van Vogt, "Identifying Scholarly and Intellectual Communities: A Note on French Philosophy, 1900–1939," *History and Theory* 21 (1982): 267–78.

5. See Howard D. White and Katherine W. McCain, "Bibliometrics," *Annual Review of Information Science and Technology* 24 (1989): 119–89; Roland Hjerppe, *An Outline of Bibliometrics and Citation Analysis* (Stockholm: Royal Institute of Technology, 1980); for further consultation, see D. Nicholas and M. Ritchie, *Literature and Bibliometrics* (London: Clive Bingley, 1978).

6. Originally published in 1979, *Scientometrics*, edited by Tibor Braun at L. Eotvos University, Hungary, is especially devoted to publishing research concerning scientific production in the main, where research fronts and trends are especially important. Among journals publishing bibliometrics research are *Library and Information Science Research*, *Journal of the American Society for Information Science*, *Libri*, *Serials Librarian*, and *Journal of Information Science*; among journals exclusively devoted to bibliometrics, the *Revue Francaise de Bibliometrie* and the newly founded *International Journal of Scientometrics and Informetrics* should be consulted.

7. Since the founding of the International Society for Scientometrics and Informetrics in 1994, professional conferences, publications efforts, and society activities have become formalized.

8. Researchers exclusively focused on scientific activity have challenged the interests of bibliometricians and are attempting a science of mapping scientific and technological endeavors. The social sciences and humanities have become the province of researchers interested in all relevant issues concerning these disciplines.

9. In an example of interdisciplinary research for area studies, see John D. Martz, "Political Science and Latin American Studies: Patterns and Asymmetries of Research and Publication," *Latin American Research Review* 25 (1990): 67–86; Jean-Pierre V. M. Hérubel, "The Nature of Three History Journals: A Citation Experiment," *Collection Management* 12 (1990): 57–67.

For a sound introduction to disciplinarity and interdisciplinarity and its variant forms, i.e., subdisciplines, see Julie Thompson Klein, *Interdisciplinarity: History, Theory, and Practice* (Detroit: Wayne State University Press, 1990); for an example of such research, consult Jean-Pierre V. M. Hérubel and Anne L Buchanan, "Disciplinary, Interdisciplinary, and Subdisciplinary Linkages in Historical Studies Journals," *Science and the Science of Science* 3 (1994): 15–24.

10. See Stephen Henry Peters, "Characteristics of the Sources Used by American Historians Writing on the History of Modern Germany" (Ph.D. diss., Indiana University, 1990); For exceptional early studies, see Annie May Alston, "Characteristics of Materials Used by a Selected Group of Historians in Their Research in United States History," (M.A. Thesis, University of Chicago, 1952); Clyde Jones, Michael Chapman, and Pamela Carr Woods, "The Characteristics of Literature Used by Historians," *Journal of Librarianship* 4 (July 1972): 137–56; Arthur Monroe McAnally, "Characteristics of Materials Use in Research in

United States History," (Ph.D. diss., University of Chicago, 1951); and Wesley Clark Simonton, "Characteristics of the Research Literature of the Fine Arts During the Period 1954–1957," (Ph.D. diss., University of Illinois, 1960).

11. See Margaret F. Stieg, *The Origin and Development of Scholarly Historical Periodicals* (University: University of Alabama Press, 1987), for extensive treatment of the professional genesis and significance of major history journals, i.e., *Revue Historique*, *English Historical Review*, and *American Historical Review* as well as *Annales:e.s.c.* For studies devoted to mapping academic cultures through journals, consult Jean-Pierre V. M. Hérubel, "Journal of the Society of Architectural Historians: The Sociological Character of a Journal," *The Serials Librarian* 18 (1990): 1–11; for a sound discussion of scholarly journals and the scholarly press, see Sherman B. Barnes, "The Beginnings of Learned Journalism, 1665–1730" (Ph.D. diss., Cornell University, 1934); Jeremy D. Popkin, "Periodical Publication and The Nature of Knowledge in Eighteenth-Century Europe," pp. 203–12 in Donald R. Kelly and Richard H. Popkin, *The Shapes of Knowledge From The Renaissance to The Enlightenment* (Dordrecht: Kluwer, 1991); for discussion of the evolution of scholarly scientific journals and their culture, see David A. Kronik, *A History of Scientific & Technical Periodicals: The Origins and Development of The Scientific and Technical Press 1665–1790* (Metuchen: Scarecrow Press, 1976).

12. There are many exemplary studies in this area; for recent research, consult John Cullars, "Citation Characteristics of Monographs in the Fine Arts," *Library Quarterly* 62 (July 1992): 325–42; Jean-Pierre V. M. Hérubel, "Materials Used in Historical Scholarship: A Limited Citation Analysis of the *Journal of Garden History*," *Collection Management* 14 (1991): 155–62. Consult Peters, "Characteristics of the Sources Used by American Historians Writing on the History of Modern Germany," chapter 2, 32–94.

13. For examples of studies emphasizing scholarly production and their early institutional origins, consult Michel Taillefer, *Une Académie Interprète Des Lumières: L'Académie des Sciences, Inscriptions, et Belles-Lettres de Toulouse au XVIII^e siècle* (Paris: CNRS, 1984); Daniel Roche, *Le siècle des lumières en province: Académies et académiciens provinciaux, 1680–1789* (Paris: Mouton, 1978); James E. McClellan III, *Science Reorganized: Scientific Societies in The Eighteenth Century* (New York: Columbia University Press, 1985), especially chapter 5, "The Communications Network of the Scientific Societies," 153–98.

14. See Bryce Allen, Jian Qin, and F. W. Lancaster, "Persuasive Communities: A Longitudinal Analysis of References in the *Philosophical Transactions* of the Royal Society, 1665–1990," *Social Studies of Science* 24 (1994): 279–310. A penetrating and insightful example of research in this field is David E. Rowe, "Klein, Hilbert, and the Gottingen Mathematical Tradition," 186–213, and Jeffrey A. Johnson, "Hierarchy and Creativity in Chemistry, 1871–1914," 214–40 in *Osiris* 5 (1989); For further reading, see Peter Dear, ed., *The Literary Structure of Scientific Argument: Historical Studies* (Philadelphia: University of Pennsylvania Press, 1991). For the genesis and maturation of journals during the eighteenth century, see Part I Genre and Discipline, chapters 1, 2, and 3; for a study of a more recent discipline, see Jean Leca, "French Political Science and Its 'Subfields': Some Reflections on the Intellectual Organization of the Discipline in Relation to Its Historical and Social Situation," pp.147–85 in *The Development of Political Science: A Comparative Survey*, edited by David Easton, John C. Gunnell, and Luigi Graziano (Routledge: London, 1991).

15. For introductions to Annaliste historiography, see Traian Stoianovitch, *French Historical Method: The Annales Paradigm* (Ithaca: Cornell University Press,

1976). A growing critical literature surrounding the Annales school exists; for excellent and recent treatments of the Annales journal and its school, see Peter Burke, *The French Historical Revolution, The Annales School 1929–89* (Stanford: Stanford University Press, 1990); for a French discussion of the Annales School and its research and publication, consult Hervé Coutau-Bégarie, *Le phénomène nouvelle histoire* (Paris: Economica, 1983); for an expanded and updated version see *Le phénomène nouvelle histoire: Grandeur et décadence de l'école des Annales* (Paris: Economica, 1989); for Annales and print culture, consult Jean-Pierre V. M. Hérubel with Anne L. Buchanan, "The Annales Movement and Its Historiography—A Short Bibliography," *Libraries & Culture* 30 (Winter 1995): 82–91; for in-depth coverage, consult Jean-Pierre V. M. Hérubel, *Annales Historiography and Theory: A Selective and Annotated Bibliography* (Wesport: Greenwood Press, 1994).

16. Consult the Annaliste approach in Francois Furet, *Livre et société dans la France du XVIII^e siècle* (Paris: Mouton, 1965). These essays cover the production of books, their distribution, and their place within the French cultural milieu; periodicals are broached as well.

17. A number of compilations and soundings have been produced. For general studies on all aspects of bibliometrics and studies on various disciplines, see Alan Pritchard, *Bibliometrics: A Bibliography and Index Volume I: 1874–1959* (Watford: ALLM, 1981); for specific items in the social sciences and humanities, consult Jean-Pierre V. M. Herubel and Anne L. Buchanan, "Citation Studies in the Humanities and Social Sciences: A Selective and Annotated Bibliography," *Collection Management* 18 (1994): 89–137.

18. Further examples are: Jennifer J. Connor, "Medical Journals and L'Histoire du livre," *Bookman's Weekly* (July 4, 1994): 5–12; Joachim F. Wohlwill, "German Psychological Journals Under National Socialism: a History of Contrasting Paths," *Journal of the History of the Behavioral Sciences* 23 (April 1987): 169–85; and Michael Knoche, "Scientific Journals under National Socialism," *Libraries & Culture* 26 (Spring 1991): 415–26.

19. See Tony Becher, *Academic Tribes and Territories: Intellectual Enquiry and the Cultures of Disciplines* (Milton Keynes: Open University Press, 1989); for wide-ranging general and specialized discussions of the professoriate and attendant specializations within academia and disciplinary formation, consult Burton R. Clark, *The Academic Life: Small Worlds, Different Worlds* (Princeton: Princeton University Press, 1987); and for discussions of the professoriate in an international perspective, see Burton R. Clark, *The Academic Profession: National, Disciplinary, and Institutional Settings* (Berkeley: University of California Press, 1987).