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Eugene Garfield, Founder and Chairman Emeritus, Institute for Scientific Information

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ISI

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Interview with Dr. Eugene Garfield

Founder and Chairman Emeritus — Institute for Scientific Information

by Judy Luther <jluther@smtgwy.isinet.com>

A legend in the information industry, Dr. Garfield created Current Contents and the Science Citation Index, from which the field of Scientometrics emerged. Here is how it all started. — JL

ATG: How did you get started professionally?

EG: I started out with an undergraduate degree in chemistry from Columbia University. In 1951 I met **Jim Perry**, a pioneer in chemical information retrieval who introduced me to **Sanford Larkey**, at Johns Hopkins, Welch Library Project where I began working as a researcher. While at the Project, I connected with **Ted Herdegen** who was Head of Scientific Information at Smith, Kline, French. They had just introduced the tranquilizer, Thorazine, and were inundated with information. They knew of my expertise with IBM equipment for information retrieval so I became a temporary consultant for them and other clients including *Biological Abstracts*.

ATG: What sort of background do you have?

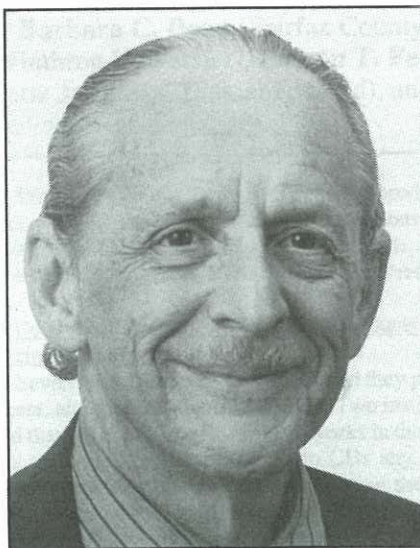
EG: I went back to Columbia University for a library degree one summer and in 1953, I received the first **Grolier Society Library scholarship** sponsored by *Encyclopedia Americana*. I subsequently earned a PhD in Structural Linguistics at the University of Pennsylvania.

ATG: How did you come to start the Institute for Scientific Information (ISI)?

EG: One of my clients was Miles Labs and *Current Contents* was developed as part of a contract for Miles in 1956. The tables of contents of 125-150 journals were copied on Xerox machines. The business grew and required the use of a commercial printer. I added other clients in the pharmaceutical industry. Originally there were no indexes, but in time, we added an address directory, journal index and keyword indexes. *CC* was sold in bulk to drug companies, 25 subscriptions for \$1500/year.

ATG: How did the business grow?

EG: **Dr. Harold Rusch**, the Director of the McArdle Memorial Laboratories at the University of Wisconsin wanted to know why subscriptions weren't available to academic institutions. We struck a deal which included an academic discount for the minimum num-



ber of 25 subscriptions. Then **Dr. Jacob G. Cohen**, a Philadelphia physician who was the inventor of thermography convinced us to offer subscriptions to individuals. We offered a single subscription at the academic discount, so it became available to all researchers.

ATG: What are the origins of citation searching?

EG: Citation searching is based on the concept that the references at the end of a scientific paper, in addition to acknowledging the work of another researcher, could be used to trace the development of ideas based on work previously done in a field. When I met **Dr. Joshua Lederburg** in 1958, he introduced us to the Chair of the Genetics Study Section of the **National Institutes of Health**. They decided to set up an advisory committee of geneticists and gave us a grant of \$50,000/year for three years to create a Genetics Citation Index. We used a three-pronged approach and created a fifteen year index to the *American Journal of Human Genetics*, a five year index to thirty core genetics journals, and a one year index to 600 science journals. The Advisory Committee recommended that we take a multidisciplinary approach as this was the time when molecular biology was born. During the second year, Congress decided to eliminate grants to commercial firms. The **National Science Foundation** was then given responsibility for it and refused to publish the 1961 *Science Citation Index*. ISI subsequently published the first *SCI* in 1964 on a quarterly basis. It took us five years to break even, so *Current Contents* carried the company until the *Science Citation Index* was self supporting.

ATG: What is unique about citation searching?

EG: Citation links overcome some of the searching limitations inherent in controlled vocabularies such as the timelag needed to include new terms. Using *SCI*, researchers can track related research without concern for linguistic limitations, by following the development of ideas which are acknowledged through the bibliographies accompanying articles. For example, the original papers on insulin used the term "pancreatic secretions" in the title. A scientist who wanted to do a retrospective research on insulin might overlook initial developments by using only word or term searching. However, by taking a recent paper on insulin and using the citations published with that article, a complete search of the literature about the development of insulin is possible. Citation searching complements both natural language and controlled vocabularies, providing researchers with complete related search results by using the citation links.

ATG: What about coverage of journals — we understand that ISI has a selective approach.

EG: Since the beginning, we've covered the world's leading science journals. The company depends on a group of highly educated coverage specialists who have in-depth knowledge in assigned fields and are constantly monitoring emerging fields of research. ISI has developed a set of guidelines against which journals are evaluated. These include, for example, whether the articles are peer reviewed, if authors receive grant funding, and if there is broad geographical representation among the authors and editorial board members. ISI also looks at citation data. Bradford's "law of scattering" states that no matter what the specialty, a relatively small core of journals will account for as much as 90% of the significant literature. The ISI database includes 8,000 journals and 6,000 books and proceedings representing the best literature published in hundreds of disciplines.

ATG: You are credited with expanding the field of bibliometrics — can you tell us how this occurred?

EG: Actually, the concept is not new. Bibliometrics as a term was coined by **Alan Pritchard** 30 years ago and some studies were done in the 1920's, however, ISI's Citation Indexes did give impetus to the field without a

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doubt. In addition to being used as a retrieval tool, it has become an essential method of doing analyses for evaluation and measuring trends. These conclusions must always be taken in context as the value is relative to the discipline.

ATG: Is it true that citation data can be used to forecast Nobel Prize winners?

EG: In 1967, we sorted the *Science Citation Index* by first author and citation frequency. Twelve of the top 50 authors won the Nobel Prize. In another study done in the early 60's we found that Nobel prize winners publish five to six times the average number of papers in their field and are cited fifty times the average. This is fairly logical, as we would expect that most Nobel prize winners have made an impact with their publications. These citation analyses also document the rise of institutions with which researchers are affiliated. The *Science Citation Index* and *Social Sciences Citation Index* facilitate the ability to do quantitative assessments. They also enable researchers to trace histories of discovery.


ATG: What about document delivery — how did it fit into the picture?

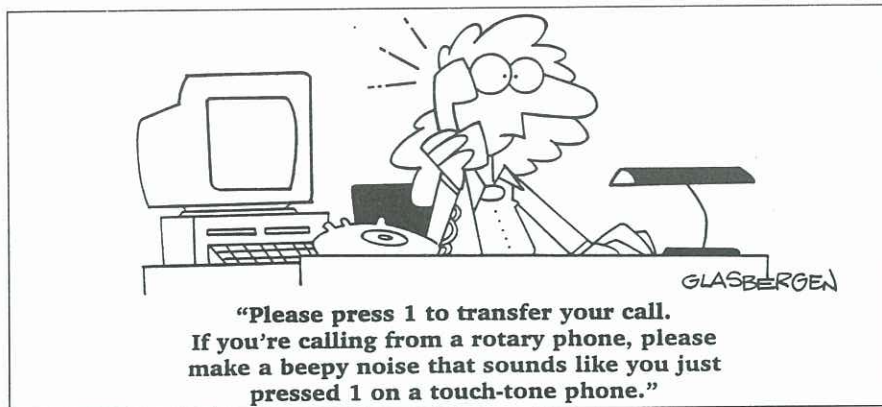
EG: We began this service because scientists kept requesting copies of articles. Since we ordered journals via airmail, *Current Con-*

tents included issues which were not yet received by our subscribers. When **Robert Woodward**, who subsequently received the Nobel Prize, requested that we send a copy of an article via special delivery, we realized that speed is of utmost importance to researchers. So we initiated a document delivery which we called the **Original Article Tear Sheet** services "OATS" (later called **The Genuine Article**, (TGA)). Initially librarians were shocked that we would tear articles from the journals to send to researchers. In fact, we felt the same way, but the demand by researchers supported continuing the service. A few years later, the **British Lending Library** published statistics showing that 20% of their requests for articles were the result of *Current Contents*. As The Genuine Article service grew and the quality of reproduction from a copy machine improved, the greater majority of documents were fulfilled using this technology. Recently ISI

announced that it has expanded the document delivery service — now called the **ISI Document Solution**.

ATG: Where do you see the industry going now with the popularity of the Intranet?

EG: There are multiple ways to connect to information — the Internet, Intranet, World-wide Web. Index services will eventually provide links to fulltext and it will be possible to hyperlink to the citing article in a seamless manner. Research in visualization will enable users to view multiple pages of resources on large screens at the same time. We will be able to work from a "virtual desk" accessing all needed resources. Libraries can help prepare end users by training them in how to access these resources and providing gateways for them to retrieve the information they seek. 



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