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Remembering — The Passing of a Giant: Eugene Garfield Dies at 90

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Sunday, February 26th 2017, **Eugene Garfield** passed away at 90 years old. A gentle giant of a man, renowned for his development of citation indexes and his foundational work in citation analysis and development of the impact factor, the original measure of citation value that continues to be used as an indicator of their importance in the field. His contributions to the creation of the field of information science cannot be underestimated.



Garfield used his doctorate in Structural Linguistics, chemistry training and experience working on the **Welch Library** indexing project at the **John Hopkins University School of Medicine**, which involved sorting and indexing documents from medical papers and journals, into play as he developed his vision to forever change the way we look at scholarly communication. While getting his doctorate he worked as a “documentation consultant.” All of this leading to his work in the discovery and pioneering of information science.

Early Work with Current Contents

With the huge growth in scientific publication over the past 70 years, **Garfield** foresaw the need for some “objective way for selecting journal rather than subjective, because we might be accused of having favorites.” He insisted from the start that the evaluation criteria for inclusion in his indexes be public — which they are to this day. The citation indexes and the *Current Contents* service became essential tools, not only in libraries but in research labs and technology companies across the globe. I first used these in the late 1970s when working as a Research Consultant for the **Yamaha Motor Corp.** By having ready access to the tables of contents of core research journals available, researchers were easily able to mark those articles of key interest and then contact the authors for a copy of the article. Perhaps this can be seen today as a precursor to today’s Open Access movement, allowing for direct communication between researchers and their colleagues as well as potential developers.

Beginning with his experience at the **Welch Library**, **Garfield** was influenced by **Dr. Chauncey D. Leake** who “often stressed the value of review articles, not only for integrating and synthesizing scientific accomplishment but also as a tool for information retrieval. As a result I studied the makeup of review articles very carefully and observed the peculiar similarity between the structure of indexes and the structure of sentences in reviews. In a review paper a sentence is followed by a citation. In a traditional subject index the same is true. But in a citation index, the situation is reversed!” After getting **Leake’s** initial advice, **Garfield** applied his own linguistic analysis to these medical articles. “I was looking for a structure that would be able to record indexing for the article.”

Leake’s background was similarly broad-based as was **Garfield’s**. **Leake** was a medical historian and ethicist, having received a bachelor’s degree with majors in biology, chemistry, and philosophy from **Princeton University** and a graduate degree in pharmacology. His influence on **Garfield** cannot be underestimated — and he often referred to the lessons he learned from **Leake** throughout his career. “During our 27-year friendship **Chauncey** and I exchanged thoughts through a voluminous correspondence. **Chauncey’s** letters were always a source of advice, encouragement, inspiration, enthusiasm, and energy.”

From Print to CD-ROM & On to the Web

In 1989 **Garfield’s Institute for Scientific Information (ISI)** released the Science Citation Index and Social Science Citation Index into a digital format for broader use of these key research tools. It was then that I had my first opportunity to meet **Garfield** in person and to talk in depth with him about his databases, his philosophy and his passions.

In a wide-ranging conversation which became an 8-page published interview (“Bringing citation indexes to CD-ROM: An interview with **Eugene Garfield**,” Laserdisk Professional; July 1989, Vol. 2, p25-32), I was able to learn from the master of structured information analysis, whose soft voice and gentle humor — along with his incredible intelligence and endless fascination with science — left an indelible memory.

Garfield, himself, openly admitted that using the printed index was “quite a task, only persevering people would do it.” You can take a trip down memory lane by checking out a video he made in 1967 showing how to search his indexes. In about 1970, **Roger Summit’s** Dialog service first offered a pay-as-you-go dial-up service that added the citation indexes to their catalog of options. “We used these CD-ROMs for a decade or more,” **Garfield** has reflected, “and some people still prefer to use them because they had some features that, even today, are difficult to implement using other technologies.” The move to the web and end-user searching opened up new markets and applications. However, the move to the web wasn’t the only change that the indexes experienced.

In 1992, **ISI** was acquired by **Thomson Reuters**, and in 2016 the Web of Science databases were spun off to their **Clarivate Analytics** subsidiary, formerly the Intellectual Property and Science business of **Thomson Reuters**. Today the Web of Science (citation indexes) includes indexing to all journals meeting their standards, including all content — cover to cover — now including over 59 million records and backfiles dating back to 1898.

Controversy Over Metrics

Garfield’s scientific system of measuring trends in science through publication analysis resulted not only in impact factors, but the pressures on academe has elevated the discussions over measurement to levels that only seemed to puzzle **Garfield** in interviews I did with him in 2006 and 2007 as a part of a research leave from the **University of Minnesota Libraries**. At that time I spoke to **Garfield** and his long-time colleague **Henry Small** about the rise of measurement and the controversies that have arisen from this. **Garfield** seemed very saddened by the efforts to commercialize the scientific enterprise.

As **Jim Testa** noted in my interview with him, “the proliferating misuse of the JCR always seems to involve the linking of the Impact Factor to a specific author. It’s a very dangerous game, because you can see very clearly, when you look at the *citation* frequency for any particular journal, that not all articles are cited equally. The Impact Factor for *Nature* is 30-something. That doesn’t mean that every article is cited 30-something times — some articles may be cited very infrequently or not at all — but, *on average*, the journal has this *citation* frequency. I think it is a very accurate measure. Because the numbers are out there and they rank journals, it enables governments and agencies to use them in ways that were never intended. From the very beginning, **Garfield** and our company have spoken out about its misuse, but it’s very difficult to stem that tide at this point.” (“Thomson Scientific and the Citation Indexes: An Interview With Keith MacGregor and James Testa,” *Searcher* 15(10):8-17.)



Today in this age of assessment and value demonstration, the game has, indeed, become very dangerous. Today the Impact Factor has been joined by a series of altmetrics, H-index, Eigenfactor and other measures of impact and value for published research and those that produce them. However, none of this takes away from **Garfield’s** accomplishments.

Humble Beginnings

Garfield grew up poor in a broken home and, for a time, lived across the street from one of the **New York Public Library** branches.

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He remembered as a boy scanning the titles of the books on the library shelves. Once he had his Bachelor's degree in Chemistry, he was able to meet **James W. Perry** who asked **Garfield** to join his group on a classified project at **MIT** in mechanized document encoding and search — a project team that included **Allen Kent** (later to be the founding director of the **University of Pittsburgh** Department of Information Science). Although this project fell apart, **Perry** brought him into the **Welch Library** project. **Garfield** also went to library school and, even before his graduation, published the article, "Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas," in *Science* (122(3159):108-111, 1955). In the article he formally proposes his new indexing system:

"A thorough scientist cannot be satisfied merely with searching the literature through indexes and bibliographies if he is going to establish the history of an idea. He must obviously do a great deal of organized, as well as eclectic, reading. The latter is necessary because it is impossible for any one person (the indexer) to anticipate all the thought processes of a user. Conventional subject indexes are thereby limited in their attempt to provide an ideal key to the literature. The same may be said of classification schemes. In tracking down the origins of an idea, the citation index can be of real help."

How many people could come up with something like this in their grad school days? Soon after this was published, he began *Current Contents*, and the rest (as they say) is history.

A Lasting Legacy

Garfield's interest in citation analysis didn't end with Web of Science. Years after he had sold his interest in ISI, he continued there as a consultant with an onsite office. He would always ask visitors for updates on how people were using the databases, demonstrating new

features and showing the results of some of his own citation trending analysis. His interest in the future of research was evident in his establishing *The Scientist*, his personal effort to connect scientists through, as the tag line says, "exploring life, inspiring innovation." He conceived the website and publication "as a trade publication for working scientists." He never lost interest in the continuing evolution of science or efforts to build new theories, find new realities and improve our world.



Dorothy Lilley and **Ronald Trice's** *A History of Information Science, 1945-1985* (Academic Press, 1989, ISBN 978-0124500600) credit **Garfield** as a "creative genius in the realm of non-conventional information systems," through his foundational work in the development of bibliometrics and scientometrics. **ASIST** (the **American Society for Information Science & Technology**) credits him for his role in the "discovery and pioneering of information science." Others have noted his ability to take what must have appeared to be "an obscure and specialist metric" and turn it into a very successful business ("Editorial," *Journal of Biological & Physical Chemistry* 9(4): 139-40, 2009).

Jay Nadler, CEO, **Clarivate Analytics**, notes that "**Dr. Garfield's** work has shaped the way that research is accessed and evaluated across the globe. We honor him for the contribution he has made to research, and to our organization as a visionary leader, colleague and friend. At **Clarivate Analytics** we will continue to innovate with the spirit that **Dr. Garfield** embodied in his groundbreaking work in information science."

With **Garfield's** passing we have lost one of the major figures in 20th century information science; however he leaves us with an incredible legacy of ideas as well as products. In **Garfield** we had a true gentleman, avid entrepreneur, and amazing visionary. For me, he was a source of inspiration, a kind-hearted soul with such a warm smile, who wanted to improve our profession, reimagine the course of science and improve our world. *Shalom Aleikhem!* 