CHEMICAL HERITAGE FOUNDATION

EUGENE GARFIELD

Transcript of an Interview
Conducted by

Robert V. Williams

at

Philadelphia, Pennsylvania

on

29 July 1997

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
Oral History Program
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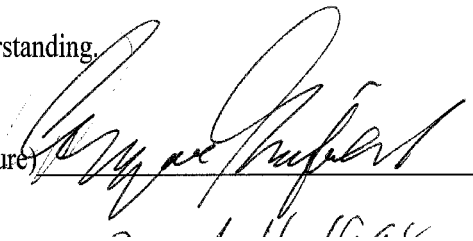
(Signature) 

Chemical Heritage Foundation
Oral History Program
315 Chestnut Street
Philadelphia, Pennsylvania 19106

EUGENE GARFIELD

1925 Born in New York City on 16 September

Education

1948 B.S., chemistry, Columbia University
1954 M.S., library science, Columbia University
1961 Ph.D., structural linguistics, University of Pennsylvania

Professional Experience

1949-1950 Laboratory Chemist, Evans Research and Development Corporation
1950-1951 Research Chemist, Columbia University
1951-1953 Staff member, Welch Machine Indexing Project, Johns Hopkins University
1954-1960 President, Eugene Garfield Associates
1998-2000 President, ASIS&T (American Society for Information Science & Technology)

Institute for Scientific Information
1960-1992 President and CEO
1992 Chairman
1993-present Chairman Emeritus

The Scientist, LLC
1986-2000 Publisher and Editor-in-Chief
2001-present President

Honors

1953-1954 Grolier Society Fellow, Columbia University
1966 Fellow, American Association for the Advancement of Science
1966 Fellow, Institute of Information Scientists
1975 Award of Merit, American Society for Information Scientists
1977 Hall of Fame Award, Information Industry Association
1977 Herman Skolnik Award, Division of Chemical Information, American Chemical Society
1978 Book Award for Best Information Science Book of 1977 (*Essays of an Information Scientist*, Vol: 1&2, 1962-1976), American Society for

Information Scientists
1980 Award, Chemical Notation Society
1983 Patterson-Crane Award, Dayton and Columbus Sections, American Chemical Society
1983 John Price Wetherill Medal, Franklin Institute
1984 Derek J. de Solla Price Memorial Medal, Scientometrics
1986 John Scott Award, City of Philadelphia
1987 Distinguished Alumni Award, Columbia University, School of Library Service
1988 Doctor (*honoris causa*), Vrije University, Brussels, Belgium
1990 Ph.D. (*honoris causa*), State University of New York, Albany
1991 Honorary Fellow, Society for Technical Communication
1991 Ph.D. (*honoris causa*), Thomas Jefferson University
1993 Honorary Foreign Member, Institute of Marine Biology, Vladivostok, Russia
1993 Honorary Fellow, Medical Libraries Association
1993 M.D. (*honoris causa*), University of Rome, Tor Vergata, Italy
1995 M.D. (*honoris causa*), Charles University, Czech Republic
1999 Avenue of Technology Award, Philadelphia, Pennsylvania
2000 Professor Kaula Award for Library and Information Science, India

ABSTRACT

Eugene Garfield begins the interview with a discussion of The Johns Hopkins University Welch Library indexing project. Garfield joined this project in 1951, during which he became involved in machine methods for indexing and searching literature. He worked on automating *Current List of Medical Literature*, and experimented with punched cards and zato coding. During his tenure there, he helped to organize a symposium to demonstrate the project's work, at which he met many pioneering information scientists. Also while at the project, Garfield developed his idea for *Contents in Advance*. He discusses his relationship with Sanford V. Larkey, and his decision to attended library school at Columbia University. After graduating, Garfield joined Smith, Kline & French as a consultant. He eventually set up his own company, DocuMation, Inc., and worked on many projects, including a *Genetics Citation Index* for the NIH and *Management's DocuMation Preview.* Garfield discusses the development of *Current Contents*, the growth of his business, and the challenges he encountered. In the 1960s, he launched *Science Citation Index*, a concept that was later expanded to include other fields of literature. Garfield was also involved in many professional organizations throughout his career, including the Information Industry Association (IIA). He addresses the evolution of his company, Institute for Scientific Information (ISI), his colleagues, and his decision to sell ISI. Garfield concludes the interview with a discussion of his experience with VINITI, changes in library education, and the future role of the Internet.

INTERVIEWER

Robert V. Williams is a professor of library and information science at the University of South Carolina. He holds a Ph.D. in library and information studies from the University of Wisconsin, Madison; an M.S. in library and information science from Florida State University; and an M.A. in history from New York University. Before joining the University of South Carolina in 1978, he was an archivist and information services manager for the Ford Foundation and the Georgia Department of Archives and History. Williams has also been an information consultant for many organizations including Appalachian Council of Governments of Greenville, South Carolina, and Pontifical Catholic University Madre y Maestra, Dominican Republic. He came to the Chemical Heritage Foundation as the Eugene Garfield Fellow in the History of Scientific Information in 1997. He is a member of the South Carolina Historical Records Advisory Board, the American Library Association (ALA), and the American Society for Information Science (ASIS), where he served as chair of ASIS History and Foundations of Information Science Special Interest Group in 1994-1995. Williams is also a member of the Special Libraries Association (SLA) and Chair of the SLA Membership Committee. Williams has numerous publications on the historical role of information science.

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INTERVIEWER: Robert V. Williams

LOCATION: Institute for Scientific Information
Philadelphia, Pennsylvania

DATE: 29 July 1997

WILLIAMS: Dr. Garfield, since the [Chemical Heritage] Foundation has already done the first interview, I thought we'd start with some of the specific kinds of things, such as the Welch Medical Library project. You began working there in 1951, I believe.

GARFIELD: Right.

WILLIAMS: Do you remember what month you started?

GARFIELD: I think it was March.

WILLIAMS: I assume you consider this your real beginning as an information scientist or documentalist.

GARFIELD: Yes, essentially. Although I had been doing what you might call documentation activities on my previous job at Columbia University. I indexed a lot of the chemical compounds that they had there. I worked with Dr. [Louis Plack] Hammett, my boss, who was an advisor to McGraw-Hill. He had a complete set of *Chemical Abstracts*, as did most members.

WILLIAMS: You were a volunteer abstracter, I believe.

GARFIELD: Yes, but only after I joined the Welch Medical Indexing Project.

WILLIAMS: All right. At the Welch Medical Library project, you had several different responsibilities. You were the chemical expert on subject headings.

GARFIELD: Yes. They hired me because I was a chemist and they needed that.

WILLIAMS: You were involved in methods for producing the *Current List of Medical Literature* by machine methods. What were other activities in which you were engaged?

GARFIELD: The project was interested in all types of methods of using machines (computers were not in use yet) for improving indexing methods and production of printed indexes, as well as methods for searching the literature.

The *Current List of Medical Literature* was, then, the monthly publication of the Army Medical Library, later to become the Armed Forces Medical Library, and eventually, the National Library of Medicine [NLM]. The *Current List of Medical Literature* had its origins in World War II. At that time, Atherton Seidell, a leading expert in microfilm, organized a system to serve the Army's doctors overseas. The library simply typed up the contents pages of the leading medical journals, and sent this "Current List" overseas by microfilm. Then the doctors could request copies of articles, which also were received by V-mail. Do you know the V-mail system?

WILLIAMS: Yes.

GARFIELD: Well, that was a microfilm enlargement system. As a matter of fact, that microfilm system was continued after the War. Sam [Samuel] Lazerow used those methods to make the library a center for inter-library loans, as director of the Serials Division. That photocopy service functions to this day, if I am not mistaken.

WILLIAMS: Still through microfilm?

GARFIELD: Yes, enlargements from microfilm. In later years, high-speed photo enlarging machines were used—probably Xerox-copyflow.

So when the *Current List* began, it was simply a typewritten contents-page service. So you might even say that it was the forerunner of *Current Contents*. My evaluation of it led to

Current Contents because I recognized its shortcomings. The *Current List* evolved from a timely, simple list without indexes. Later on, they added subject and author indexes to it. But the time required to read and index the articles introduced delay.

WILLIAMS: Now, the indexes existed before you came and started working on the project?

GARFIELD: Yes, it was a very substantial monthly publication by the time I got there. It was six years since the end of the War.

WILLIAMS: 1951.

GARFIELD: From a simple list it had become a monthly publication, 8½ x 11. It was organized in several sections, including the section containing the contents pages. The other sections were the subject and author indexes. Part of the problem was that it took so damned long to get the indexing done. Delay was introduced when it became more than just a simple contents page service. It never was a facsimile of the contents pages, as *Current Contents* became. A job once requiring a month gradually stretched out to months and months. Adding the production problems of putting together an index to about ten thousand items a month delayed things quite a bit.

At the same time, you've got to remember that in parallel, the AMA (the American Medical Association) published the *Quarterly Cumulative Index Medicus*. *QCIM* was still in existence when I came to the project. So there were two competing services. For whatever reasons, lateness or whatever, *QCIM* was more of a showpiece for doctors. I interviewed faculty members at Johns Hopkins and I found many doctors who had copies of *QCIM* in their offices, which they could buy for a song, but the covers had never been cracked. It was, however, used by librarians, as was the *Current List*, but it had a different format. It had a full-entry format, whereas in *Current List* there was a two-step process. You looked at the index and then went to the contents page for the full bibliographic entry. This was annoying, and slowed searching. In *QCIM*, under the word you got the full bibliographic citation. Eventually, after I left the project (I can't remember the exact year), the AMA and the NLM made an agreement. The AMA would cancel *QCIM* and the *Current List* would be modified in format, and become the new *Index Medicus*. And that's what you have to this day, the monthly *Index Medicus*. It was also cumulated annually or every six months.

WILLIAMS: When did you get the idea to start working on the automating of the *Current List*?

GARFIELD: Well, within the first year that I was in the project. At first, I had to learn all their procedures. I was heavily involved with the subject heading list analysis. I frequently made trips to Washington. I got to know the editor, Seymour [Irving] Taine; we became personal friends. Robert [L.] Hayne was his assistant editor. Bob later came to work with me at Smith, Kline & French Labs. Then later on he left there and came to work for me at ISI [Institute for Scientific Information]. Thelma Charen, who is still at NLM, as far as I know—or if she isn't, she's just recently retired—was involved with the indexing. Dr. Estelle Brodman was a key figure in the library and a major figure in the history of medical bibliography. I am still in touch with her. Sam Lazerow was working there then. Brad [Frank Bradway] Rogers came on board shortly after I came to the project, but he was not there when the project began. I believe he was attending library school at Columbia [University] after having been selected as the new director.

WILLIAMS: It started in 1947.

GARFIELD: Of course, after he arrived, I got to know Brad Rogers very well. He made the decision to terminate the project. I don't know what the background discussions were. It may very well be that Dr. [Sanford Vincent] Larkey was tired of the project himself, and also tired of me. Between all those factors and various things I think I described before as to how I left the project, its time had come. By that time, however, I had learned all their production methods, and knew exactly what they were doing. A developed punched-card system was never implemented in preparing the *Current List*. We also used IBM punched-card methods for producing subject heading lists.

WILLIAMS: In one of the articles there's a picture of the printout and those kinds of things.

GARFIELD: Yes, but they never adopted my system directly. There was a list-o-matic camera system involved?

WILLIAMS: Yes. In Larkey's 1953 article (1), which he presented in 1952 at MLA, there's a photo reproduction of some pages of the thing set by the machine.

GARFIELD: I have to look at that. Well, they may have been the subject heading lists. Clearly, the subject heading lists were implemented.

WILLIAMS: No, this was *Current List*.

GARFIELD: The *Current List* itself?

WILLIAMS: Produced on the IBM 101.

GARFIELD: No, impossible.

WILLIAMS: No?

GARFIELD: It could not be produced on the 101. The 101 was a sorting machine.

WILLIAMS: Right.

GARFIELD: The way in which the system was set up experimentally, no. It was never completely implemented on punch cards. It would have been on list-o-matic cards, IBM cards, which would have the bibliographic entry typed on it.

WILLIAMS: Yes, possibly then. I'm trying to remember what I saw.

GARFIELD: Then later on, when I was a consultant to NLM, they adopted use of a list-o-matic camera. This means that you could have the normal entry typed on the face of the card. Then you could sort the IBM cards by keying holes in them. After they were sorted, you could then paste these cards up on a large board and photo-offset it for the printer. Or you could run the cards through the list-o-matic camera, which photographed them in sorted sequence and produced the image of the page.

WILLIAMS: Yes. I may be confusing what I saw in various articles about it.

GARFIELD: In any event, they may have adopted certain changes. But they never adopted the 101 system for searching. That was just experimental.

WILLIAMS: Now what Larkey says in this 1952 report (1), about you, he says you had "worked out an amazing but fundamental wiring system for the IBM 101, which permits searching of any five-digit number in any one of sixteen five-column cards."

GARFIELD: It did much more than that. What you described was a straight forward use of the 101. My system permitted the search for dozens of five-digit codes simultaneously.

WILLIAMS: But that's more about the searching and sorting than it is about the production of the *Current List*.

GARFIELD: Right.

WILLIAMS: Well, talk about your beginning work with this 101 machine. It was already there when you came? They already had the machine?

GARFIELD: My recollection is it had just arrived. Nobody had done anything with it. They didn't know what to do with it. When I arrived, you've got to remember, I was essentially the replacement for Williamina [Elizabeth Armstrong] Himwich. She was a wonderful woman and a Ph.D. brain physiologist. She was leaving for Illinois to join her husband, who was Harold [Edwin] Himwich, a very famous organic psychiatrist and founder of that field. He became the director of the first full, total research hospital on mental disorders at Galesburg, Illinois. Anyhow, I had to learn the 101 myself.

WILLIAMS: They weren't using it for anything when you came?

GARFIELD: No. The only thing you could use it for was sorting and tabulating data. Remember, it was the IBM 101 statistical machine. They were using punched cards to create lists of headings. The printing of those lists was done at Johns Hopkins Hospital. So I became very familiar with what was going on at the Johns Hopkins Hospital. I became very friendly with Clifford Bachrach, who was the head of the statistical section of the hospital—medical records and so forth. He later on went to the National Library of Medicine and retired from there. He was head of *Index Medicus* for a while, as I recall. So we could print and sort the

subject heading authority lists with punched-card machines. The printing machine was called the IBM 407 tabulator.

WILLIAMS: Now, that's what I thought I'd seen the *Current List* printed on.

GARFIELD: That's what it is. That's a tabulator.

WILLIAMS: All right.

GARFIELD: Yes. Those were probably experimental ones. It was never, to my knowledge, adopted at NLM.

WILLIAMS: You taught yourself?

GARFIELD: Yes, right. I may have taken a short course that IBM offered. I learned a lot from the local IBM representative, who was a fellow named John Brown. At first he told me that the things I wanted to do couldn't be done, but I figured out new methods of wiring. IBM was very conservative then. Later, I did meet some of their brighter people, like [Hans] Peter Luhn and Steven Furth, at the project. I taught myself how to wire and search the 101, which was primarily a machine designed for doing statistical analyses. What you were programming was the format and input. There was a wiring board you used to format the columns that would be sorted, or printed, and so forth. There was a very small tabulating mechanism on that machine. But it mainly was there to print statistical reports.

WILLIAMS: By 1952 Mrs. [Claire Kelly] Schultz had done her thesis here [Philadelphia] at Drexel.

GARFIELD: 1952?

WILLIAMS: 1952.

GARFIELD: That seems early.

WILLIAMS: I'm pretty sure that in 1952 she did her M.S. thesis. She was on punch cards, and she had been using the IBM 101 at Merck.

GARFIELD: Merck Sharp & Dohme.

WILLIAMS: Right.

GARFIELD: She had a special board designed that permitted her to dial in the search requirements.

WILLIAMS: Right. I was wondering.

GARFIELD: I was not aware that it was done in 1952. Maybe.

WILLIAMS: Yes. That was the date on her thesis, which I've seen at Drexel. You were not in touch then, though.

GARFIELD: Not at the time of the project that I know of. I certainly knew her later.

WILLIAMS: So this was independent work?

GARFIELD: Yes. The intermediary in a certain sense—not actively but conceptually—was Calvin [N.] Mooers'. Because you've got to remember that in Claire's system she adopted Calvin Mooers' zato-coding.

WILLIAMS: Right. She started with that.

GARFIELD: Basically, what she was doing was superimposing the eight-digit zato-codes directly on the punched-card. (In computer circles this is called hash coding.) If you looked at

my twelve-field card, you could still differentiate the five-digit codes. What was superimposed was the wiring zato-coding involves.

WILLIAMS: You worked out the wiring diagram?

GARFIELD: Yes. In other words, if you take an eighty-column card, you've got room for sixteen codes. But you've got to leave room for a document serial number identification or reference. We had twelve searchable fields with seven-digit numbers. Actually, a five-digit number for a subject heading, and a two-digit number for the subheading. So seventy-two columns were used for subject headings assigned to the document.

WILLIAMS: Right.

GARFIELD: A search involved finding one or more five-digit numbers or seven-digit numbers—the last two digits being a subheading code. To find articles involving both heart disease and cancer, you searched for the two appropriate five-digit code numbers. You had to search across all twelve fields. Now, in normal searching procedure, you wire in the five-digit number that you want to search for. Then you set the columns that you want to search on. Normally you would search for one five-digit number, in any of the twelve fields. You do this by plugging connector wires into the holes in the board. However, you can combine—that is, superimpose—them to search for a combination of digits simultaneously. You combine the wires so that you're searching for several numbers at the same time. When you work out the various probabilities, the card will not respond to the search unless it has the numbers you want. There will be a few false drops, but these can be screened out using the normal search procedure on a smaller deck of cards.

If you had been searching for a single digit, you would get a huge number of false drops. Since you were searching for combinations of five digits, you reduced that. The theory of the probabilities of false drops were all basically explained in a chapter of a book by [James Whitney] Perry (2). The chapter in the punch card book had all those probabilities worked out.

WILLIAMS: You were using [James W.] Perry's punch card book (2)?

GARFIELD: The book discussed the zato-coding using statistical probability of false drops. Now, in Claire Schultz's case, the false drops could not be eliminated by machine. You had to examine the cards, false drops included. We got false drops, but then we could do a normal

search and weed out the false drops without scanning the cards manually. Suppose you were searching ten thousand cards. If you got a false drop rate of 2 percent, there would be two hundred false drops. Well, if you got five hundred correct responses and two hundred were false drops, you would run the deck of seven hundred on a second pass, and only the correct would respond.

WILLIAMS: Yes. You really had two separate projects going with the 101: printing the *Current List* and searching on the document term cards.

GARFIELD: Yes, exactly.

WILLIAMS: You punched in what kind of database? Was it the *Current List* database that you were searching?

GARFIELD: Yes. I got the index entries from *Current List*. We assigned a serial number to each paper. I believe the five-digit code was part of the subject heading authority list. Each subject heading had a classification number.

WILLIAMS: This was what Larkey was bragging about on your part?

GARFIELD: The searching system.

WILLIAMS: A searching system more than anything else.

GARFIELD: Did he mention the printing of the *Current List*? I don't think he did, did he?

WILLIAMS: When I read this, I saw the searching aspect and what was in my head was *Current List* and that you had actually produced the whole thing.

GARFIELD: It was searching *Current List* subject headings that had been assigned to a collection of documents.

WILLIAMS: You've mentioned some of the other folks who worked on the project with you and Larkey in the other interview.

GARFIELD: Helen G. Field, who was a medical librarian on the project. Helen Field married Giles Rich, a judge who is still on the U.S. Patent Court of Appeals. He's in his eighties. I spoke to him a few months ago. Helen is now in a nursing home.

WILLIAMS: Thelma Charen, she was another?

GARFIELD: She was a NLM person.

WILLIAMS: John Whittock?

GARFIELD: John joined us late in the project. He's probably retired now—he was a dental librarian at Penn [University of Pennsylvania], I think. But he joined the project in about January of 1953. Both he and Dr. Larkey conked out on the day of the symposium. [laughter]

WILLIAMS: About that symposium, almost everyone I've talked to said to me that it was that meeting at the Welch Medical Library that was the first realization that there were this many documentalists around the country.

GARFIELD: Yes, well, we had invited three hundred people to come. Most of them were librarians—not necessarily documentalists.

WILLIAMS: Tell me more about the inviting. Who participated and in what way?

GARFIELD: Well, I did most of the work on the symposium. If Larkey and Whittock had their way they would have had a little group or nothing at all.

WILLIAMS: Whose idea was it?

GARFIELD: Mine. I was PR-minded even then. [laughter] No question about it. I wanted to help keep the project alive. I was conscious of the fact that it was coming up for renewal. Another reason I wanted the meeting was because we had so many visitors. I was getting tired of demonstrating to visitors almost every day. It was driving me up the wall. I said to Dr. Larkey, "We'll get them together and explain it to them all at once." So he agreed. We scheduled advisory committee meetings, and then the symposium. There were whole series of papers that were supposed to be presented. Larkey was supposed to give one or two, John Whittock one, and I was supposed to cover the machine methods and search demo (3). As it turned out, I gave them all, because they didn't show up.

WILLIAMS: Who selected Clapp to be the chairman?

GARFIELD: Verner [Warren] Clapp was a member of the advisory committee. The chairman of the advisory committee was Chauncey D. Leake. I had gotten to know Verner very well, having visited him at the Library of Congress. He was very machine oriented. As you know, he went on later to become head of the Council of Library Resources. He even supported me in my later experiments on the Copyrighter—a device for selectively copying text.

WILLIAMS: So you sent out the invitations to the folks who had visited the project. How did you select the other folks to be invited?

GARFIELD: Well, anybody could come that paid three bucks. [laughter] There was no restriction. The meeting was announced in the journals, I'm sure. Our secretary, Marge, did all that clerical work.

WILLIAMS: Were you shocked when three hundred people showed up?

GARFIELD: I can't honestly tell you yes or no. I just really don't know. I don't think shocked is the right word. I just don't know how to answer that question. Look, if you were to ask me at that time how many people might come, I'd have said, "Well gee, how many medical and special librarians are there? How many people are interested in this field?" There were probably six or eight hundred members of the Division of Chemical Literature at that time. ASIS was still called ADI. I think ADI people made up a good percentage of the three hundred who came, as well as medical and special librarians.

The attention that the meeting got, well, it just kept on building, you know.

[END OF TAPE, SIDE 1]

GARFIELD: It was held in the Great Hall of Welch Medical Library. Have you ever been to the Welch Library?

WILLIAMS: No.

GARFIELD: It has this famous, huge painting of the four doctors—Welch, [Sir William] Osler, et cetera. It was a beautiful affair. So everybody got well fed, and coffee breaks, too. I marched them around, demonstrated the 101, and gave all the talks in the lecture hall. I had also created posters explaining how the machine works.

WILLIAMS: Was Larkey really sick?

GARFIELD: Was he really sick? How do I know? How could I know?

WILLIAMS: I gathered from what you'd said in the previous interview that you doubted it.

GARFIELD: Well, I doubted it, yes. Of course I doubted it, thinking he might have had a drink too many. But to my recollection, he came to the office a day or two later.

WILLIAMS: Oh, yes? Talk about your impressions of some of the folks who were there, who stand out in the field. You've mentioned Ralph [Robert] Shaw already. What were your impressions of him at the time?

GARFIELD: Oh, Ralph Shaw was brilliant, the fastest-talking person I had ever met. He was somebody who was impossible to deal with in a debate. His repartee was so fast that he just could disarm you. But he was also a brilliant guy and a very successful administrator. He ran the Department of Agriculture library, and had been involved with the Rapid Selector and so forth. Later on, I had a personal encounter with him that was very, very significant. He became

the dean of the new library school at Rutgers. While I was still at Columbia, he contacted me about becoming an assistant professor. At the last minute, he turned me down and hired Lowell Martin.

WILLIAMS: Yes.

GARFIELD: It would've changed my life if I had gone there. But who knows?

WILLIAMS: Calvin Mooers?

GARFIELD: What about Calvin Mooers?

WILLIAMS: Your impressions? He was at the meeting also.

GARFIELD: Was he?

WILLIAMS: Yes, I think so.

GARFIELD: I'm not sure if Calvin was there. Do you know?

WILLIAMS: Mrs. Schultz said so.

GARFIELD: He came?

WILLIAMS: She got into an argument with him at the meeting.

GARFIELD: Oh, Claire was there?

WILLIAMS: Right. Yes.

GARFIELD: Oh, God! I got into a fight or she got into?

WILLIAMS: She did.

GARFIELD: What about?

WILLIAMS: I can't remember now what she said.

GARFIELD: Well, Calvin—I had met him before. He visited the project.

WILLIAMS: Oh, he did?

GARFIELD: Oh, yes. I met him before that meeting.

WILLIAMS: Mrs. Schultz describes him sort of as the person who was always afraid you were going to steal his ideas.

GARFIELD: Yes, he was somewhat paranoid.

WILLIAMS: Was he?

GARFIELD: Yes. I think it was very unfortunate. I'm sure his ideas would've been much more widely understood and adopted if he hadn't been. He wasn't all that good a businessman, you know. He was really a rather reclusive researcher.

WILLIAMS: Really?

GARFIELD: Yes. The fact that he never was involved with ASIS. He never was involved with ADI. If he was involved with any organization, maybe it was some mathematical one. He probably felt more comfortable with mathematicians than he did with information people.

WILLIAMS: Mortimer Taube? He was also there.

GARFIELD: Yes, Mort is a very interesting personality. He and I, we got along basically very fine. I remember when he first went into business, he proudly told me what he was going to be doing, and described the Uniterm system to me. But he got annoyed with me later on after I left the project, and I started my company, and I called it DocuMation. He had started Documentation, Inc. I was publishing *Management's DocuMation Preview.* The neologism was supposed to be a combination of documentation and automation. However, I later changed the company name to Eugene Garfield Associates—Information Engineers.

WILLIAMS: Did he try to sue you or anything?

GARFIELD: I don't remember if he did or did not. But the name DocuMation remained until it became Eugene Garfield Associates.

WILLIAMS: Saul Herner described him as a publicist, a salesman for documentation.

GARFIELD: Oh, he was definitely a salesman, yes. He was like me in that respect. I mean, he believed in his product, and he was a good salesman. He was a good communicator.

WILLIAMS: Was he effective at delivering his products in terms of contracts?

GARFIELD: For quite a while he did. I think until they ran into serious problems with the concept. In theory it sounded good. But I think when it got into handling large numbers of documents, it fell apart.

WILLIAMS: Big numbers of documents?

GARFIELD: Yes. Then he got involved with Termatrex cards. So it could be mechanized.

WILLIAMS: Right.

GARFIELD: So it seemed to me to be like an oxymoron. Because the Uniterm system had not been proposed as a machine system. Although I don't know whether there's a contradiction or not there. I can't remember all that well.

WILLIAMS: Was Taube likable?

GARFIELD: Oh, Mort had a very nice personality. He was a very sweet guy. Is there any doubt about it?

WILLIAMS: No, I'm reading his stuff, and his stuff is written really—

GARFIELD: He's a philosopher. Dogmatic?

WILLIAMS: —sort of "devil take the hindmost" kind of thing. Particularly in his attitudes about librarians.

GARFIELD: Well, he was cocky. Librarians? After all, they weren't perfect by any means. [laughter] An incredibly conservative group.

WILLIAMS: John [William] Mauchly was also at that meeting.

GARFIELD: He was?

WILLIAMS: Yes.

GARFIELD: I don't specifically remember. I'm not surprised that he was.

WILLIAMS: No impressions based on that meeting?

GARFIELD: Well, I had met him, too, separately.

WILLIAMS: Oh, you had?

GARFIELD: Oh, yes.

WILLIAMS: He had been down to look at what you were doing?

GARFIELD: Yes, he came to see me. Later on he and I became very close friends, when I came to Philadelphia. Claire knew him, too. It was sad, what happened to him. He was not a good businessmen. Somebody could say I wasn't either, in the sense that I was not the corporate type. ISI, even after it had grown to seven hundred people, was treated like a family, not a business.

WILLIAMS: Back to Taube, was he a business type, a corporate type?

GARFIELD: Well, I don't think he was around long enough for us to have found out. His company became fairly big right away because they got the NASA contract.

WILLIAMS: Right. Mrs. Schultz describes Mauchly—but then she was working for him for a couple of years—as not a vice president. They'd made him a vice president at Sperry [Rand]. He was a researcher, and that this was part of the reason for the failure of—not of him so much, but of that whole Univac system. Was that your impression? Did you know him? Were you involved with him in the late 1950s?

GARFIELD: I saw John periodically in the 1950s and then until he died of a blood disease. I visited him in Ambler and knew his wife. I saw her when Penn celebrated the anniversary of ENIAC. In any case, he definitely was not a business type. He had been a physics professor before ENIAC. After he left Univac, he became a consultant in PERT systems.

WILLIAMS: Oh, is that right?

GARFIELD: Yes, for the construction industry.

WILLIAMS: I didn't realize that. Interesting.

GARFIELD: PERT was very hot at that time: Project Evaluation Review Technology. We even used to use it here to control various projects. Irving [H.] Sher was very good at it.

WILLIAMS: Yes. So that was developed in the early 1960s?

GARFIELD: Late 1950s or early 1960s, yes.

WILLIAMS: How was your presentation received at this meeting in terms of what you remember about it?

GARFIELD: Very well, indeed. There was no significant criticism. A lot of the people who came were there because they were curious. I don't think they were really qualified to judge it one way or the other. People who were super conservative probably didn't come. Remember, we were still calling them "machines" and "machine methods"—not computers.

WILLIAMS: Right.

GARFIELD: IBM machines were just card-activated calculators.

WILLIAMS: So it was advertised more as a conference dealing with machine methods.

GARFIELD: "Machine Methods in Scientific Documentation" was the symposium's title.

WILLIAMS: Now also at this meeting, Saul Herner, who was at the Applied Physics Lab, gave his paper on user studies.

GARFIELD: Oh, that's right! Yes. Saul and I had become good friends. I participated in one of his surveys. I did the interviews at Johns Hopkins Medical School.

WILLIAMS: Oh, you did?

GARFIELD: Yes. I wandered around the med school and hospital asking people how they gather information. A classic remark was made by a pharmacologist—I think Dr. Marshall—who said, "I do experiments." [laughter] He didn't seem to understand me. I was thinking of library information. But his answer was very revealing, I think. You're talking to an entirely different type of information user when you're dealing with scientists. To them, gathering information is something to do or get in the lab. If they thought they could find it in the library, they might. But the notion was foreign to them—the idea that the library should be the extension of the laboratory, or vice versa. That probably had something to do with the tedious nature of library search in those days.

WILLIAMS: What was the reaction of the folks that you were interviewing as part of Herner's study? Now, his is about the second. The only one that I know much about—maybe there were some others, but the most well-known one was the one the guy did that reported at the 1948 conference. But user studies were practically unknown. What kind of reactions were you getting from these folks that you talked to?

GARFIELD: It varied considerably. I really don't remember all that well. It was a good experience for me because I got to meet users. These interviews probably contributed to my awareness of what was missing in the old systems—including especially timeliness more so than complexity. You've got to remember we're talking about an era when indexes were often three years behind the literature. That sort of thing.

WILLIAMS: So this played a part in your thinking about this.

GARFIELD: Oh, sure. If you talk to enough people, you find out how they actually get information. Why do we have so many informal methods of getting information? Because you

couldn't rely on the formal ones. In addition to indexes, it wasn't unusual for journal articles to be published two years after submission.

WILLIAMS: Now, you've said that most or many of your ideas that came out at ISI started there at that project.

GARFIELD: Yes.

WILLIAMS: Certainly *Citation Indexing*, I think, hit you there first, and *Current Contents*. You described how *Current Contents* fits into that.

GARFIELD: Yes. Oh, even my preoccupation with indexing chemical compounds got a boost there, even though I was interested in that at Columbia. At the Welch project, I did abstracting for *Chemical Abstracts*. I did that so I would learn the process. They sent me mainly articles on pharmacology in Spanish serials. We were also interested in searching chemical files. I was brought there because I was a chemist. We were well aware of the various chemical notation systems. I didn't meet [William Joseph] Wiswesser until later. But I was a member of the American Chemical Society already, and going to meetings.

WILLIAMS: And you continued to go to those meetings.

GARFIELD: Madeline [Mary Berry] Henderson and her colleagues were chemists.

WILLIAMS: You were fired, you said.

GARFIELD: Yes.

WILLIAMS: Fired? Not the project terminated or some combination of it?

GARFIELD: I was fired. Not only that, they fired me, and they didn't even give me my vacation pay.

WILLIAMS: Really?

GARFIELD: Yes.

WILLIAMS: Why was Larkey so unhappy? I know you've talked about it in the other interview.

GARFIELD: His excuse was that I refused to stop publishing *Contents In Advance*, which I considered to be a private project. It clearly had no effect on my work. In fact, I started it in order to be better informed on what was happening worldwide in documentation.

WILLIAMS: You were doing this on the side?

GARFIELD: Yes. We used to photograph four contents pages pasted on a board and reduce them to about half the original size.

WILLIAMS: The idea came directly from the *Current List*?

GARFIELD: Yes. So to speak.

WILLIAMS: Only in this case what?

GARFIELD: I was photographing the contents. I wasn't retyping them.

WILLIAMS: You were doing it in library literature or library documentation literature?

GARFIELD: Right.

WILLIAMS: Do you still have a copy of that?

GARFIELD: I don't know. It can be found in some libraries, I think.

WILLIAMS: It's not in the Library of Congress.

GARFIELD: It's not in the Library of Congress? Did you ever look at a *Union Catalog* for *Contents in Advance*?

WILLIAMS: I checked pre-1956 imprints and came up with something called *Contents in Advance*. But if you look at the uniform title—that's a uniform title. [Showing the printout of the cataloging record from the Library of Congress] That's not a reissue.

GARFIELD: Well, Prometheus House was the publisher subsequently.

WILLIAMS: Oh, it was?

GARFIELD: That was after Ann McCann took over. After I left the Welch project, I returned to New York. I continued to publish *Contents in Advance* while I was in library school. Ann McCann was in my class at library school. She and another student—Marge Courain—were helping me. We did it together. We were using an outside printer. Then later on I turned it over to her. She set up a company called Prometheus House, and she kept on publishing it until it went out of business.

WILLIAMS: So this really could be it.

GARFIELD: Oh, this is it.

WILLIAMS: The real title looks like it's *Union List of Library Periodicals.* [laughter] The uniform title is *Contents in Advance*? That's weird. Unless they switched these around.

GARFIELD: Something's screwed up.

WILLIAMS: Well, I'm glad to know this is it because I was afraid it didn't exist.

GARFIELD: But remember, it started in 1953 or 1952, late 1952. Because I couldn't have been doing it that long.

WILLIAMS: And you see the date there.

GARFIELD: That's 1955.

WILLIAMS: 1955, yes.

GARFIELD: As I say, that's after I stopped publishing it myself and gave it to Ann McCann.

WILLIAMS: This makes me think somebody changed the title around, and this is not really the one that you put out. Do you think you can dig out a copy?

GARFIELD: I don't know. I remember when I got married in 1955, I had a closet in the apartment—we lived in Woodbury, New Jersey—full of stacks and stacks of *Contents in Advance*. [laughter] When we moved a few miles away to the log cabin in Thorofare, New Jersey, my wife said, "We're not taking them with us."

WILLIAMS: So you tossed them?

GARFIELD: Yes.

WILLIAMS: I've checked the Penn catalog, the Drexel catalog. No luck.

GARFIELD: You should try a few foreign libraries. Well, back to Larkey. Larkey may have been dissatisfied on other levels.

WILLIAMS: That you were publishing it and that, supposedly, it was taking time away from the job.

GARFIELD: There were other factors, I think, also involved in his wanting to get rid of me.

WILLIAMS: Can you give an example?

GARFIELD: Well, probably he may have heard about political views that I had had when I was much younger. It was the McCarthy Era. The Larkeys were very much involved in Democratic Party affairs.

WILLIAMS: Reading about him and reading just a few of his articles, he strikes me as a conservative man, very much a middle-of-the-roader.

GARFIELD: Well, Larkey was a liberal democrat. He was a liberal.

WILLIAMS: Was he?

GARFIELD: His wife was a member of the National Democratic Committee. They were Democrats. There is a hilarious story about how he was going to help me out when I got evicted from my apartment on Calvert Street for playing the saxophone. I had to appear in court. He said, "Oh, I'll come down and testify for you." He walked into the courtroom, and the Republican judge recognized him and immediately said to me—within five seconds—"Mr. Garfield, I expect you to be out of that place in twenty-four hours." [laughter]

Then Dr. Larkey was further upset when he found out that I had moved to a place in the Red Light District in Baltimore so that I wouldn't be bothered. I had rented this big room over a corner drugstore where I could blow my horn as much as I wanted. One time I had gone on a weekend trip to Chicago to visit my girlfriend. I had left a message at his office that I wouldn't be in on Monday. He never got the message and was upset that I wasn't at work. So he went over to my apartment—Mt. Royal and Charles Street. When he saw what and where it was, in a very, very low-down district, he told me the next day, "That's not a respectable place for you to be living." You want to talk about a controlling person? So he did me a favor. He got me in a

place next to the hospital—so I could work ever harder—he got me an apartment the size of a closet located over another pharmacy, right in front of the emergency entrance to Johns Hopkins Hospital. So that's where I lived out the rest of my project days.

WILLIAMS: You could work around the clock then.

GARFIELD: Yes. Which I did. No saxophone there. [laughter] There wasn't enough room to take it out.

WILLIAMS: Yes. Now the linkage between *Contents in Advance* and *Management's DocuMation Preview* [*MDP*] is really pretty direct, right? Because you'd given up the one covering documentation.

GARFIELD: Yes. *MDP* was in the management field.

WILLIAMS: But you were still trying to do the same kind of thing.

GARFIELD: Yes.

WILLIAMS: By 1956 you'd incorporated as DocuMation, Inc. in New Jersey.

GARFIELD: I don't know if that's the right year. Probably 1955 or 1954?

WILLIAMS: I think 1956 is what was in the previous interview, but I'm not certain. Oh, but wait! Before I get there, I want to talk about Columbia. I don't want to forget.

GARFIELD: You might be right.

WILLIAMS: Let's talk about Columbia. You said that you decided to go to library school because folks had said you needed the credentials. Who was your advisor there? Talk about general experiences.

GARFIELD: Well, the person who recommended library school was Seymour Taine, editor of *Index Medicus*. When I got there, I didn't have an advisor at first. Then somehow the dean, Dr. Carl White, called me in and suggested I apply for the First Grolier Fellowship, which had just been established.

I honestly can't remember how he found out about me. I guess somebody told him. This fellowship, the First Grolier Fellowship, was sponsored by *Encyclopedia Americana*. When I filled out the part asking for recommendations, my list of references included Verner W. Clapp, chief assistant Librarian of Congress; Ralph Shaw, director of the National Agricultural Library; and Brad Rogers, director of the National Library of Medicine. I wonder who Brad Rogers had listed when he applied?

WILLIAMS: [laughter] They wouldn't turn you down.

GARFIELD: Now, Carl White was the dean. He was a wonderful, sweet man. I am eternally in his debt. As far as I can recall, he was a theologian. He was an incredibly gracious person. That thousand dollars made a huge difference, because I was supporting a child and working on the side at the Old Hickory Book Shop. They were dealers in rare medical books. I cataloged their whole collection. Murray and Jo Gottlieb remained friends until he died and then I saw her from time to time at MLA meetings.

WILLIAMS: Tell me about your impressions. You'd just come from one of the most advanced projects dealing with the whole area.

GARFIELD: The faculty were unbelievably conservative, including Morrie Tauber. Maurice [F.] Tauber was the famous Tauber of cataloging fame. I may have told this story before, but years later, after one of the student revolts at Columbia, I came up to see him. He told me that the students had locked him up in his room. [laughter]

WILLIAMS: Really? [laughter]

GARFIELD: I said to him, "Morrie, that was a great idea. I wish I had thought of that when I was here." [laughter] But he was a gracious gentleman from North Carolina and I always respected him.

WILLIAMS: So your impressions, even at the time, were of tremendous conservatism?

GARFIELD: He was always very nice to me. Yes, I'll tell you an example of it. I and half a dozen or a dozen other students formed the "Documentation Club," a strictly extracurricular activity. At each meeting, one of us would give a lecture on what we had known about and worked on before coming to Columbia. I talked about citation indexing. A student from India, Gupta, talked about Colon Classification. Robert Krupp, who later became the science librarian at New York Public Library, had come from industry. Bob spoke about patents. Another student was the poet laureate of Iran. Nasser Sharify became the Dean of the Pratt Library School. We covered topics never discussed in class or barely mentioned.

WILLIAMS: No one was talking about those things in class?

GARFIELD: No. Patents? You've got to be kidding. In library school? Citation indexes? Come on. Colon Classification? No way.

WILLIAMS: Tauber didn't mention it?

GARFIELD: Mention? Maybe the word was mentioned.

WILLIAMS: No one talking about machine methods.

GARFIELD: There was all this other stuff. I can't remember the other things we talked about. Maybe microfilm. But the unique thing about the Documentation Club was this—not one faculty member ever showed up, even the fellow who taught science literature, Oliver Lilly. And Tom [Thomas] Fleming, the medical librarian, who also taught part time, was too busy.

WILLIAMS: What kind of student attendance did you have?

GARFIELD: Oh, reasonable. We wouldn't have continued if we didn't have some. I became very good friends with all of those guys. Columbia was the international library school. We had students from all over the world. Later on that became a wonderful asset for me. There was

a medical librarian from Thailand, a science librarian from Sri Lanka, and so on. Knut Thalberg of Norway was a member of the club, too. He was a mathematician from the University of Trondheim, a technology institute, and became library director. I saw him regularly until a few years before he died. In this respect, library school was a wonderful experience.

WILLIAMS: None of this was going on within the classrooms?

GARFIELD: No.

WILLIAMS: Now, you finished the MLS program in 1954. I gather you immediately started to work on your Ph.D. there? But not in the library school, right?

GARFIELD: Not anywhere. I couldn't get anywhere. I tried to set up a Ph.D. program at Columbia. I had my M.S. credits and course work I had done at the Watson Laboratory and also at Johns Hopkins. I got four professors to agree to participate in my interdisciplinary program. But they could never agree on a date to meet. One of them was George [Elbert] Kimball, and another was Morrie Tauber, and Merrill [Meeks] Flood from the industrial engineering school. Eventually, I had to give up because I couldn't get financial support although I might have still had some G.I. credits left.

WILLIAMS: But you took some course work. I have that you took about sixty hours at Columbia. In a Ph.D. program?

GARFIELD: Yes. I may also have had some chemistry credits from my days with Professor Hammett. In any case, that became moot because I left for Philadelphia to work as a consultant for Smith, Kline & French.

[END OF TAPE, SIDE 2]

WILLIAMS: I had an e-mail from Arthur W. [William] Elias. Tell me about your connection. I met Art when he was working for Wyeth Labs' science information department.

GARFIELD: Ask his view of it. He may have an entirely different perspective from mine.

WILLIAMS: Was he working for you at the time?

GARFIELD: Yes, he was one of the four horsemen of the Apocolypse. He led the revolt. This was a group including Art, Irv Sher, Marv Schiller, and Ivan Riesenbach—all VPs at ISI at that time. They were dissatisfied with my leadership and felt that I was not sufficiently bottom line-oriented. They were particularly unhappy about the *Index Chemicus* and its continuing losses.

WILLIAMS: Oh, I see. Is that when he went to Biosis?

GARFIELD: Not immediately. At first, they formed their own company.

WILLIAMS: Was Herb [Herbert S.] White working for you at the time?

GARFIELD: No. He came later. Irv Sher came back about a year or so later, to his and my good fortune.

WILLIAMS: Now at the time of this revolt, you still held your 100 percent or close to 100 percent?

GARFIELD: Yes, but 20 percent of the company was owned by a group of Wall Street investors. This was around the time that the *SCI* was losing money, and we were worried about solvency. So this is about 1965?

WILLIAMS: Talk about when you made the decision of how to structure the company. You were a one-person operation. I don't know if you had stock then or when you decided to go with a stock-oriented organization.

GARFIELD: Well, it was a corporation very early on. You do that to limit your liability. Even when I had DocuMation, Inc. I was one person.

WILLIAMS: But you still had a corporation? And had stock?

GARFIELD: Well, any corporation has stock.

WILLIAMS: Yes. When did you start giving up shares to it?

GARFIELD: Well, I had given options for shares to all these guys. When they left, one of them, Schiller, deceptively led me to believe that he was not involved in the revolt, because his options were due to take effect within a few months. So he waited until then. He lied to me all during that period. Then when his options became effective he told me he was going. I think Art and Marv lost their options. I can't recall what Irv did.

Shortly after they left, they started a new publication. They formed a company called Information Corporation of America. Very nice name. They started an indexing service in the field of agriculture. We filed a suit against them for trade secret violation or whatever. Their company never took off. Art can give you a different perspective on it, perhaps, as to why it didn't succeed.

WILLIAMS: You were still holding the majority shares in the company?

GARFIELD: Oh, yes. I had majority even until I sold it.

WILLIAMS: Let's go back to the *Citation Index*. I had forgotten I saw that article on the patent citation trial. I had forgotten about that. Tell me about the NIH grant. How did this come about?

GARFIELD: Very simple. Dr. [Joshua] Lederberg wrote me a letter in 1958 telling me he had read my article about citation indexes in *Science*. Eventually, we met in Philadelphia in 1959 and he suggested that I apply for a grant to the NIH to do an experimental *Genetics Citation Index*. We got the grant in 1960 and he served on the Advisory Committee.

WILLIAMS: In looking at your bibliography, I saw an unpublished paper titled, "Librarians versus Documentalists" that is dated about 1954 or 1955 (4). I wondered if you still had a copy of that paper or if you recall what it was about?

GARFIELD: It's in my bibliography?

WILLIAMS: Don't dig it out, that's all right. Because of what was going on at Columbia, because what you'd seen at the project, just keeping on with what was going on in general, you were doubtless aware of the controversy, particularly between the special librarians and the documentalists. How did that whole controversy affect you? The special librarians had a phrase going around called "Documentation was special library work done by amateurs." There was a fairly intense controversy particularly with moves to establish a profession called documentation.

GARFIELD: I guess I wasn't too much embroiled in that sort of thing. Once you had the library degree you were, as I said, official or Kosher. So they couldn't criticize you because you didn't know anything about libraries, not that not having a library degree really meant you didn't know anything about libraries either. In fact, while many of the documentalists were librarians, many had not been.

If someone has a doctorate and then goes for a library degree, it's a secondary consideration for a lot of them. They are not typical library school graduates.

WILLIAMS: Well, Taube certainly was very critical of the library community. I just wondered how you reacted when we talked about some of it in terms of no interest from the faculty in these issues. You sort of had a foot in both camps.

GARFIELD: So what is your question? I was a member of SLA for quite a few years. I belonged to the pharmaceutical section because it was very related to my business. That's a little further down the pike. A lot of my friends were members, too. Winnie [Winifred] Sewell, Ann McCann, and Marge Courain were all people from the pharmaceutical industry. They were librarians who worked in the pharmaceutical industry. I'm sure that Claire Schultz was a member, too. As was Charlotte Studer, who helped me get started.

WILLIAMS: Claire Schultz was very much involved. This particularly applies a little bit later on.

GARFIELD: I mean after all, it was only 1954 when I went to Smith Kline, a pharmaceutical company.

WILLIAMS: I've been doing some work in this area, trying to understand, because my background comes from the special libraries area. Reading about what was going on in the 1950s—late 1940s, early 1950s—it looked to me like a great deal of animosity between these two groups.

GARFIELD: I think a lot of that has to do with traditionalists versus revolutionaries. You know, changing the way we do things. People who wanted to spend a good bit of their time on what other people would consider to be peripheral. After a while you become more and more specialized, you're preoccupied with machine methods or new ways of doing things.

WILLIAMS: Well, I wondered how it affected you in your business, as you started DocuMation, to go and sell to special librarians. Were you viewed as a friend or an enemy?

GARFIELD: It could vary. I wouldn't say more than anyone else. Yes, I did work with a lot of special librarians. After all, it was Charlotte Studer, Miles Laboratories' pharmaceutical librarian, who gave me the contract to do the primitive *Contents* page stuff. It became *Current Contents* later. I didn't see a conflict. A librarian has many things to do besides searching. It's only a fraction of their lives, it's not all of it. But those that needed these systems were in favor of it. In a lot of situations, when *Current Contents* was finally started, librarians got annoyed at me because their clients were asking for articles that weren't yet in the libraries. We were getting the journals by airmail. They weren't arriving that fast in their libraries. So that kind of an annoyance, not that I was a machine maniac and they weren't interested or something like that.

WILLIAMS: No controversy over your calling yourself, say, a documentalist and resentment about that?

GARFIELD: I don't recall any animosity as such, but I rarely used that term—I was a documentation consultant, not a documentalist.

WILLIAMS: Then back to 1956. It seems to me that real success came when Bell Labs offered to buy the service from you. I was trying to pin down when in 1956 this actually happened. Do you remember?

GARFIELD: I suppose we could try and trace the exact date. At the time, we announced *Management's DocuMation Preview*, and Richard Gremling was the Bell Labs librarian. He later reported to Ken Lowry, who became the chief librarian at Bell Labs. Lowry had come from the Air Force. I had met him in 1953 at the Welch meeting. Bell Labs was planning a contents page service for their researchers in management behavioral science. I thought originally they were management personnel but they were mainly people doing research on management systems. They heard about *MDP*. So we negotiated a contract for five hundred copies, but we printed a different cover and called it *Survey of Current Management Literature*. That actually proved later to be deceptive to my future patrons who confused management researchers with managers.

Shortly after I signed the Bell contract, I met Harry Brager. He was a Washington PR consultant. Harry's partner, Kaufman (I forget his first name) owned Kaufman Press in Washington DC. He had excess printing capacity and Harry had a little extra money. He opined: "Oh, gee, this is going to be a great thing." They put five thousand dollars into the pot and became my partners. I used to visit Harry's office at Thomas Circle in Washington and put his address on the cover. The company was called Eugene Garfield Associates. Then we discussed the promotion campaign and what to call the publication. Harry, justifiably, after a brainstorming session, didn't like the name. We named it *Current Contents*. Then we sent out this disastrous direct mail shot, which I think I previously described. They had used a list of high-paid executives rather than a list of researchers. We received two subscriptions—one was from the assistant of the vice president of Alan Wood Steel Co., the other I can't recall. Brager and Kaufman packed the venture in and gave me back *Current Contents* and the Bell Labs contracts.

WILLIAMS: What were the sales of *MDP* before the Bell Labs contracts? Were you doing all right?

GARFIELD: No.

WILLIAMS: You were doing all the publicity yourself? Advertising?

GARFIELD: Yes.

WILLIAMS: Were you taking booths at association meetings?

GARFIELD: No. It was strictly by personal contact. And besides, it was only over a period of months.

WILLIAMS: What was happening while you had the Bell Labs contract?

GARFIELD: An important part of the history here is described in my essay in *Current Contents* (5), which describes how it all began with a loan from Household Finance Corporation. It is up on my web site. I was strapped for cash and had to borrow five hundred dollars to pay the printer.

WILLIAMS: I have it as 1957, but I can't tell what month this took place. Just a year or two would have transpired. We can trace the month by month events with a little research in my files.

GARFIELD: I can't remember all the details. If I went through the correspondence, perhaps I could track the date I met Dick Gremling, et cetera.

WILLIAMS: I hope you kept the correspondence.

GARFIELD: Do you want me to ask?

WILLIAMS: No, that's all right. That was one of the issues, to keep reminding you of the value of correspondence.

GARFIELD: I would be inclined to think I would not throw out any such correspondence if I had it ten years ago.

WILLIAMS: Now, in talking with Mrs. Claire Schultz, she mentions the return postcards coming back in that you had paid returned postage on. Was this part of the five thousand-dollar deal that you had made with these folks in DC? When she came to work with you in 1957, I think that's when your deal with Brager was.

GARFIELD: No, that was way past that time. Claire worked part time for me in assembling lists of journals. She came to the log cabin a few times and then to the little office on the second floor of 1523 Spring Garden Street, across from SK&F [Smith Kline & French].

WILLIAMS: Was it? All right.

GARFIELD: Brager and Kaufman were out of the picture by 1957. That is the year we were doing *CC Pharmaco-Medical, Chemical and Life Sciences.*

WILLIAMS: What was this return mail post-card thing used for?

GARFIELD: That was probably a promotion for *Current Contents Life Sciences*—certainly not the management edition.

WILLIAMS: It was. All right.

GARFIELD: She was never involved in the Bell Labs project.

WILLIAMS: Nor was she involved in the Brager deal?

GARFIELD: No.

WILLIAMS: I couldn't tell when. It looked like it was 1957 but I couldn't tell what month it was.

GARFIELD: I started with the *Current Contents Life Sciences* edition in 1957. Its full title was *Current Contents Chemical, Pharmaco-Medical and Life Sciences.* The official launch date for *Current Contents Life Sciences* is 1958. ISI is celebrating its fortieth anniversary. However, you must remember that it existed as a service to Miles Labs and other firms before that date.

WILLIAMS: So you don't consider *Current Contents* really beginning with *MDP* then?

GARFIELD: That's an ambiguous question. The name *Current Contents* already existed when we were doing the management edition, which continued. So it was a title for a series of *CC* editions. We even had one for education, which was a failure, too.

WILLIAMS: What is the real anniversary of *Current Contents*? Was it in 1957 when Mrs. Schultz worked for you?

GARFIELD: Claire was pregnant at the time. Well, we hired a part-time marketing person—Marv Schiller. He was a student at Penn State. I hired him part-time to do direct mail brochures.

WILLIAMS: Now Claire Schultz started with you while you were still out in what you called the chicken-coop phase.

GARFIELD: Yes, she worked out in the chicken coop for a little while. She was pregnant at the time. Then she came to work in Philadelphia after I moved the office.

WILLIAMS: From her description and yours, those were tough times. How did you survive them? Did you get discouraged constantly?

GARFIELD: I survived because I had the consulting work. I was also working for Smith Kline.

WILLIAMS: That was bringing in enough income?

GARFIELD: Well, I worked for them two or three days a week. Originally, I worked there four days a week. I got married again in 1955. My wife, Winifred, was working as a secretary at the Franklin Institute.

WILLIAMS: I think you said she knew how to do layout.

GARFIELD: Yes, she had experience as a draftsman during the war. She's the one who laid out the pages. Claire was a librarian and had none of those skills.

WILLIAMS: How did you use Mrs. Schultz primarily?

GARFIELD: Doing journal lists and whatever. She used these little pieces of paper instead of 3x5 file cards. I'll never forget that. [laughter] Maybe she was being frugal.

WILLIAMS: Now, did she go around and talk to the special librarians? She was active in the pharmaceutical division of SLA.

GARFIELD: It was strictly a clerical job. She was pregnant; she couldn't do that much. When she had the baby it was over. She didn't work for me all that long.

WILLIAMS: Three quarters of a year, something like that. Again, I was trying to get a feeling for the difficult times. Or were you able to put all these things together that you were doing and still feel you'd make it?

GARFIELD: You live from day to day. What can I tell you—being self-employed? You hope you're going to get another contract. You use your time to make contacts and whatever people do that are not fully employed. Of course, by the time we get into 1958, we're now talking about a subscription publication. That decision made things somewhat different. I can't remember the date when, but the University of Wisconsin signed up for twenty-five subscriptions as a cost of seven hundred fifty dollars per year. They were the first academic group. Previously, I had sold *Current Contents* to the pharmaceutical companies. The minimum order was twenty-five copies at fifteen hundred dollars per year. Contrary to my naïve expectations, the companies who had their own internal services were the last ones to sign up. Merck was the last, but the biggest—five hundred copies. They didn't become a customer

until many years later. When they finally gave up the ghost, we were already very successful. By then, *Current Contents* had many features they couldn't possibly duplicate, such as the address directory and author indexes.

WILLIAMS: The Miles Labs deal was the one that really took you over the top.

GARFIELD: Not really. They started the march up the mountain. Their contract was nowhere near sufficient. I sold Warner Lambert and a few companies twenty-five copies each. We still did not have enough pharmaceutical companies subscribing to sustain the thing when we started to take individual subscriptions. Thanks to Dr. Jack Gershon-Cohen, we began to take individual subscriptions. He had suggested a price of one hundred dollars per year over the phone and I immediately accepted. He did not want to take a free sale from a drug company. Once we began direct mail promotion we had a very good, quick response. I remember saying to Marv Schiller, when we reached two thousand subscriptions, "Oh, gee, wouldn't it be fantastic, it will be the millennium when we reach five." [laughter]

WILLIAMS: The 1956, 1957, maybe 1958 too, period strikes me as the classical struggling period for you as an entrepreneur.

GARFIELD: Funny, yesterday I was just getting rid of a whole bunch of slides. By the way, you talk about saving artifacts, do you want to save artifacts likes this? Yes? I've been throwing out old slides by the ton. Sorry, I just dumped a whole bunch yesterday.

WILLIAMS: Those are useful. Were those in a publication or just used for presentations?

GARFIELD: Most were for lectures I gave all over the world, but some may be available in print. I threw out tons of viewgraphs.

WILLIAMS: Well, don't do that.

GARFIELD: It's a lot of work to take them apart or store them. I had a wastebasket full yesterday and also sent some down to Beverly [Bartolomeo]. The formats of *Current Contents* have changed a lot—you wouldn't recognize some of the things we used to do. I had forgotten that when we first included addresses, we typed them at the bottom of the page like a footnote in

a journal. It looks strange to see it now. Later of course, we computerized and created our author-sorted address directory in the back.

WILLIAMS: This stuff needs to be kept. CHF [Chemical Heritage Foundation] wants to talk serious business with you about your files and taking them on.

GARFIELD: You know I've got a serious space problem. I've got all this clutter here. Eventually we have to get rid of all this stuff.

WILLIAMS: I would make a deal with them (CHF) soon about what to do and then you can say, "All right I want to be rid of this," and they will add it to their collection.

Anyway, what I'm trying to find out about a critical period in the beginning of your business is what your feelings, hopes, and despairs were.

GARFIELD: My memory isn't all that great. There were a variety of problems. We just went from day to day and dealt with them. You know we had to deal with competition from the American Chemical Society. They started their Kwic Index called *Chemical Titles.* As a consequence of that, *Current Contents* has never been a big seller among U.S. chemists. The pharmaceutical people, yes, because *Current Contents* covered the overlap between chemistry and biology. But if you were a typical chemist, and had to rely on *Chemical Titles*, it was not the same. Kwic never really took off, but they still publish it, I think. A key historical point is that at one point they tried to steal our name.

WILLIAMS: Really?

GARFIELD: Yes. A Walter [J.] Murphy was in charge at ACS then. My patent copyright lawyer, Arthur Seidel, at that time said, "Do you want to be the first guy to sue the American Chemical Society?" Whether that was true or not, I know that he assumed that would be the case. He was an ACS member, too. As it turned out, a letter was sufficient to get them to back off. They were clearly violating our *Current Contents* trademark.

WILLIAMS: They tried to start using the same title.

GARFIELD: They called it *Current Contents*.

WILLIAMS: Talk about the suite of *CC* publications, covering various areas. You went from the life sciences onto areas like space science and education.

GARFIELD: I have a vague recollection that we may have suspended *Current Contents Management* for a while, but later resumed it under the banner of education. But that proved to be a bomb because education research people got ERIC [Educational Resources Information Center] free.

WILLIAMS: Yes, that was in your previous interview.

GARFIELD: The educational edition flopped, so we killed that, with all the money going into educational research. But education research is really social sciences. So then we made education a section of the social sciences edition.

WILLIAMS: Then it did all right?

GARFIELD: Even after we resumed the social sciences again it was not a resounding success. I don't think it's all that big a winner. We just wanted to cover the full spectrum of academic subjects.

WILLIAMS: Money wise, profit wise, *Current Contents Life Sciences* has been the big seller.

GARFIELD: Right. I just sort of felt that what we were doing was providing a university wide service. So I was essentially covering all of the areas in the university. And *CC* can not be separated from an interest in creating the indexes. Our *Social Science Citation Index* was started about 1965 or 1966, as I recall—only a few years after the *SCI* [*Science Citation Index*] was launched.

[END OF TAPE, SIDE 3]

WILLIAMS: Have you ever had any copyright challenges from any of the journals about use of their title pages or any of those kinds of things?

GARFIELD: Yes, various kinds. I don't think we ever got into any serious litigation, *per se*, except with Robert Maxwell. But that was not because of the copyright of the contents page as such. He was just trying to harass me. Did I describe any of that in the previous interview?

WILLIAMS: No. What happened there? When was this?

GARFIELD: It's got to be over thirty years ago. Robert Maxwell sued us for alleged copyright violation. That was his way of trying to insert a wedge, to buy my company. He was known for making power plays. He did that to Biosis at one point. He'd said to them, "If you don't let me buy you out then I'll put you out of business." He had made up his mind after we first met—a long, long time ago—that I was going to work for him. I met him thirty-five years ago or more. So he sued us for copyright violation but my lawyers were pretty clever, Arthur Seidel and Edward Gonda. (Ed died many years ago.) Ed subpoenaed him. So Maxwell showed up at my lawyer's office to have his testimony taken. We discovered that he himself was violating U.S. copyright law. He was not printing journals according to the requirements of the old copyright laws. You could only print so many copies outside the United States. Right in the middle of his testimony, he realized he had been hoisted on his own petard, as it were. He burst out, "Let's forget about all this crap. I'll buy your company out."

WILLIAMS: That was the first you knew that this was his ploy?

GARFIELD: He agreed to an out of court settlement: the agreement gave us the right to not only photocopy *Pergamon Pages*, but he had to supply us with two free copies of each of his journals on demand, at our discretion. But in exchange for that, we had to give him free subscriptions to our publications. He used that to his advantage. He used the *Science Citation Index* copies to fulfill a paid subscription to a client for his subscription agency. He would simply forward his copy. [laughter] But we had the right to photocopy any article from any Pergamon Press journal for one dollar. Which in those days seemed like a lot of money to him. But as the years went by, that amount seemed lower and lower.

WILLIAMS: Do you still have that right?

GARFIELD: The agreement eventually expired after thirty years and was renegotiated.

WILLIAMS: You counter-sued him?

GARFIELD: I wouldn't say we counter-sued him. As a result of his suit, however, the settlement resulted. Much later on, he again tried to buy my company. When I had completed my negotiation with Ted [Theodore Lamont] Cross to become my partner, he called me from his yacht and made me an offer. He didn't know about the deal. Somewhere along the line, former members of our board of directors, who owned ISI stock, sold their shares to Maxwell. That gave me a lot of headaches. He tried to use that as a wedge to buy the company. He owned about 6 or 7 percent of the stock. He was eventually "frozen out" by Ted Cross when he became the majority shareholder. But he again sued, saying he had been disenfranchised. The suit was still in process when he died, and eventually the estate was glad to get his remaining equity.

WILLIAMS: Interesting.

GARFIELD: As I said, litigation was still in process when he died. Then eventually the bankruptcy court probably settled one way or another. I don't know how they did it. It was just outrageous harassment, but I was done with it after I sold out to Ted Cross.

WILLIAMS: Any other interesting legal battles that you've had over the years about the company?

GARFIELD: There was one publisher that sued us not for copyright, but because we wouldn't cover all his journals. He took the position that we were the dominating force in the market, alleging that, not being included in *Current Contents*, he couldn't survive; that we favored his competition.

WILLIAMS: How did you respond to this?

GARFIELD: We won that case. He claimed that we were discriminating because we covered his competitor. We proved we did that on reasonable grounds. He had one "journal" that wasn't really a journal. It was some type of annual spectroscopy series.

WILLIAMS: How did you make decisions over the years about changing the contents of *Current Contents*? Was citation analysis used?

GARFIELD: Only partly. In the beginning, we relied on the drug companies. They knew what they needed. We had no citation data. Once we were covering the core, from then on you're dealing with the periphery. When a new journal was started by Academic Press or by the American Chemical Society or by some other highly reputable publisher, we knew that they had already done the marketing research. They knew they had a guaranteed niche. But even in those days, our policy was not to cover them instantly. We waited until they were out for a year.

With journals from professional societies like the *Journal of the American Chemical Society*, you're going to have pressure from readers. You can't leave their journals out very long.

WILLIAMS: In some cases would you do counts of some type?

GARFIELD: Yes, after we had the citation data from the *SCI*. We didn't have *SCI* before the genetics project started. So in the early days we relied on subjective input from clients. But once we produced the first *Journal Citation Index*, we knew we had a tool to determine the most significant journals. (The *JCI* was sort of another *Author Citation Index*.) After a while, you get to know a good journal from a bad one. With experience you learn to evaluate a journal. There are many intangible factors that intrinsically tell you a journal is worth covering. While ISI has gone to great pains to explain its policies, to this day there is considerable resentment in the "third world" that we don't cover everything that they publish because of this preference for the highest impact material.

Incidentally, there is a rampant mythology and misrepresentation in discussing the number of extant journals. The literature is full of meaningless statements about the number of journals available to be indexed. The number of journals is really not as relevant as the number of articles that are published that matter. There are huge numbers of small, often trivial journals published for all sorts of reasons. Journals are often published to satisfy national or institutional ego. Just because they exist does not mean they should be listed. Many customers argue that too much coverage is clutter. In a few cases, we added journals that were real trash and we had to drop them.

One journal in nutrition, e.g. after we published it for about a year, we realized that all the articles were published and written by one person—I'll never know how it was selected. But today ISI has a large group working on journal evaluation. They spend a lot of time looking at new journals. It is a non-trivial expense to index an article, and a lot of journals involve cost of translation of titles. Many require specialists just to scan them, as in the humanities and social sciences.

WILLIAMS: Now size wise, how did you make your decisions? How did subscription rates relate to cost of production?

GARFIELD: These are basically budgetary issues. Given the known cost to process an article, we could only cover so many—given the subscription income. Many a year we went over our quota and then we'd have to cut back expenses somewhere. It is traumatic when you drop journals. Fundamentally it was not a good idea because you disappoint people. You get them used to having a journal and then when it's dropped, the demand for the journal drops. However, once we started to cover a journal in *Current Contents*, if after a few years it wasn't being cited very much, we would have to reconsider. There are a lot of other journals that could be added that might be used more.

Still, covering the primary core is what matters most. There will always be new journals, which have to be evaluated. The people who get that journal will argue that it's the most important journal in the world. Many a campaign was waged by groups of fifty to one hundred people who would write the identical letter saying that, e.g., *Magnesium Research* should be covered. When you get a hundred identical letters, you know it is a calculated campaign by the editor or publisher. Not that you could ignore it, but that's not the same thing as readers spontaneously writing in. If half a dozen people separately wrote about a journal, you realized that you might have a serious gap. The squeaking wheel gets the grease.

WILLIAMS: Well, the synergy of the two publications—*CC* and *SCI*—must have been nice, since the *Citation Index* proved quantitative data.

GARFIELD: Right. Well, in the early days, there always were more journals covered in *CC* than in *SCI* simply because of the extra cost. People sort of assumed that if it was in *Current Contents* it ought to be in the *SCI*. But there were a lot of journals in *CC* that were included not so much for their high merit, but for their borderline interest. We would cover a certain Russian or a Japanese journal because *CC* readers wanted to know what they were doing—good or mediocre—to get an idea of what was going on in Russian or Chinese research.

So *Current Contents* served a newspaper function. It could cover more since there were fewer indexing costs. But you got criticized for not indexing them completely in *SCI*. But once we added key word indexes to *Current Contents*, they were retrievable, but not by citation search.

WILLIAMS: When did *Current Contents* make a profit?

GARFIELD: It was certainly making a profit by the time we started the *Science Citation Index*. That's how we could afford to take that risk after we finished the Genetics project. We had to launch *SCI* in 1964. It was the profit from *Current Contents* that kept it going, but then we came close to going under.

WILLIAMS: So you were making enough money to help the cash flow?

GARFIELD: People got scared, so we sold 20 percent of the company for half a million- dollar convertible debenture. The investors got a sweet deal. As it turned out, we never really needed the money.

WILLIAMS: I saw something about that in the earlier interview. Talk about that. You called it some kind of mistake in accounting, right?

GARFIELED: I don't know about it being a mistake. I just think that they were overly conservative.

WILLIAMS: In terms of forecasting the cash load?

GARFIELD: Yes.

WILLIAMS: So the financing was really not necessary?

GARFIELD: Well, as it turned out. But I suppose that you can say, "Well, if those added subscriptions had not come in, what would you have done?" Hindsight is always a little better

than foresight. Anyhow, let's say it was a little bit of panic. Of course, if we had waited too long, then it might have been even more costly to raise the money. Once you are on the verge of disaster, you pay a higher price. Well, maybe there were other actions we could have taken. If we didn't raise that Wall Street money, we might have killed the *Index Chemicus*, since it was losing money. In fact, it caused a rebellion here because I insisted on keeping it going for all those years. There are often different choices that you have.

WILLIAMS: I want to come back to that in a minute. We'll talk about *Index Chemicus* and that rebellion from the few hints that I picked up in the previous interview. You've talked about the ideas for *Citation Index*. When I talked to Mr. Herner, he said that he thought that you had gotten a few of your ideas for *Citation Index* from his user studies where the users kept saying how important references were.

GARFIELD: Well, that fed into it. In other words, that made me more conscious of the significance of references to scientists. But that in itself doesn't lead to a citation index.

WILLIAMS: Why did it take so long to get the idea of the *Citation Index* into production? You had the basic idea in 1953, wrote your *Science* article in 1955 (6). But it really isn't until late 1960, early 1961, that you got the grant to do *GCI*. Is that what it took?

GARFIELD: Well, I did experimental indexes.

WILLIAMS: You did?

GARFIELD: Oh, yes. We even did a *Patent Citation Index*—with those friends of mine from the pharmaceutical industry. But what was I supposed to do—launch a commercial service when few people were convinced it was worthwhile? Where was the money going to come from? I didn't have the money to do it. I hadn't even started *Current Contents*. You're talking about the years when I was still in research. I tried to interest others like *CA* [*Chemical Abstracts*] in the idea. Even in 1960, the *Genetics Index* was still really research and few investors would take such a risk.

WILLIAMS: Part of what became *Index Chemicus* you had tried, as you say, experimental citation indexes as part of that project.

GARFIELD: No, not *Index Chemicus.*

WILLIAMS: Or the patent project had.

GARFIELD: No, you're confusing two different patent things. One was a *Patent Citation Index*, which was simply an experimental project, which was done by me and Marge Courain of Merck up in Rahway. She processed the patents that she had in her collection. She did the punch card work. As a result of that, we produced an experimental *Patent Citation Index* to those four thousand patents. That experiment led to the paper I published in 1957 in the *Journal of the Patent Office Society*.

Now that is completely separate from the steroid project. We got a contract from the Pharmaceuticals Manufacturers Association to encode the steroid chemical compounds in the published literature, so that the U.S. Patent Office could expedite searches on that literature in connection with patent filings. As a result of that indexing experience, I became aware that every chemical article contained the molecular formulas for the compounds we were coding according to the coding system that the Patent Office set up. Mr. Andrews at the Patent Office supplied the code sheets. It was then I realized that when you published a paper, you had to include a molecular formula for each new compound you reported.

I realized that you could go through these papers almost blindfolded and circle that molecular formula. I used the same technique to create a molecular formula index of SKF compounds while I was a consultant at Smith Kline. I calculated what it would take to extend this simple molecular formula indexing to all the compounds in one hundred core journals. I went to Glenn [E.] Ullyot, among others, at Smith Kline and none of them would believe me, he in particular. He is still to this day an American Chemical Society stalwart. He sponsors the Glenn Ullyot research lectures here in Philadelphia. He's a sweet guy and I like him very much. But Glenn could not believe it, nor would anybody else when I told them that for twenty-five thousand dollars a year, I could produce an up-to-date, monthly molecular formula index to the entire core literature.

"So you're going to do what a huge staff at *Chemical Abstracts* can't do?" They did not recognize that I had found the key to doing it very simply. I wasn't going to use chemists to do this. I needed chemists, eventually, because we did a lot more, as it turned out. But SKF said, "Absolutely not." I said, "You give me permission as your consultant to do this on my own." They said, "Go ahead and we'll be one of your customers." So, instead of paying twenty-five thousand for an exclusive, they got it for two thousand, after I lined up twelve other companies, including Parke-Davis and the others. Each committed two thousand bucks per year for one or two years.

Then we had a meeting including Max [Maxwell] Gordon, who was one of the people who supported my scheme. He had been very critical of *Chemical Abstracts*. The group then said, "A molecular index formula is fine, but what we really need is a service that includes a graphical abstract displaying molecular formulas." That's how *Index Chemicus* was born and its initial format established. Initially, we used the presence of the molecular formula to determine what was a new compound for indexing. Then we had to start calculating formulas ourselves for intermediates that were mentioned, but not necessarily identified, in the article by molecular formula.

WILLIAMS: Now let's talk about that because this sounds like the idea for the algorithm in your doctoral work at Penn. Is this the same algorithm or procedure we're talking about here?

GARFIELD: It's related, but quite different. Originally, the idea was to feed in chemical names and compute their molecular formulas. That had to be done for intermediates or other compounds that had not already been identified by molecular formula. The formula is a product of the analysis done to confirm the compound's synthesis and isolation.

WILLIAMS: But in *Index Chemicus* it didn't quite turn out that way?

GARFIELD: No, Irv Sher invented a little circular slide rule for calculating molecular formulas. One of those should be around somewhere. [laughter] Matt Clark tells me there are a few and one ought to be sent to CHF. We used to give them out as promotional items.

WILLIAMS: That was what you used in *Index Chemicus*?

GARFIELD: Yes, you could use this slide rule, but as you did indexing you learned algorithmically to calculate the same way.

WILLIAMS: Now, without a chemistry background, my ability to ask really relevant questions is limited. What happens at CAS during indexing for *Chem Abstracts*? How do connection tables and algorithms relate to what you did in *Index Chemicus*?

GARFIELD: They were all separate. Originally at *CA*, they calculated molecular formulas manually. At *CA* and ISI, connectivity tables were eventually used to facilitate the use of the Wiswesser notation and machine searching. But that came later. We didn't use Wiswesser in the very beginning. It came later.

WILLIAMS: What were you using at the very beginning for *Index Chemicus*?

GARFIELD: As I said earlier, we manually extracted the molecular formula from the published paper and used our slide rule for intermediates, et cetera.

WILLIAMS: And indexed using that.

GARFIELD: We assumed the authors' calculation was correct. We would occasionally check the accuracy with the slide rule, but they were usually correct.

WILLIAMS: Then later you picked up the Wiswesser Line Notation System and used that? Were you paying anything for use of that?

GARFIELD: No. Bill Wiswesser was a good friend and was very anxious to have anyone adopt this system. When *Index Chemicus* adopted it, many of the chemical companies decided to use it to encode their own private files.

WILLIAMS: Well, there is a Wiswesser Line Notation System Association that existed at some point.

GARFIELD: That came a little later. Bill was thrilled to get the notation system used. I think we used him as a consultant and I don't recall whether he was paid. Bonnie Lawlor might remember if he was. There were problems involved in using any of the notation systems, since there always were exceptions that came up.

WILLIAMS: Was the algorithm described in your dissertation used in *Index Chemicus?*

GARFIELD: It never really got used.

WILLIAMS: Why is that?

GARFIELD: Because we weren't keyboarding the names of the compounds. That was the whole point of it. We wanted to avoid the use of chemical nomenclature. We didn't want to have to get involved in dealing with the names of the compounds. We were avoiding nomenclature, even avoiding titles of articles. That's what you can do with citation indexes. You can retrieve information without getting involved with article titles or indexing words or names of chemical compounds. You could retrieve chemical information without getting involved in nomenclature. This was the direct antithesis of *Chemical Abstracts*. They required Ph.D. chemists to do their indexing because they had to learn the complex system of chemical nomenclature. My dissertation established that this was a hidden, previously undescribed language. So I treated it that way, just as a missionary tries to describe a previously undescribed language.

WILLIAMS: *Index Chemicus* made money?

GARFIELD: Not for a long, long time. It didn't make money for twenty years. I don't know when and if ISI started making money on *IC*. We were happy to break even because we lost so much for many years. I imagine that even after I sold the company, they thought seriously about killing it, but eventually, it turned around. I really don't know how profitable is. But the key point was that I had invested a lot of ego in it and there was a very loyal staff of chemists.

WILLIAMS: Was the competition with CAS a significant factor?

GARFIELD: Yes, of course. In those days, academics and even most industrial people were not going to drop *Chemical Abstracts* to buy *Index Chemicus*. *IC* serves a different purpose. It caters to a very specialized industrial market, and those few universities that do industry-related research.

WILLIAMS: You said there was an internal revolt over your decision to keep publishing *IC*?

GARFIELD: Yes. Knowing we were losing money on *Index Chemicus*, at one point in the 1960s, we tried to come up with an alternative product.

[END OF TAPE, SIDE 4]

GARFIELD: We created a special edition of *Current Contents* that would substitute for *Index Chemicus*. It just didn't fly. It was too abbreviated for the organic or medicinal chemist who needs chemical flow diagrams.

WILLIAMS: Let's return to the beginning of *Science Citation Index* and your getting the grant from NIH. Talk about how this happened.

GARFIELD: I told you about the letter from Dr. Lederberg in 1958, the year he won the Nobel Prize. He asked in that letter—which is still available—what had happened to my idea for the *Citation Index*. He had read about it in my *Science* magazine article in 1955. I wrote him a long letter telling him of my various efforts to get the *SCI* developed and that I was not able to get support from the National Science Foundation because I was not a non-profit institution, and so forth.

WILLIAMS: You actually made some proposals to NSF?

GARFIELD: Oh, yes, various proposals. A lot of those are in the files. To make a long story short, he suggested that I apply for a grant to the National Institutes of Health. The Genetic Study Section might take an interest in it. I was visited by a woman who was the executive director of that study section and a member from Jackson Memorial Library in Bar Harbor, Maine—Dr. Green. I can locate their names for you. At that time, they said it was perfectly legitimate for a for-profit organization to apply for a grant. It was done quite regularly. So we negotiated a three-year grant for fifty thousand dollars a year.

WILLIAMS: Was this same thing possible from NSF? Did they have contracts?

GARFIELD: No, they did not to my knowledge, make grants to for-profits. They had service contracts. They did not give out research grants to companies or unaffiliated persons. After I left the Welch project, Helen Brownson said to me later, "Oh, why didn't you come to me?" I

said, “Well, I was an unaffiliated individual. You don’t give grants to individuals.” To this day, if an individual applies for a grant to the NSF, they will be turned down. You have to be affiliated with an organization, a non-profit. Companies get contracts.

WILLIAMS: But by 1956 you had your own company.

GARFIELD: Not when I first left the Welch project. I was an unaffiliated individual. She said to me, “Why didn’t you come to me?” “What do you mean? What was I going to tell you?” I had to get myself connected first to a non-profit or a school. For the NIH project, 1960-1963, we had an advisory committee of a dozen scientists, geneticists. While we were pursuing the project, a congressman from North Carolina named Congressman [Lawrence H.] Fountain became very upset about a grant that had been given to a for-profit group in New England somewhere. The people involved had done something illegal or unethical with the money. He demanded that a new rule be established at NIH. They would no longer make grants to companies—only to non-profits. All existing grants had to be converted to service contracts. Since they were used to contract management, they transferred remaining money on our grant to the National Science Foundation. The NSF negotiated a contract to complete the project. As a result, we contracted to produce one thousand copies of the *Genetics Citation Index*, which is sitting up there on my shelf. But in order to produce the *Genetics Citation Index*, we had to first produce the multidisciplinary data for the 1961 *SCI*.

WILLIAMS: So part of the agreement was not only genetics, but you had to extract genetics out of all of the science articles.

GARFIELD: We had to extract it from the 1961 *SCI*. So we created *SCI* data for covering six hundred and some odd journals, completely cover to cover—over a hundred thousand articles. We also created an in-depth genetics index covering five years and a fifteen year index for one journal. Once we distributed the *Genetics Citation Index*, I suggested we do the same thing with the 1961 *SCI*. They would not hear of it. They would not pay for printing and distributing the *SCI*. That was already produced and in machine readable form.

WILLIAMS: Who is this?

GARFIELD: The NSF.

WILLIAMS: No, what person?

GARFIELD: Burton [W.] Adkinson, among others.

WILLIAMS: Helen Brownson was still there?

GARFIELD: Yes, she was still there. I forget my contract officer's name. So, I then had to make the decision to either toss the data out and continue with *Current Contents* alone, or launch a *Science Citation Index* service. So we made the decision to launch a quarterly index. The first quarter of 1964 was produced and printed in the middle of 1964. However, we simultaneously decided to publish the 1961 *SCI* for five hundred dollars.

WILLIAMS: The first issue of *SCI* covered what period?

GARFIELD: January to March of 1964. We bound it in a hard cover, too.

WILLIAMS: Now that was the period that the literature covered. When did it actually appear?

GARFIELD: It came out in the spring of 1964.

WILLIAMS: What about the *Genetics Citation Index*?

GARFIELD: The *GCI* consisted of three parts. One section covered the literature of 1961. It was derived from the 1961 *SCI* database. It also included two other sections to test the impact of multi-year compilations.

WILLIAMS: When did that appear?

GARFIELD: The *GCI* came out in 1963 and the *SCI* came out later in 1963.

WILLIAMS: I'm trying to nail these down.

GARFIELD: Looking at the *GCI*—first printing, July 1963.

WILLIAMS: That's *GCI*? Yes, I had that.

GARFIELD: You'll have to look up the exact dates in a catalog. [laughter] I'm sure it exists in the Library of Congress.

WILLIAMS: Well, they're going to have the coverage probably and not the actual date. Probably you'll have to find the first issue. I was hoping you had the first issue of *SCI*. You don't? So was what your financial status when you made that decision?

GARFIELD: To do what?

WILLIAMS: To publish *SCI*.

GARFIELD: We were publishing *Current Contents* and we were making a profit on *Current Contents.*

WILLIAMS: You called *SCI* the most risky decision of your career. Were you borrowing money at the very beginning of the *SCI* business?

GARFIELD: No, I don't think so.

WILLIAMS: You had enough cash flow or money in the bank to do that?

GARFIELD: I think so. Remember, when you announce a subscription publication, you get payment in advance. At five hundred dollars a year, and one hundred subscriptions, you had fifty thousand dollars cash flow.

WILLIAMS: How were subscriptions that first year?

GARFIELD: They weren't received fast enough. We were spending money faster than we were taking it in. So the decision to borrow half a million dollars was based on a projection that we would need more money than we were taking in and how much money we needed to produce the product. The price of that convertible debenture was 20 percent of ISI stock. We also had to cut our production costs. So we decided in 1966 that we would no longer cover U.S. patents as we did in the first two years, because we wanted to sell *SCI* to industry. Since we got so few subscriptions from industry, we cancelled the coverage of the patents.

WILLIAMS: This must mean, then, most of your subscriptions came from academic institutions.

GARFIELD: Of course. I just told you there were no industry subs.

WILLIAMS: But government wasn't coming through with much?

GARFIELD: No. The U.S. government doesn't account for that much in any case—maybe 10 percent. The first subscription for five hundred dollars came from the CIA library. [laughter] The second was from Communist China and the other was from the British Library. The Library of Congress got it free.

WILLIAMS: Really? How were overseas subscriptions in the early years?

GARFIELD: Probably up to 20 percent.

WILLIAMS: How did you set the price?

GARFIELD: I guess we estimated the market at a price of five hundred dollars a year. We hoped to generate five hundred subscriptions or a quarter of a million dollars. We could produce *SCI* for that in 1964—about two dollars and fifty cents per source article.

WILLIAMS: My first memory of *SCI*, and particularly *SSCI*, was the librarian showing it to me and saying how expensive it was.

GARFIELD: Yes. You can imagine this reaction—the 1961 *SCI* was printed in six volumes. Five hundred bucks was a big pill to swallow in those days. But it contained information on one hundred thousand articles, 1.5 million cited references. Whatever sales we made paid for the printing. We made enough to cover the printing and distribution so we could launch the 1964 service and leave the gap for 1962 and 1963.

WILLIAMS: Who is "we"? How many employees in 1963?

GARFIELD: I can't remember exactly—fifty to a hundred? To do the citation processing, we had a lot of key punch operators.

WILLIAMS: A lot of these folks you hired because you had the contract with NIH?

GARFIELD: Yes. I honestly don't remember how many.

WILLIAMS: How big was that amount of money? I was trying to find that amount with NIH.

GARFIELD: We got a fifty-thousand-dollar-a-year grant.

WILLIAMS: You did it for the three-year period.

GARFIELD: When NSF refused to publish the *SCI*, I was able to negotiate another contract with NSF to do a study of the coverage of indexing and abstracting services. That was one way that we kept some of the people working. We produced a report that showed the gaps and overlaps between various indexing and abstracting services. We used the 1961 *SCI* database to demonstrate how certain articles were missed completely.

WILLIAMS: Talk to me about how you were making decisions on input of this stuff into the computer. How were these decisions being made? We're talking about something that no one else had ever done. How did you get input and output done in a way that was efficient? Who was making these decisions? Did you hire some programmers at the time?

GARFIELD: Eventually we did. I can't remember exactly when these people first came to work for us. Irv Sher was here in the late 1950s, as was Phil Sopinsky, our vice president of data processing. We were using punch cards. We would rent mainframe computers at the IBM service bureau in Philadelphia in the early 1960s. Later on, we got our own computers. At first we used service bureaus or bought night time at a bank or other mainframe user.

WILLIAMS: You had some internal programming folks, or did you contract out?

GARFIELD: No, Irv Sher was involved in the programming.

WILLIAMS: What was his background?

GARFIELD: Well, Irv Sher was a biochemist but also a mathematician. He fully understood programming. He was a polymath. Phil Sopinsky was a data processing person. He had worked at Curtis Publishing Company. Some of our earliest programmers are still at ISI. Scott Roberts is one of them.

WILLIAMS: Are they really?

GARFIELD: Yes. ISI's ten-year club includes dozens who are here over twenty-five years. This year Beverly Bartolomeo is a forty-year member. She is our oldest employee. Arlene Marshall is here thirty-nine years; Loretta Carter, thirty-eight years, et cetera.

WILLIAMS: Is that right? What strikes me in looking at *GCI* is how much it physically resembles the page layout of the current *SSCI* and *SCI*. Decisions that were made over thirty years ago were apparently pretty good, or at least they served you well.

GARFIELD: We considered a lot of alternative formats. We were well aware of compromises that had to be made because of the space problem. We could have used a much more informative format if we had unlimited space. That's easier now with the new electronic formats. With the new Web of Science, it's going to be more flexible, but even now there are limitations. If you look at the *GCI*, one of the indexes had a combined source and citation index. There is no intrinsic reason why the two should be separated, except for space. Looking at *GCI*—there is one combined index for 1958 to 1962. You see what it did. It combined years so that you could see any gaps in citation. This tells you that a source item was not cited. And when you look under one author's name, you see the full listing of his or her publications, which was or wasn't cited.

WILLIAMS: Did this system just kind of fall together? You kept playing with all kinds of variations on it.

GARFIELD: Of course, yes. Months and months.

WILLIAMS: Other than yourself, to whom do you give the central credit for the development of the ideas, in terms of how it was done.

GARFIELD: The implementation was Irv Sher.

WILLIAMS: Was it? He was the principal one on *GCI*? I noticed that you all jointly authored that (7).

GARFIELD: Together. I was running the company, but we had long discussions. Irv was a very opinionated, strong-willed guy. But we eventually worked it all out.

WILLIAMS: You say he was one of the folks who left the company but came back.

GARFIELD: Art Elias influenced him to leave. Yes, he came back.

WILLIAMS: What is he doing now?

GARFIELD: Irv died last year. But he was working pretty close to the end. He was director of quality control here, but in the early days he was called director of research.

WILLIAMS: What have you done over the years in the way of marketing analysis and user studies? Have you done many studies of it?

GARFIELD: I don't think you could say we did many. It's pragmatics. You're running a business, and unless you are making huge profits, you can't even afford that kind of a luxury. Quite a few people outside of ISI were studying certain aspects of *SCI*. I don't think that an adequate number of studies were done, even to this day. Did you see the paper I published recently in *Libri* including a synoptic history (8)? I refer to certain validation studies. But we really don't know about use. It's out there, people buy it. People make general statements. If you read [Lowell L.] Hargens' paper (9), published a while ago, he claimed that in 60 percent of faculty evaluations the citation indexes were involved. How would we know that? In his study, he asked people about using citation analysis in any way, one way or another.

WILLIAMS: I know our folks at South Carolina do.

GARFIELD: How do they use it? How intelligently do they use it? Who knows?

WILLIAMS: Yes. My own experience at one institution is that it gets mentioned pretty often in tenure reviews and promotion reviews.

GARFIELD: It should, but it depends on how it gets mentioned. A lot of people lump tenure evaluation together with all kinds of other uses that are made. A faculty candidate is nominated for evaluation. So it is natural to ask, "What has this guy published? We'll look it up in the *SCI*." What does that tell you? That's no different than looking him up in *Chemical Abstracts* or anything else, or asking for his CV [*curriculum vita*]. But there are people who tell you they use the *Citation Index* to evaluate people, but mean that they checked his bibliography. That's not what we're talking about. So how many actually use *SCI* to determine how well his or her work was cited? Fifty percent of the people who tell me they use the *SCI* mean that they simply found out what he published.

Then a lot of them take the next step. Okay. "What did he publish in," not "how well was he cited?" He published in high-impact or low-impact journals. The journal impact factor

is today extremely pervasive. There are articles published, literally, every week or two involving impact factors—discussion of it, good, bad, indifferent, whatever. All over the place. There are probably fifty articles a year using journal impact factors. Why? They are being used as surrogates for an actual look up of the true citation count.

An important point to mention is the fact that citation indexes list papers by first-author indexes in the *Citation Index*. Most people have the impression that you only get credit if you are first author. This is nonsense. You look up each paper under the first author's name, but you get the citation count for any of the co-authors. That was the principal index problem. Today if you go into the Web of Science, ISI's Internet-based *SCI*, all authors are listed, even in the citation index. In other words, an entry is created for all your papers, not just your co-author's name. If you are second author, you see the other name followed by dotted lines. So you know it's a secondary author entry.

WILLIAMS: Most folks say, from my experience, they are using *SCI* or *SSCI* to see how many times they are cited. The problem is, they use it then as a cumulative kind of count instead of looking at what journal he was cited in.

GARFIELD: If you're talking about people in the field of information science, you need to use the data in a restricted context. Don't try to compare this person to a biochemist. If somebody gets cited a hundred times a year in the field of information science, he's a superstar. In biochemistry that's very normal. You don't have to be a genius to know that of all the people that are cited in our field, Gerry [Gerard] Salton is way at the top, and everybody knows that his work has had a pervasive influence.

WILLIAMS: Our problem is that in our field you've got to go not only to *Science Citation Index*, but also to *Social Science Citation Index* and, to some extent, *Humanities Citation Index*.

GARFIELD: Well, it's all combined in one now in the Web of Science.

WILLIAMS: Is it? I've got to give that a try. You sort of launched the citation studies industry.

GARFIELD: That's probably true.

WILLIAMS: *SCI*, *SSCI*, *Bibliometrics*, and so forth. Talk about these ideas, how they began to occur to you, and then some of them ending up as products. What is your favorite one?

GARFIELD: First of all, in my 1955 paper (6) I did say, very briefly, that you probably could use citation indexes for measuring the impact of individuals. But there was no explicit reference there to the journal impact.

[END OF TAPE, SIDE 5]

GARFIELD: In the proceedings of an Office of Naval Research conference, we did a paper, which was published as a monograph on research evaluation (10). Irv Sher and I analyzed Nobel Prize winners for 1964, 1965, or whatever year it was at that time. We had also been involved in a project that was sponsored—the Air Force, Harold [A.] Wooster, paid for a study called "Use of Citation Data in Writing the History of Science" (11). In that one, we traced the history of DNA using citation limits. We're talking about pretty early on.

I wrote to Bob Martin for the first time in 1962. I also wrote Derek J. [John] DeSolla Price and J. D. [John Desmond] Bernal the same letter. All said they could see the potential of the *SCI* in social studies of science. Derek Price became very involved with us and it provided a thrust towards quantitative studies.

WILLIAMS: When did you start making your database available to outside researchers?

GARFIELD: Well, Derek used our data very early on. In 1965, he published his famous "Networks" paper based on our data (12). We had a contract with the NSF that permitted any scholar to use the database for certain purposes like that. Later, they used that contract to bootleg studies by Computer Horizons and others.

WILLIAMS: Is this what followed immediately after they administered the NIH grant?

GARFIELD: Later on. The NSF contract came after we were publishing several years. Mort Malin was our vice president. He negotiated this contract with NSF for fifty to a hundred thousand dollars. In exchange, any legitimate academic scholar would have access to the data under certain conditions. They used <u>that</u> excuse to have Francis Narin massage our data. He also did studies for NIH in which we never were paid a cent in royalties or licensing fees.

WILLIAMS: I'm not familiar with this.

GARFIELD: Computer Horizons performed all kinds of studies for NSF and NIH, and NIH never paid us for it. That's a long involved story, but they misused our data for many years. We were eliminated from any chance to bid on those contracts because we employed over five hundred people. So we were not a "small business."

WILLIAMS: Tell me about your favorite project called the *Atlas of Science*.

GARFIELD: Favorite in what sense?

WILLIAMS: Favorite in terms of saying this is a neat way of looking at science and the impact of individuals or institutions.

GARFIELD: The *Atlas of Science* was related to what is called today visualization. Dynamic mapping of science is now happening. We pioneered the creation of co-citation cluster maps. Visualization techniques and so on, will permit analysts to integrate a huge amount of data. This is separate from the work on using a primordial paper and tracing the historical network right up to the present. What were the best papers on the way? What were some of the stepping stones? These were the kinds of things we had anticipated in our original Air Force paper on the history of DNA. We should be able to do that today, algorithmically.

WILLIAMS: I've been thinking about it in terms of the pioneers.

GARFIELD: When I taught at Penn, my students had an assignment at the end of the year to take a subject and create a historiograph. They would start with a primordial paper and trace out the citation network for a period of time. Anybody can do it manually.

WILLIAMS: You gave them access to the database or they had to do it manually?

GARFIELD: You didn't need a database. You tell your students, "Here are a hundred papers on Bradford's Law. Take the bibliographies from all these papers and create a year by citation map. What cites what? You create a citation index of the one thousand papers that are cited. You arrange them chronologically, and select the most cites, e.g., one hundred or so. Then trace the network of most cited nodes."

WILLIAMS: A lot easier to do with the *SCI* database.

GARFIELD: It's a lot easier? Well, maybe. It's still a manual job. You still can't visually see the progression on Web of Science. If I look up a certain paper in the Web of Science, it's going to show you where and how often it was cited, but not in the context of the entire network. You still have to construct that yourself. It should be algorithmic.

WILLIAMS: You can search it a lot faster, back and forth between the volumes.

GARFIELD: But the visualization is important, too.

WILLIAMS: I've been thinking about the list of pioneers. How far back are *SCI* and *SSCI* now?

GARFIELD: 1945 to 1954 is sitting right over there, as is 1955 to 1964. They were published after the original *SCI* was, into the 1970s or 1980s. It's not absolutely complete, but it goes back to 1955 for social science.

WILLIAMS: You are just about out of wall space.

GARFIELD: Here it is, 1956.

WILLIAMS: So *Social Science Citation Index* goes back to what year?

GARFIELD: This one covers 1956 to 1965. What I need here is volume one. I wanted to see which journals in library science are covered, if any. Of course, every article or book that is cited is covered. I mean what was the source list?

WILLIAMS: It's a fair amount. Nothing under information science?

GARFIELD: "Information science and library science," here it is. Okay. Journals. But notice, *American Documentation* is not there, nor is the *Journal of the American Society of Information Science*. Here's *Library Quarterly*. Oh, "See information science."

WILLIAMS: Unless it's under computer science for *American Documentation*? That seems pretty unlikely.

GARFIELD: Yes. We need to check this out. I can't remember.

WILLIAMS: You were obviously involved in the journal selection process. Was there synergy in terms of the journals you were receiving for *Current Contents* and *SCI*?

GARFIELD: Yes. When we decided to go back to do old citation indexes, we did a citation analysis. We were limited to what we could cover. I don't know why *JASIS* didn't make it. Perhaps if we had refined the procedure more, it would have been included. But we were selling *SCI* for science libraries and *SSCI* had to cover a lot of other fields, like economics, more heavily.

WILLIAMS: Well, at that time it would have still been *American Documentation*.

GARFIELD: That's weird.

WILLIAMS: What year is this? 1960?

GARFIELD: 1956. It's called *American Archivist*. Yes, that's unbelievable.

WILLIAMS: It's still called *American Documentation* at that point. Interesting.

GARFIELD: Yes, but it's not in here—*American Archivist*, that's a shame. *History of Social Science and Philosophy*. *Psychiatry*. Well, there you go.

WILLIAMS: Well, its potential is unlimited in terms of all the stuff that still needs to be done. Do you have particular hopes for an area that hasn't been explored that really needs exploration?

GARFIELD: I hope eventually somebody will decide to do a book citation index. I was interested in promoting that idea, but I got sidetracked. Maybe I'll get around to doing it. There is always some other thing that comes up. I don't know that ISI will consider that a high priority. They have a different basis for deciding. It is something that could be best done by ISI, but it could be done by anybody else, too. Of course, I'd like to have the BCI [book citation index] integrated with the ISI database because they have processed all the citations <u>to</u> books. What's missing is books as source data. So you need the source, then of course their citations. Today it should be easier—what with all the PDF files available.

WILLIAMS: I've heard folks say they just didn't want to publish in any kind of chapters and books because of the lack of coverage in something like *SCI*.

GARFIELD: Well, that's a mistaken idea. The book can still be cited and picked up.

WILLIAMS: But not quite the same as getting journal coverage, though. Because they don't get distributed as widely.

GARFIELD: Well, that's a different story.

WILLIAMS: But because they don't get picked up in the indexes as well, too.

GARFIELD: Well, they aren't listed, as well. It depends on what field you're talking about.

WILLIAMS: Talk about the tail end of *Index Chemicus*. We covered some of that earlier stuff. You've had sort of a running battle with CAS over the years. I think you said that at one time you almost went to work for them.

GARFIELD: I was considered for a job out there.

WILLIAMS: Was this when [Evan J.] Crane was the director?

GARFIELD: Yes, and Charlie [Charles Llewellyn] Bernier was there. I believe they hired Karl [Fredrich] Heumann instead. I was a candidate at various points.

WILLIAMS: At the research end?

GARFIELD: Yes. You've got to remember that even until 1960, after I had started ISI, we tried like hell to get the ACS to do what we did in *Index Chemicus*. I was a member of an ACS committee here in Philadelphia that recommended to *Chemical Abstracts* what they needed to do. So it wasn't as though the *Index Chemicus* was something they couldn't do. They chose not to somehow incorporate what we were doing. If they had, I wouldn't have started it.

WILLIAMS: Something like the *Index Chemicus* fell on deaf ears with CAS.

GARFIELD: Yes, that or getting out a subject index quickly and up-to-date. *CA* was so far behind that it cost industry a lot. Subsequently, *CA* got a huge grant, an unbelievable amount of money, from the NSF to establish the Chemical Registry System.

WILLIAMS: A total of fifteen million, according to my calculations. How did this affect you?

GARFIELD: How did it affect me? It pissed me off [laughter] that they got all this support and we couldn't even apply for a grant. But later on when NSF wanted to, they gave various companies big contracts when the Internet started. The *CA* grant gave them a monopoly on a chemical registry system that many people must use to stay in business.

WILLIAMS: It was in 1960, I believe, that NSF made the first big grant or contract to the CAS. You had been trying in previous times to get funding from NSF.

GARFIELD: It depends on how early you mean. At one time, I sent them a proposal for a newspaper of science. It involved a proposal to publish a daily *Science Citation Index*—like a stock listing.

WILLIAMS: Proposals to NSF?

GARFIELD: It's a lot of work just digging out all that information. But we can find that proposal in my files. After a while, you get tired of trying to sell yourself to the government.

WILLIAMS: Being rebuffed?

GARFIELD: Yes, you only have so many hours in a day, so much energy. You have to make a living.

WILLIAMS: Adkinson was not responsive to this?

GARFIELD: Well, after the contract on abstracting and indexing services, we never heard from each other again. I saw him recently at a meeting where he was honored for his service to the field of information science.

WILLIAMS: But you were good friends with Fred [Alonzo] Tate.

GARFIELD: Yes, Fred had worked locally for Wyeth, I believe. Fred almost came to work for me. I wanted him to work for me, but he took a job with Wyeth first. Then he went to CAS. Then he became quite an adversary. Fred became very opinionated, much more so than I had ever believed. With all that NSF money, he was able to do a lot of interesting stuff.

WILLIAMS: Opinionated about CAS?

GARFIELD: Yes, about what was the right thing to do. He became holier-than-thou in his dealings with people, which was not atypical of people in non-profit organizations then. Even today, there is a lot of that attitude, but less blatant.

WILLIAMS: I think the folks at *CA* give him central credit for the development of their computerized system.

GARFIELD: Yes. He was a key player.

WILLIAMS: You must have kept up with them in terms of computerization. Were you ahead of them from what you could tell, behind, about the same, or was there just so much difference in size and money that you couldn't compare?

GARFIELD: I don't know. They were doing different things. What I learned, I got from *C&E News*. They were never very forthcoming with us. Certain members of the *CA* staff would be very open since they were professionals and not concerned about competition. I always found it amusing that *CA* and other organizations would feel so threatened by us.

WILLIAMS: Let's talk about the Information Industry Association. The IIA was your and Saul Herner's idea, I gather, more than anyone else.

GARFIELD: Yes, although I'm not sure how that happened. There were five original people.

WILLIAMS: Who else besides the two of you?

GARFIELD: Boris Anzlowar was one of them. He had a small company called Pharmaceutical Medical Documentation, I believe. He published an index to unlisted drugs. He originally worked for Norwich Pharmaceuticals. Boris was a very nice guy. He came from Yugoslavia. Eventually he went back there, after starting his business, and finished medical school. He never got to practice medicine. Shortly thereafter, he died in an automobile accident. Boris even worked for ISI for a while as a consultant, including work on the back issue Perm Term Indexes and translations. He was one of the five. The other two people were Bill Knox, from McGraw-Hill, and Jeff Norton. I forget his former affiliation, but Jeffrey Norton today is the publisher of

Audio-Forum. They sell audio cassettes—foreign language cassettes other types of educational audio.

WILLIAMS: How did the idea of IIA get started?

GARFIELD: IIA was inspired in part because we were excluded from NFAIS [National Federation of Abstracting and Information Services]. They would only accept non-profit members in those days.

WILLIAMS: I didn't realize that.

GARFIELD: Sure. They represented the non-profit sector; we were for-profit.

WILLIAMS: Now this is 1968—the year NFAIS was founded?

GARFIELD: Is it? So it's almost thirty years now. At some point we hired Paul Zurkowski.

WILLIAMS: You and Herner got together and talked about this. He didn't remember who came up with the idea first. He kept saying, "Oh, I just followed Garfield around." [laughter] So I didn't get much detail from his on this.

GARFIELD: Well, I'm sure that there is stuff in the correspondence file on this.

WILLIAMS: Don't count on it. Maybe yours, I hope.

GARFIELD: I'd have to look back. Do you remember what year Zurkowski came in? I believe we had the Association before we had a full-time person.

WILLIAMS: 1973, right. You were chairman in 1973 and I think Zurkowski came in the same year.

GARFIELD: Well, we started in 1968.

WILLIAMS: You'd written an unpublished paper in 1966 that looked at the role of non-profit organizations such as CAS and their role as competitors with the for-profit. I wondered if that paper had a significant influence. What you're saying is that the exclusion from NFAIS was more important?

GARFIELD: When did NFAIS start?

WILLIAMS: I can dig it out of my chronology here but it would probably take me a while.

GARFIELD: A few years before.

WILLIAMS: Right, they just had their 25th anniversary. So it has to be at least thirty or thirty-five years. I noticed this in your bibliography, though, that unpublished paper, but I didn't see it and just wondered if you remembered any ideas in it.

GARFIELD: What's it called?

WILLIAMS: It didn't have a title. It just said, unpublished paper that looked at the role of the non-profit organizations as competitors with the for-profits. I didn't bring that bibliography. It was in 1966. I don't have the title but it's non-profit versus for-profit.

Well, between 1968 and 1973 it looked like the IIA grew fairly slowly. Now, who was going out selling the idea?

GARFIELD: All of us.

WILLIAMS: One on one kind of thing?

GARFIELD: Bill became very important since they had the greater resources at McGraw Hill.

WILLIAMS: Yes, he was the first president. Were you trying to sell at things like Library Association meetings where there were exhibits?

GARFIELD: No, we were more concerned about what we could do to offset the pervasive influence of the non-profits. I don't even know what was the first meeting we held. Probably the IIA headquarters has a copy of the proceedings. That would give you a better idea. When I was chairman I must have given some talks.

WILLIAMS: You became chairman in 1973.

GARFIELD: Had Bill Knox died already? I can't remember. He died pretty early.

WILLIAMS: I didn't notice if there was a chairman and a president or was there a chairman and just an executive director? I think that's the year you hired Zurkowski.

GARFIELD: I honestly don't remember.

WILLIAMS: Let's talk about how you feel about the organization. It's a huge organization now. It must have been an effective lobbying group.

GARFIELD: I'm not involved in IIA anymore. When Paul Zurkowski left, and even probably before he left, I had dropped out because I kind of felt it was dominated by huge corporate outfits like AT&T and others.

WILLIAMS: So you didn't go to meetings anymore?

GARFIELD: Well, at some point I didn't. I haven't been to an IIA meeting in decades, except when they invited me to a special meeting. I still don't go. The association's role, as I began to see it, was a service to the conglomerates. They saw it as a way to preview smaller companies and their executives who were coming up and pick them off for acquisitions. That's a legitimate role. So a lot of the members were presidents of their own small companies. They used these

meetings to meet acquisition personnel and impress people with what they were doing. Eventually their companies would be acquired. As a matter of fact, after a while, IIA even had special sessions where they invited companies to make a pitch!

WILLIAMS: To be bought out?

GARFIELD: Yes, so to speak. That wasn't something that I was interested in. It was the issues that the industry had. As the years went by, I was more involved in science and they were dominated by the financial information services. All that took over. The issue of government competition was complex, too. Some of the IIA members had no objection to government agencies, because their business was obtaining contracts. Saul Herner and others had many indexing contracts with NLM and other agencies. We, on the other hand, objected to blatant competition from the government.

[END OF TAPE, SIDE 6]

GARFIELD: It wasn't that I couldn't see a place for IIA. But I had little to contribute to the discussion of the financial information services? Money-wise they were huge, and dominating. Then IIA's membership fees rose to an outrageous level. In fact, ISI dropped out until later on, when Bill Schlagel came in. He used IIA to explore for other companies for acquisition. I imagine today Thomson is an active member.

WILLIAMS: Does the Association serve any of the purposes that you were originally interested in?

GARFIELD: Perhaps, I just don't pay that much attention to it anymore. I'm sure they are concerned about protection of copyright, et cetera. That was Paul Zurkowski's forte. He had been a congressional aide on that subject.

WILLIAMS: It's not a brainchild?

GARFIELD: Some of the topics that come up on their agenda are interesting. But I wouldn't pay the high fees to attend those meetings. Occasionally IIA may have a topic of interest to me,

but a lot of it is rehash of what I've learned in other arenas. I never had my eye on being acquired by a big company, even though it almost happened.

WILLIAMS: Talking about IIA, and relationships with these communities, brings me to your continuing relationship with the library community over the years. Was ISI exhibiting at the various library association conferences?

GARFIELD: Oh, yes, many of them.

WILLIAMS: What kind of reactions were you getting from the library community?

GARFIELD: Mixed.

WILLIAMS: They were saying, "Why do you have to charge so much?"

GARFIELD: Sometimes, especially since the medical libraries got *Index Medicus* practically free of charge and today, MEDLINE is free. Whatever the printed *Index Medicus* costs you, it is only a fraction of its true cost, and peanuts compared to *Current Contents*. Libraries of all types had their own perspective. If you can't afford something, then it's declared too expensive. Dr. Lederberg, who I love dearly, the year that I met him, had just won the Nobel Prize but he said he couldn't afford fifty dollars a year for *Current Contents*. I'm sure there are libraries today that still can't afford it.

WILLIAMS: We talked about your original attitude about library school—the traditionalists versus the revolutionaries. Has that traditionalist attitude affected your dealing with librarians, since you were very dependent on them? Has your attitude shifted or changed over time about the library community?

GARFIELD: Librarians, like every other group, are a mixed bag. Some had an innate hostility while others embraced new ideas. It was the user community that determined whether libraries bought our services, but there were always pioneering librarians, too. Everywhere you go, for many different reasons, there may be some hostility. In the medical community, Marty [Martin Marc] Cummings, former director of the National Library of Medicine, was hostile. I think I'd met the guy once in his entire tenure, when he and I were at a meeting organized by Ken Warren

involving "Coping with the Biomedical Literature." But I know that he hated my guts. In principle, he was opposed to for-profit ventures. He created an atmosphere among medical librarians that—in a sense, that we were the enemy. There are librarians for whom the National Library of Medicine is a god. The NLM cannot do anything wrong. So whatever anybody else does is wrong. You can't explain a lot of this stuff. There are people in the library community who, for their own personal interest, will push whatever system over your system. There is an incredible amount of local "competition" going on. You don't know what may, in a particular institution, drive people to want *SCI* and buy it, or not want it or not buy it. I built up a sales organization with sales reps who had good personal relationships with librarians all over the country, all over the world. Eventually that's what selling is all about. You build up personal relationships and confidence. Yes, most of the time the product is used and supported by local users. But I'll bet you could find institutions that buy one product that is used only a few times a year. But they continue to buy because they think they ought to have it, or they have a good relationship with the sales person, or whatever. There are places who will not buy your product because they hate your guts for whatever reason.

A *Scientific American* article in August of 1995 (13) alleged that we insisted that somebody subscribe to the *SCI* for ten thousand dollars a year in order to get their journal covered. This libelous statement was repeated in *Scientific American*. They quoted the editor of *Archives of Medical Research*, a Mexican journal. I called the son of a bitch to ask, "Where did you hear that?" He said, "Somebody told me that once." He recited that to the *Scientific American* reporter as gospel. He said the person who told him was now dead. We had to hire an attorney before the edition of *Scientific American* would publish an apology two months later. This is now up on my web site.

WILLIAMS: An apology?

GARFIELD: Yes, about the allegation that you had to buy the *SCI* in order to get your journal covered. That editor said this because he was upset that his journal wasn't covered in *SCI* at the time.

WILLIAMS: Not a retraction?

GARFIELD: They didn't call it a retraction. That article is cited a lot but the retraction is rarely mentioned—the <u>first time</u> was in correspondence, a series of letters published in the journal *Mathematical Intelligencer*. Another author wrote another article repeating the calumny from *Scientific American*. It was evident that he hated citation analysis. I've written this guy an e-mail asking if he ever saw the published apology. People will repeat that statement in

Scientific American because they don't know about the apology. I'm just giving an example of why some people may not like you—you're dealing with rumor and all sorts of hidden agendas. Everywhere you go in the "third world", there is some journal that thinks ISI should cover it or more of their local journals.

WILLIAMS: How much of this have you felt was directed at you, personally.

GARFIELD: Well, obviously I feel that personally. Even though the people at ISI, when the *Scientific American* article appeared, would have just as soon ignored it. But I pushed them and they finally got a lawyer to go after *Scientific American*. Even *Scientific American* ignored me until the lawyer wrote them. Then they published the clarification.

WILLIAMS: Really, it took that kind of pressure?

GARFIELD: Yes, even though the editor of *SA* will deny it. The editor's name is John Rennie.

WILLIAMS: All of this took place after you sold the company?

GARFIELD: Oh, yes, this just took place in 1995.

WILLIAMS: The original accusation was in 1995?

GARFIELD: Yes! It is hard to believe that it never occurred to *SA* to ask me if that allegation was true or not. If we were going to publish an article in my newspaper, *The Scientist*, that made such an allegation, we would call to verify the information. They wanted to believe this fellow in Mexico, who did say it to a reporter. They want to blame him for it, though he denies now that he said it. *SA* refused to publish anything that <u>he</u> wrote them because they said they had proof that he said it, probably a tape.

WILLIAMS: These things can have a long life, too.

GARFIELD: If I wanted to be a real nasty SOB, I could have filed suit against the editor in Mexico for libel. But that will not solve the problem. It is interesting that the editor of the *Math Intelligencer* did see the correction note. He put it as a footnote at the end of a letter, which was written in a rebuttal to the other guy. I've got this all right here. It's really incredible. I would not have found out about this if I had not been doing a search on the Web of Science. The guy never cited me. He did cite the [W. Wayt] Gibbs article in *Scientific American* (13), which reminded me that I had not used *SCI* to trace references to it. I should have immediately put that *SA* article in my research alert profile to look for references to papers that cite that article. Whenever I find such references, I write to the people and say, "You haven't seen this correction note." You'd never find it. It's on a page up in the front of the October issue—the typical correction that everyone ignores. I found out that ISI indexed the correction note but assigned the authorship to the authors of the original article. Which is really not true. It's an anonymous editorial item written without an author. You could just as easily assigned its authorship to the editor of *SA*.

A sociologist would look at all this and say it is ego—you're worried about your reputation. I've traveled all over the world, and I can't complain. I've been well received, honored by librarians and scientists. There are always going to be detractors—people who are dissatisfied for whatever reason. But I feel obligated to respond to false allegations or misuses of ISI data. I must write a few dozen letters a year of this kind.

WILLIAMS: One of the things I read in the long *Science* article about ISI and the *Citation Index*, is a quote from you saying, "The board of ISI just sits there and tries to throw out his wilder ideas." That struck me as amusing.

GARFIELD: You may be talking about William [J.] Broad's article (14), I think.

WILLIAMS: I think so. That struck me as funny because my image of someone who owns his own company is that he always gets what he wants. It struck me two ways. One, that you've really been the idea man of ISI, but secondly, just because you own the company, you may not always get your way.

GARFIELD: That's certainly true. I didn't.

WILLIAMS: Talk about the dynamics.

GARFIELD: You can't do things if people don't support you. Not the board of directors, they didn't have that much to do with it. You say "wilder ideas"—I'm not sure what that means. If we were going to launch a product, we never sought approval from the board of directors. My board of directors was advisory, even to the end, because they didn't have control. They weren't the kind of people, with the exception of Dr. Lederberg, who could contribute anything to those day-to-day decisions. They were financially oriented. Walter Eberstadt represented Wall Street. He was picked to represent the investors that I told you about, who provided the five hundred thousand-dollar convertible debenture. Have I told you the story about the whiz kids?

WILLIAMS: There is a little mention of it in the previous interview.

GARFIELD: That was when the revolution took place and the four guys all left. The Wall Street group had just invested in the company when that happened. Eberstadt represented the ten investors, who had put up half a million bucks, fifty thousand dollars each. They were the top executives from each of the ten Wall Street firms. Goldman Sachs, Oppenheimer, Model Roland—you name them, they were included. Most of them were personal investments they put aside for their kids or something. They knew that if they put that away, ten or twenty years later they'd make a bundle. They thought. So, Walter Eberstadt called me up after hearing about the resignation of four vice presidents.

WILLIAMS: He's the one representing the Wall Street guys?

GARFIELD: Yes. He says, "My God, you told all my colleagues that you had top-notch executives, and you depended on these people," and so forth. He described them as absolutely critical and he was worried what I was going to do now. So I said to him, as I told the group later, "Whom did you think that I was hiring in the late 1950s and early 1960s—the whiz kids?" Managing a successful company in the U.S., or anywhere else, involves learning how to manage mediocrity. Because if you have people working for you who are geniuses, most of them will not stay. If they're that good, they'll go on and do their own thing. Another example is Dick [Richard] Harris, who left later on. I've had endless numbers of people leave this company. You cannot keep them here forever without giving them a huge slice of the pie.

I said to the Wall Street group, "Who did you think I was hiring, the whiz kids?" Referring to Defense Secretary [Robert S.] McNamara's whiz kids at General Motors. So they left and we managed. We managed by hiring more mediocrities. You don't bring into your company the cream of the crop. You bring in the people you can afford. Or you get young people and you develop them into really top-notch people. That's why we've got people here

working thirty or forty years. If they're good, they'll develop as individuals. I'm very proud of the people who left to go on to be executives in other companies. There are lots of them.

WILLIAMS: You've had some really good folks over the years.

GARFIELD: Sure. Look, Arthur W. Elias is a brilliant guy. The fact is that he was unhappy with my management—they were afraid that I was going to run the company into the ground and wipe it out. As a result, we'd be in big, big trouble. Maybe the fact that we had to do the financing bothered them, I don't know. They never came to me to discuss it. They just came and gave me an ultimatum—they never came and discussed it with me, which I would have appreciated. We might have worked out something. But they never did. They just came to me and said either you resign or we're leaving. That was it.

WILLIAMS: Now, Herb White said to me that you had fired him.

GARFIELD: Yes. He told you that? It's true. Did he tell you why?

WILLIAMS: No.

GARFIELD: Let's say that it was for a very legitimate reason, and today it would be very common to hear about that sort of thing. But he was a personnel matter. I won't name individuals, but it was unacceptable behavior. He was not the only person. There was another person in this company who at one point harassed an employee. We didn't do it right away, but we finally had to get rid of him. But Herb had a very bad temper. When he gets angry, there's fire in his face. After a while that was hard to take, too. But he's a brilliant guy, and he's clearly successful. He's in his proper milieu now.

WILLIAMS: If we could name these management styles, what's been yours over the years?

GARFIELD: Well, some people think that I've always been too lenient. In one case, our printing coordinator's behavior was unacceptable to me, but we forgave him and let him continue. I should have fired him the minute we knew about the first offense. In those days, ISI had a reputation that, for all practical purposes, nobody was ever fired. The way we got rid of undesirables was to make them feel uncomfortable. If their colleagues felt they weren't pulling

their weight, they might complain. But a lot of people got away with murder for a long time. But that was before harassment laws and equal opportunity.

WILLIAMS: Because you had a hands-off approach?

GARFIELD: Not hands off. I always said, "Nobody has to work more than nine to five, but I don't want anybody in this company condemning those who choose to work late or come in as early as they want." We didn't have official flex-time then, which we do now. For example, Irv Sher went home early, but took his work with him. He left here at 3:30 in the afternoon, but came in at 6:00 a.m. There were a lot of people who couldn't deal with that. It had to be regimented. You paid a price for not being rigid. There were some mistakes made. One example of nepotism was my stepchild, Pete Aborn. He became vice president. He was much more interested in outside community activities. But he did a fine job organizing the construction of this building and the ISI child-care center.

WILLIAMS: Have you been the finance man also? Or just the bottom-line finance man?

GARFIELD: For many years, our treasurer was Marv Schroeder. He was good up to a certain point, while we were small. But then he became a stumbling block. He seemed to stand in the way of any change. I'm not a big numbers man, if that's what you mean. People always say I do quick calculations in my head, but that's got nothing to do with being able to read a balance sheet and that sort of thing. I used to say I taught Paul Zurkowski how to read a balance sheet or create one. He didn't know what cash flow meant when I first met him, but he learned later on.

WILLIAMS: What about a good financial forecast?

GARFIELD: A lot of the stuff I learned to do by the seat of my pants, as I did when I was working in New York as a kid. I started working when I was twelve or thirteen years old and had a lot of street-smart people around me. You know, street-smart and quick with numbers.

WILLIAMS: Why did you sell ISI?

GARFIELD: First of all, I was recently hospitalized with my ulcer. Day-to-day management was just getting out of hand for me. We were having one problem after another. We decided to hire a new executive, CEO, named Marty [Martin E.] Kenney [Jr.]. He came in here and it turned out to be a disaster. He was a member of Alcoholics Anonymous [AA], which I didn't know when he was hired. He hired his cronies. He had five or six executives in this company who were mostly members of AA. He literally conspired to get rid of me and get the company sold. I never had the documentary evidence, but I was pretty confident. Eventually, he was exposed, and I terminated him. But he did a lot of damage in a short time. I just decided that I didn't want to have to manage day-to-day personnel problems anymore.

William Golden of AAAS [American Association for the Advancement of Science] mentioned my name to Stan Warshawsky from Wall Street. He came to see me and said, "I have somebody who's interested in partnering with you. Get yourself a partner who can run the business." That's how I met Ted Cross. He had a small company named JPT. He had run a legal press, Warren, Gorham and Lamont. I didn't realize; I was naïve in the respect that he clearly bought the company with the idea of just staying here for three to five years and selling it for a huge profit. He really had no interest in the company as such. He had no intention as treating me as a real partner, he never did. He made a number of decisions that I fought him on, but he had majority control.

WILLIAMS: You actually sold out to him or went into partnership?

GARFIELD: He acquired over 50 percent, the majority. I had about 45 percent of the stock until the end. There were certain things he couldn't do without my approval, but other than that, he had control. He was the one who closed the child-care center. Not only did he close it, he didn't tell me he was going to do it. He wanted to close it without even giving the parents sufficient notice. Imagine, you have your kid in a child care center, and it's November, and you are told to take your kid somewhere else. A lot of lives were disrupted.

WILLIAMS: While speaking of the child-care center, you must have been one of the first ones in the city to do that.

GARFIELD: In the country, for that matter. Not that it was the wisest decision on my part; it was a little stubbornness. I shouldn't really have gone in on it. Because when we started the Caring Center, the [President Ronald Wilson] Reagan Administration hadn't yet eliminated government support for child-care. We expected the various low-level employees to be able to get some additional state support for child-care. Secondly, a lot of people said they wanted child-care, but not in Philadelphia. When it really came down to it, most of our people live in

suburbs outside Philadelphia. They didn't want to drag their kids in with them on their way to work.

It sounded nice, in theory, to have your kids near you in case something happened, but they left them at child-care centers near home or relatives nearby when they went to work. So out of a hundred fifty kids we had at that center at the end, only twenty-five were children of ISI employees. However, those who used the Center loved it and felt more secure being close when they were needed. Our society in America is not yet prepared to provide child-care the way, for example, it is in Belgium. In that country, your children are essentially in the public-school system from two years old and up. By the way, when it finally did close, we managed to get financing for a new non-profit center at 31st and Spring Garden with some financing through the University.

WILLIAMS: You were losing money?

GARFIELD: Let's say a quarter of a million a year. I regarded it as our donation to the community. The company could afford it, since we weren't giving out that much money for other charities, although I have always been very charitable. I feel that if the company is making good money, we should donate generously.

[END OF TAPE, SIDE 7]

WILLIAMS: Back to the partnership.

GARFIELD: Even before the deal with Ted Cross of JPT, the ISI Press had been closed down by Marty Kenney. JPT closed down the *Atlas of Science*, which was just beginning. They also wanted to close down *The Scientist*. They offered it to me for a dollar. So that's when I took over *The Scientist*. I relieved them of obligations to employees, et cetera. Ted lied to me. In Dr. Lederberg's office, he swore to me that he was going to help keep *The Scientist* going, that it was his objective to make it profitable. Once he made the deal, they never even tried. They clearly had planned, once they'd gotten in here, to wipe out all projects that were losing money—that didn't contribute immediately to the bottom line. *The Scientist* was clearly one of them. They were not going to put any energy or time into trying to make anything a success if it already wasn't profitable or breaking even.

Ted's a very clever man. He probably had the Thomson Company in mind when he bought into ISI. He knew that they would pay a good price for ISI and it would be a good fit for

them. JPT was smart enough to utilize my expertise wherever it suited their purpose. Of course, I also benefited financially. But they screwed me out of several million dollars in the final transaction. Of course, it is now a different company, and a lot of people left or were terminated. The culture was changed, but it is remarkable how many old timers have proved indispensable.

WILLIAMS: What happened when you hired Martin Kenney?

GARFIELD: Marty Kenney was supposed to buy stock from the minority shareholders. I had the right of first refusal. I never heard that they were trying to sell their stock until quite late.

WILLIAMS: Nobody offered it to you as they were supposed to?

GARFIELD: No, I told Kenney to buy the stock but he never did it. Then I got a letter from Maxwell's lawyer. So this led me to think, "There is something going on there." I found out from Peter Model that he had offered the stock to me, but Kenney had never followed up. So he and Eberstadt sold their stock to Robert Maxwell.

WILLIAMS: So when you went to the partnership with JPT, you gave up majority ownership.

GARFIELD: That's correct. JPT was the name of Ted Cross's company. Joe, Paul, and Ted. They were all publishing execs. Joe Palazolo had worked for Ted in various capacities at Warren, Gorham, Lamont, as did Paul [David] Neuthaler.

WILLIAMS: They then sold out to Thomson.

GARFIELD: That's right. That happened about three or four years later.

WILLIAMS: You still had your 40 percent?

GARFIELD: Yes. I was compensated as chairman. I had a contract for a five-year period. Then later, I was no longer an employee, but a consultant. That's what I'm now, essentially. I

have no say whatsoever in this company, but my advice is sometimes solicited and it is important to them, for PR reasons, that I attend some meetings.

WILLIAMS: Do you regret selling?

GARFIELD: I regret the circumstances that led up to the sale. I regret that I did not take actions to guarantee that certain things would not occur. But you can't have it both ways. At some point, I had to get some money. I had absolutely exhausted the possibilities of using my salary to cover my obligations. I didn't even own my own home at the time; the company owned it. The apartment was owned by the company and I had to buy that apartment back from ISI. I paid the highest price for it.

Do I regret it? It would have been nice if I had children who were capable of taking over. One of my sons worked here for a while. He is now a computer analyst. He just wasn't suited to this. My other son, Stefan, is not interested. My youngest son is twelve and a half—what would it matter to him? Ten years from now, would he want to come work here? No. My wife, who was vice president at the time, might have theoretically, but I don't think she would have wanted to continue. I think that I should have taken better precautions about what they were going to do about *The Scientist* and the child-care center and a few other things I didn't think of. But other than that, I've done very well financially. I could have done better, maybe. The longer you hold out, the better your price generally is. So I held out for thirty years. I took a part of that money and set up the Eugene Garfield Foundation. You wouldn't be sitting here if I didn't have that foundation.

WILLIAMS: What strikes me is that you are a classic case, and maybe even more classic than usual, of the person who loved the business and created products that served a useful purpose. That feeling sort of was the core business, really. Though there were the products, it's that feeling of trying to advance the purposes of science and the purpose of documentation/ information science. Is that feeling still there within the company, or just looking at the folks who came up at the same time as you in the information business generally?

GARFIELD: I can't speak to the motives of the executives in this company. I'm sure every one of them takes satisfaction out of ISI's products, feels a certain amount of service to their clientele. They're no different than most other business people. There are always going to be some mercenaries, but I'm sure they enjoy being able to provide a useful service. Bill Schlagel was a very financially oriented guy, but he told me repeatedly how great it was to be in a company where it was visibly obvious that you were performing a useful service—that you weren't just a "me too" provider.

Now, if this company went out of business, it would be felt in the scientific community. If everything was shut down at ISI, somebody else would have to restart it. That's the key issue. It's not as if you're operating a luncheonette. If your luncheonette closes, people go to another luncheonette. That's the difference. Not that those people who run a luncheonette are not entitled to feel satisfaction in their service to their clientele. Everybody serves in their own individual way. Returning to ISI—there are a lot of tools that can still be developed with the ISI database that will be of enormous utility and provide satisfaction to a lot of people. The Internet is a new opportunity that enhances the value of citation indexing, which inherently is hypertext driven.

ISI must make a good profit. Thomson paid a good price, and they're entitled to get their money back. They're entitled to a good return. I don't begrudge them that. In fact, I do everything in my power to help them, even though I get nothing financial out of it. The better the company does, the happier I am because it ensures the continuance of the products I started. If I want to invest in Thomson, I can, but I don't. I don't think their stock has done all that well over the years. If you just invested in the S&P 500, you'd do very well today. [laughter] Over the long term, if you can tolerate the risk and anxiety, you can do even better with a small CAP fund.

WILLIAMS: In 1963 you made an appearance before a Congressional Committee holding hearings on whether to establish a national research data processing and information retrieval center (15). You discussed the chaos in scientific communication. Were you really in favor of establishing that center? From reading your testimony, you seemed to have mixed views. By 1963, ISI is doing well. Another big leap is coming with *SCI*. Did you have mixed feelings about the establishment of this kind of center by the federal government?

GARFIELD: Maybe. Probably, because I've always had mixed feelings. I'm having an e-mail conversation right now about the government providing free access to all of its databases, including patents. It's a mixed blessing. As a citizen who pays taxes, I feel that it should be available. On the other hand, the government can be a real deterrent to innovation. In spite of the huge resources they've had, I don't think NLM and others in government are all that innovative. Given the money and the resources they've had, I think it could have been even more innovative. I'm criticizing Don [Donald Allen Bror] Lindbergh. NLM does a good job, but a lot more could have been done sooner. Yes, I am ambivalent. Maybe that national center would have been serviced by a lot of outside companies. A national center could also have used databases licensed from private institutions.

WILLIAMS: Well, you make one argument that kind of intrigued me. You said, "Maybe what should happen is that each individual scientist should be given a stipend so that he or she could buy their own information services." Was that your middle ground? That is, the entrepreneur could get some support.

GARFIELD: Yes, right. Because especially now, since MEDLINE is free, that stipend could provide funds to buy service from the private sector. In theory, scientists can still do that. A few years after we got started, we realized that scientists could take money out of the research grants to buy *Current Contents.* That was a major discovery. It was one key to the successful promotion of our business. I discovered that grantees could use their funds to buy research materials. I had to tell them that they could do this. We used to put that information on our brochures. It's perfectly legal to charge *Current Contents* to your research grant.

WILLIAMS: So that became part of your marketing?

GARFIELD: Yes, absolutely.

WILLIAMS: Also in this testimony, you talked about your 1961 trip to Moscow to see VINITI [Soviet All-Union Institute of Scientific and Technical Information]. Talk about that trip and how it happened.

GARFIELD: It was during a biochemistry congress. I was one of five hundred Americans who were there for the International Congress of Biochemistry.

WILLIAMS: How did you get invited in to see VINITI?

GARFIELD: I don't remember how that occurred. George Vladuts told me that was when he first heard me speak. Then I returned to Moscow for the Book Fairs and met Professor [Vassily V.] Nalimov in the 1960s, as well as [I. A.] Mikhailov of VINITI.

WILLIAMS: You said you were impressed in some ways by VINITI. The Congressional Committee was interested to learn if they used automation. Apparently you didn't see much automation at VINITI.

GARFIELD: Right. That's true.

WILLIAMS: No other impressions remain of VINITI? You seem to have liked that model in some ways.

GARFIELD: Well, it was multidisciplinary. It was not as large as many people alleged. Most of the work was done by part-timers. The abstracters were outside scientists. They didn't have twenty thousand employees. Just like *Chemical Abstracts*, they had a list of volunteer abstracters. But still, they probably had a lot of full-time employees, I'm sure. In 1961, all I had to show them was *Current Contents*. Subsequently, I came back there several years later and spoke about the *SCI*.

WILLIAMS: Oh, you did? You visited them again?

GARFIELD: I was in Moscow many times over the years. We used to go to the Moscow Book Fair beginning in the 1960s.

WILLIAMS: Let me ask you about academic information science programs. In a 1963 article, you seemed optimistic about programs at Georgia Tech and Drexel. You also mentioned what you were doing at Penn. They were going to offer graduate programs in information science that would really begin to deal with information retrieval and other related information problems. Has your optimism come true?

GARFIELD: Well, I certainly felt there was a need for advanced study of information systems and trying to make information science a real science. I was asked to teach a course in information retrieval at Penn in the school of engineering under the CIS program—computer and information science. While ENIAC had been developed at Penn, they were pretty naïve in the area of scientific documentation. They were excellent in the theory of programming languages and a few people, like [Aravind K.] Joshi, understood linguistics. Since I got my degree in linguistics at Penn, I was a kindred soul. Morris Rubinoff drew me into the program and one of my close friends was Saul Gom, the guru of programming languages. Today, a lot of information science is related to the Internet and computer systems. Library science is clearly taking a turn. There are certain basic functions that still have to be done. There is this big gap between the poor and rich sections of society. The poor depend on public libraries the way we did when we were kids. At Penn, Dorie Farber and others are gurus of the Internet. There are more advanced things being done with computer networks. But it's a very rapidly changing

situation. While computer science is expanding, library schools seem to be contracting. Maybe the Internet will spawn a greater interest in library training.

WILLIAMS: Today the emphasis is on some combination of computer science and MIS in business. Indeed, that's the focus of the new program Michael Buckland had developed at Berkeley. They've changed their name just as Drexel has.

GARFIELD: The College of Information Studies.

WILLIAMS: Michigan has also changed. The School of Information is what they call it at Michigan. Michael Buckland's program at Berkeley is now called School of Information Management, I think.

GARFIELD: So where will reference library training go?

WILLIAMS: They'll probably stay in traditional programs like mine at the University of South Carolina.

GARFIELD: Would they be called library programs?

WILLIAMS: I consider my program to be on the traditional end, unfortunately, but it's become Library and Information Science. We teach the Internet stuff, but the research and development work in information science deals with problems of information retrieval and sophisticated computer modeling and those kinds of things. Mostly that's taking place in schools of computer science, as at Georgia Tech. From the beginning it called itself School of Information Science. But it looks more like a computer science program. That's why I was wondering if you were more optimistic or less optimistic or just amused about that.

GARFIELD: I don't know what to say about that. I have no strong feeling one way or the other. I think that clearly, with everything that has happened up 'til now, there will still be a need to refine all these systems, which will draw in people from all kinds of backgrounds and disciplines.

WILLIAMS: What do you think the Internet is going to do to all of this?

GARFIELD: Well, I would hope that the Internet would just make a lot more people interested in the kinds of problems that we face when doing literature searching and reference work. In the past, it was separate from the user's involvement. The average scientist today, if he's going to have full text available, is going to have to learn to search and exploit these databases. He's going to have to learn what's right and wrong with systems like MEDLINE. Hopefully, free MEDLINE will get them so involved that they'll say, "Oh, jeez, this is a crappy system. Why doesn't it permit me to find this or that?" Even *Chemical Abstracts*, whatever. The more you can get these users involved in using the systems, the better they'll become. A big problem is the dichotomy between free and paid services. It will be free for all the academics, because the universities are going to pay for access through licenses. Ultimately, the end user will have access to these services and push them to the limit. Right now, the systems can be very frustrating. You go up on the Internet and the delays are terrible. Eventually, higher speed and capacity will make things easier.

WILLIAMS: Are we in the information field going to be in more demand or, hopefully, get better, as a result of the Internet? As you say, there is free and wide availability of these things.

GARFIELD: I hope so. Eventually, larger percentages of material will be accessible over the Internet. Somehow print material will all be converted to machine-readable text. We have to bridge the gap between the present and the past, as with JSTOR. I think that there will be cheaper, faster, and more intelligent OCR scanners. It will be cheaper and cheaper to convert everything to machine-readable form. When I have to use those old printed indexes sitting over there on the shelf, it is painful. For all intents and purposes, they're like dinosaurs. But occasionally there's something that I have to search, which I cannot do yet by computer. So I walk over and pull a printed volume out, and open it up. But then I realize that I have to spend the next ten minutes looking up a few source items. You want to get somebody else to do that for you.

WILLIAMS: Not to mention going back or forward in time from that point.

GARFIELD: Well, in the old days when we had nothing else, we were conditioned to use the printed volumes of *SCI*. We didn't think <u>anything</u> of sitting there for fifteen minutes copying out a bunch of references.

WILLIAMS: I tell my students that we used to spend hours standing at the card catalog. Now if the computer doesn't respond in five seconds we drum our fingers impatiently.

GARFIELD: We have heightened expectations. So I would hope that we will find a way to convert all the old material so that it too will be used along with the new stuff. It would be a tragedy if it wasn't. There's clearly still a need to get back into the older journals and make those links. Contemporary history of science could be done much easier. We might still be able to do what I've always said that we could do with our databases. Hopefully, it will all be integrated. We'll have all these links without huge gaps. You won't have to differentiate between MEDLINE and *Chemical Abstracts* and *SCI*. We've got a long way to go before that happens. Although, some of the things that *CA* has been doing with STN integrates different databases. You can do a DIAL INDEX search of everything. How all that gets resolved financially with all these profit-making, non-profits, and government databases, I don't know. It's a real challenge.

You realize as the years go by that the problems are endless. You're never going to be able to do all the projects that you thought you were going to do.

WILLIAMS: What are your regrets?

GARFIELD: Regrets? I don't have regrets about anything. What's the point? You did what you thought was best at the time. If you made a mistake, it's done, it's over. What can be done to rectify it?

WILLIAMS: By regrets I meant feeling as if, "Gosh, I intended to work on that project but it didn't look like it was going to be successful." That kind of regret.

GARFIELD: Many years ago, we were going to create a citation index of the medical journals of the nineteenth century. This was a project that involved an effort like what Henry [G.] Small did to create a *Physics Citation Index* for the 1920s. Students went through the journals extracting citations, many of which were implicit. They weren't all written out. If we do this for nineteenth-century medicine, there might be a couple dozen medical historians who would use it to develop a better history of American medicine. Maybe it will be possible to scan in all those journals by OCR and create an archive of American medicine, searchable by hypertext links.

In spite of the citation linking that you could do, you're still going to need a citation index so you can see the statistical data for each cited paper or book. Just a hypertext linked

database of journal names would not be a replacement for a citation index. In the ultimate library catalog, the source work is displayed but it also tells you what it cites, all the trails from there, and what cites it. The catalog entry should display for a book or an article all its limbs in both direction as well as related records.

[END OF TAPE, SIDE 8]

GARFIELD: To create these backlog indexes will involve a lot of problems. How long it will take, I don't know. I hope I'm around to see some of it. [laughter]

WILLIAMS: I hope you are, too.

GARFIELD: It will be interesting, ten years from now, to see how far this comes. Things don't move as quickly as we like to think.

WILLIAMS: That's true, but on the other hand, it is amazing how quickly they do move, and that must have been the case with you, also. You now have forty-five years in the field.

GARFIELD: If I had my way, there would be a government WPA project to go back and create a *Citation Index* for all the literature that was ever published. Incidentally, there is a Chinese *Citation Index* now.

WILLIAMS: Is that right?

GARFIELD: They started one apparently a couple of years ago. I've now seen it. Before Professor Nalimov died he wrote to me and said somebody in Russia was interested in creating a *Citation Index* for Russian arts and humanities. Where are they going to get the money? But they've got all kinds of manpower and maybe someday it will happen. That's a Russian WPA!

[END OF TAPE, SIDE 9]

[END OF INTERVIEW]

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