

**Shelby White and Leon Levy Archives Center
Institute for Advanced Study**

**Oral History Project
Interview Transcript**

**John Dawson
Interviewed by Linda Arntzenius
May 30, 2013**

**Permission to use this material for anything beyond personal research
must be requested from the Institute's Archives. Please contact
archives@ias.edu with questions.**

**Institute for Advanced Study
The Shelby White and Leon Levy Archives Center**

Oral History Project Release Form

In exchange for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, I (the "Releasor") hereby irrevocably give, donate, assign, transfer and grant to the Institute for Advanced Study (the "Institute") all of my right, title and interest in and to all audio and/or video recordings of the oral history interviews in which I participated, together with all transcripts thereof (collectively, the "Materials"). My gift, donation, assignment, transfer and grant to the Institute includes: (i) title to the Materials, free and clear of all liens, encumbrances and interests of others; (ii) the right to all present and future copyrights, including but not limited to, the exclusive right to make, reproduce, publish (in print, on video and in all other formats) and to otherwise exploit the Materials, excerpts of the Materials and works derived from the Materials; and (iii) the right to use my name and likeness as required by the Institute in connection with its use of the Materials. For the avoidance of doubt, I hereby authorize the Institute to use the Materials (excerpts and derivative works) for any and all commercial, educational, research or other purposes.

Public access to the Materials is subject to the following conditions (please check one):

- None.
- Closed for 10 years from the date of the interview*; full public access thereafter.
- Closed under other conditions as stated below*; otherwise full public access:

*I understand that prior to the date of public access, access to the Materials may be given by the Institute to its staff and to others for the purposes of preserving and cataloguing the Materials.

I acknowledge and agree that this is the entire agreement between the Institute and me respecting the Materials and shall be binding upon my heirs, representatives and assigns. It may be modified only by a writing signed by all parties. This agreement shall be governed by the laws of the State of New Jersey and the federal and state courts situated in the State of New Jersey shall have exclusive jurisdictions over disputes between the Institute and me.

Witness:

Cheryl A. Dawson
Name of Witness: *Cheryl A. Dawson*

John Dawson
Signature of Releasor

Name of Releasor: *John Dawson*

Date: *6/19/2013*

Linda Arntzenius: Thank you for coming to do this.

John Dawson: Pleased to be invited.

Linda Arntzenius: Before we start, I want to just say for the sake of the recording that it is Thursday, May 30th, and I'm here at the Institute for Advanced Study to record an interview for the Oral History Project with Professor John Dawson,¹ author of *Logical Dilemmas: The Life and Work of Kurt Gödel*, and a Member in the School of Mathematics from '82 to '84. Is that right?

John Dawson: Yes, that's correct.

Linda Arntzenius: Well to encourage you to speak candidly, I just want to let you know that the contents of our discussion will be closed from the public for a time period of your choosing, and we can discuss that later on in the process. The focus of the interview is to capture your reminiscences of the Institute, and your time here as a Member in the school of mathematics. But first, if I may, I would like you to please tell me a little bit about yourself, your background, where you grew up, what your parents did, and how you came to your subject.

John Dawson: Okay, well, I grew up an only child in Wichita, Kansas, which is an aircraft center. My father and his brother ran a plating shop, an electroplating shop that was used by the aircraft industry there. That was basically the mainstay of Wichita's economy and actually still is, for that matter. So I grew up there. They had very good schools at the time, and I was always academically inclined, so I thrived in the school system. In high school, I was co-valedictorian of my class, and I applied to MIT as my top university and was admitted there. And I attended there on a National Merit scholarship. Sounds incredible these days, but the total tuition for all four years that my parents had to pay was \$800.00. And MIT was the other main influence, I would say, on my career. So it's kind of interesting that the two major institutions that have really affected my career have both had three letter identifiers.

Linda Arntzenius: Yes, MIT, IAS.

John Dawson: Right.

Linda Arntzenius: Yes, indeed. What did you study there?

John Dawson: I was a mathematics major there. Very briefly, when I went there, I thought I might be a physics major, but I very soon learned that, first of all, I didn't have a lab technique at all, and I thought like a mathematician and not like a physicist. So I moved very quickly to mathematics. That's also where I met my wife. She was one of the few coeds at the time. If you go to MIT now, you'll find it's almost 50/50. But then, well, my class for example, had 900 men and 20 women.

¹ John W. Dawson (1944-), Member in the School of Mathematics, 1982-1984.

Linda Arntzenius: Which year is this?

John Dawson: This was 1962, the fall of 1962 when I entered. My wife entered the following year, and there were about twice as many women then because they had just opened, finally, a women's dorm. So there were around 40 in her class. Anyway, we met, not through the mathematics, interestingly enough, although she became a math major as well, but through music because we were both active as flutists. She played in the band, I played in the orchestra, and we had all kinds of common interests.

After MIT, I went to the University of Michigan for my doctoral degree, and initially, I thought I was going to go into analysis, but I switched into mathematical logic. I had a logic course in my senior year at MIT and had liked it quite a bit, and when I got to Michigan, there were a lot of really pretty brilliant students in analysis. And I thought, "I'm not sure I'm really quite on their level."

But logic, I started attending a logic seminar, and rapidly I just sort of got more and more interested. So that's what I actually ended up getting my [doctorate in.]

Linda Arntzenius: Can I ask, when you were at MIT doing logic, was that in the mathematics department?

John Dawson: Yes.

Linda Arntzenius: It was? Not in the philosophy department?

John Dawson: Yes, and that's a very good question because so many places it would have been, including Harvard just up the street. As far as I know, it's still in the philosophy department [at Harvard].

Linda Arntzenius: Yes, that's one of my questions, actually, but we'll get to that later. So how did you then come to be a Member here?

John Dawson: Okay. After I got my doctorate, it was a difficult time to find jobs. So I had a post doc, a three-year post doc at the main branch of Penn State, State College. And when that was finished, I was lucky to find a position at the branch campus in York, and when I got there, I was frustrated because I was the only logician for miles around. And it was a two-year campus. So you didn't get to know the students that well because they were gone after two years.

I found myself just kind of out of the loop as far as being able to keep up with other people. So I ended up doing something that I'd actually done when I was writing my dissertation. When I started out writing my dissertation, I tried working on a problem that was on a published list, and actually, that's a very foolish thing to do if you're a newcomer unless you're really brilliant because those problems don't end up on published lists until they've stumped the experts.

So I wasted quite a bit of time on that and eventually found the thesis topic on my own by going back to some material I'd had in this course at MIT that I didn't feel I quite fully understood. I thought I'll go back and consolidate my knowledge. And it turned out that things were not at all the way I expected them to come out. I went back to my advisor, and he thought about it overnight, and he said, "You know, I think that's really an interesting topic that hasn't been explored."

Linda Arntzenius: What was the title of your thesis?

John Dawson: Definability of Ordinals in the Rank Hierarchy of Set Theory. So I was an axiomatic set theorist. And I got very interested in the so-called forcing technique that Paul Cohen² invented. So that was what I used in the dissertation. Well, anyway, when I ended up at York, I did the same sort of thing. I didn't quite know what to do, but I thought I should go back and read the masters. That's the thing to do. And in logic, Gödel³ is the master to start with, he and Tarski.⁴ So I started to do that, and I thought, "Well, the first thing to do is just get a list of all of his publications and see." I was familiar with quite a number of them, but I thought I should get a list of all of them. And I was amazed that there was no such list available. No one had ever made a bibliography of his publications. There was a bibliography that he made here, but even it was incomplete.

Linda Arntzenius: What year are we talking about now? This is the '70s.

John Dawson: This is the '70s, yes. I got my degree in '72.

Linda Arntzenius: So you've never been to the Institute by this time.

John Dawson: No, that's right. I had gotten my doctorate in '72. I was then three years at the main campus. So it was 1975 before I started at Penn State, or at the York campus of Penn State. So I really got going, I would say, right around 1980. That'd be two years after Gödel died. That's when I realized that one thing I could do was simply publish an annotated bibliography of Gödel's published works. In the course of which I discovered three minor publications that had never been listed anywhere. He just seems to have forgotten about them. So it was an annotated bibliography, and I published it in the *Notre Dame Journal of Formal Logic*. That then attracted some attention, and I also posted a query--the American Math Society, in their *Notices*, used to have a column called Queries. It didn't last very long, it was only a few years, and I don't really know why they discontinued it.

² Paul E. Cohen (1934-2007), Member in the School of Mathematics, 1973-1974.

³ Kurt Gödel (1906-1978), Member in the School of Mathematics, 1933-1935, 1938, 1940-1953; Professor, 1953-1976; Emeritus Professor, 1976-1978.

⁴ Alfred Tarski (1901-1983), Member in the School of Mathematics, 1942.

I mentioned that I was interested in biographical studies of Gödel, and on the basis of that, I was contacted by Professor Solomon Feferman⁵ out at Stanford. He was curious what I had in mind, and so I told him, "Well, I've done this bibliography of Gödel's published works, and I'd really like to extend that and find out about unpublished things." But I had already heard by rumor that his papers were here, and that they had not been catalogued. And worse, that they were in this shorthand, and so I knew that this was going to be a big problem.

At any rate, I started writing the Institute to find out what the situation was. And of course, I was told the same thing everybody else was, that they simply weren't catalogued and weren't available. But I did inquire about the shorthand, and finally sent them a letter saying, "Could you possibly send me some photocopies of about a half dozen pages of the shorthand so that I can figure out which shorthand system it is?" Because there were two competing shorthand systems in use at the time.

And so they did, and I was able to find--well, actually, a very thorough textbook on that system.

Linda Arntzenius: And this would be in German?

John Dawson: Yes, yes. It turns out that there are two institutions in this country that have vast collections of books on shorthand. One is the New York Public Library, and the other is Yale. And Yale happened to have the original publication by the man who invented the system. So I was able to get that, but I could only get it for a week. It was considered a rare book. I had to use it in the library, and of course, this is while I was teaching. So you know, I didn't have that much time to look it over. But that particular semester, I was on leave back at the main campus, and a good friend of mine in the math department, his wife was a native German. She agreed to help me get the gist of this.

Linda Arntzenius: Had she been taught shorthand? Because there was a time when it was customary to teach it in school.

John Dawson: There was a time when it was customary. I don't think she had, no. It's interesting. We think of it as something that secretaries or court reporters learned. But in Germany, I think it was rather the opposite. It was the intellectuals who learned it.

Linda Arntzenius: Interesting. It's a very useful skill.

John Dawson: Yes, and not only for taking dictation or for speed, but for saving space. I think that was one of the major things. So anyway, I was able to determine which shorthand it was, and I think the truth of the matter is I just sort of pestered the Institute with queries often enough that they got a little tired of replying to them.

⁵ Solomon Feferman (1928-2016), Member in the School of Mathematics, 1959-1960.

Linda Arntzenius: So did you write to the Director, to Harry Woolf?⁶

John Dawson: I don't remember originally writing to him. It's been long enough – I think I just wrote to the School of Mathematics. I'm pretty sure that's who I wrote to. Anyway, I got a reply eventually from Professor Borel⁷ saying, "If you're serious about this, you should make a formal application to become a Member." And my initial reaction to that, I thought, "Well, this is probably the end of the game because I'm in a two-year branch campus. I don't have much credentials. I'm relatively new."

But then I thought, "Well, on the other hand, if I don't make an application, then it's obviously finished. So I might as well put the ball back in their court." So I made the application, and I included copies of the bibliography. That would have been in December of 1981 that I made the application. And I really didn't expect much to come of it, but in the meantime, I was pursuing other leads. I went down to the Library of Congress over the spring break to look at von Neumann's⁸ papers down there because I figured there might be some material there. Well, it turned out that the week that I was down at the Library of Congress, Borel called my home and left a message on our answering machine saying that they were interested in having me come, and would I be interested in cataloguing the papers.

Which was something I honestly hadn't thought of. I mean when I made the application, I didn't mention cataloguing them because I didn't have any archival experience. But with an offer like that, you can't refuse it. So he suggested I come to the Institute the following week just to see how many papers there were and to judge whether I thought it was possible at all, and that same week by coincidence, Sol Feferman contacted me and said, "Would you like to serve on the board of Gödel's collected works?"

Because in the meantime, while all these negotiations were going on, the reason Professor Feferman had contacted me in the first place was that not long after Gödel died, the Association for Symbolic Logic decided that it would be good to publish his collected works. And they formed a committee, and they did a certain amount of work, and then they learned that the Austrians were planning a much more extensive compilation, and apparently already had a head start on them.

Linda Arntzenius: But they [the Austrians] didn't have the materials?

John Dawson: They didn't have – right, they didn't have the materials here, but they did have some archival material at the University of Vienna, and they also had people that they could interview, some of his colleagues. So they were planning to include some biographical material, they claimed they

⁶ Harry Woolf (1923-2003), IAS Director, 1976-1987; Professor-At-Large, 1987-1994; Emeritus Professor, 1994-2003.

⁷ Armand Borel (1923-2003), Member in the School of Mathematics, 1952-1954; Professor, 1957-1993; Emeritus Professor, 1993-2003.

⁸ John von Neumann (1903-1957), Faculty in the School of Mathematics, 1933-1957.

were going to publish his collected published works. And I think they were planning to do it in both German and English. Anyway, when the American team learned that, they backed off. Now that I've been in Austria, I understand it better. Time moves very, very slowly in Austria.

I think they didn't get the funding they anticipated, and nobody really got on it. And I found out more or less by accident from a colleague in Austria that this wasn't really going anywhere. When I eventually let Professor Feferman know about that, he was very excited, and then organized a new group, and that's what he was inviting me to join. So this same week, I get these two –

Linda Arntzenius: Golly. It was meant to be.

John Dawson: And I came here the next week. It was in March, and I had a terrible head cold, I remember. I was really feeling miserable.

Linda Arntzenius: This is March '81.

John Dawson: '82 now. Yes, it was December '81 when I made the [application] – it was March '82 when I came here. And so I presented myself to Caroline Underwood, expecting that she would then introduce me to Professor Borel, and he'd probably interview me and whatever. Well, to my amazement, she simply said, "Oh, yes," and she handed me the keys and took me down to the basement of the library, and I was left totally undisturbed for six hours, just looking through this material, which was rather daunting because it had been put in moving cartons, apparently, at Gödel's home by people who didn't know what it was.

Linda Arntzenius: It may have been his wife.

John Dawson: It might well have been, yes. So they were just in these cartons. There were 60 boxes of them, and they were piled literally from floor to ceiling in that wire cage down in the basement. The weight was such that the bottoms were starting to burst. It was that bad. I couldn't really look even into all the boxes, and in fact, there was nobody else really down there, so I didn't even have any help just lifting the things. I had to just look at what I could easily get to. But I was able to tell that a lot of those boxes weren't actually his papers, but rather books from his library or offprints that other people had sent him of their works. I think 40 of the 60 boxes were in one or the other of those categories. So that cut it in a third.

Linda Arntzenius: Makes it more manageable.

John Dawson: That made it definitely more manageable. But there were still 20 boxes of manuscript materials that were his. And of course, some of them were definitely in the shorthand.

Linda Arntzenius: How is your German?

John Dawson: Well, as mathematical German goes, I'd had a fair amount of experience. I don't speak German well because I've never really had the need to, and not been over there often enough to develop it. But I can read technical German pretty well. Now if you give me a page of literary German or newspaper German, the vocabulary will be so different. But anyway, that really wasn't a problem. The shorthand, of course, was.

Well, I felt this is an opportunity I just can't turn down, even though I certainly had some doubts of how long it would take to do it.

Linda Arntzenius: Did you feel almost an obligation to do it?

John Dawson: Yes, I would say so. Yes. It was both a personal opportunity, and yes, an obligation to the field to at least try to see what could be done.

Linda Arntzenius: Because even if those people in Austria were going to pursue [the publication of collected works], they would still need to have this material and it would still have to be catalogued.

John Dawson: That's right.

Linda Arntzenius: In order for anything to move forward.

John Dawson: Exactly, exactly. The one thing that helped out, and certainly we hadn't really anticipated this, it turns out that my wife, in addition to being a mathematician, also was very interested in the German language and had taken more German, actually, than I had. So at the end of the day, I went back and did meet very briefly with Professor Borel, and he asked me what I thought, and I told him that I had looked at it, here was what it was, and there was a lot of material. And I thought I was willing to tackle it.

So he suggested I come for the summer semester to get a head start on it, which was fine, and I didn't have funding from Penn State that year. I was eligible for a sabbatical, but I didn't apply to the Institute until after the date had already passed for Penn State because I didn't have an idea I'd be doing it. So the Institute basically paid my salary for the first year, and then I took the sabbatical a second year and extended my stay that second year. When we got here –

Linda Arntzenius: Did your wife come with you?

John Dawson: She didn't come on that first visit, but she came here certainly when we were here.

Linda Arntzenius: During the summer when you were –

John Dawson: Yes.

Linda Arntzenius: Do you have children?

John Dawson: No, we don't have children, but we did have a dog with us, and we were very pleased that they understood that we would like to have accommodation that would include our Siberian husky, who rapidly became well known, I think, by everybody here. Anyway, yes, she came from the beginning, except for that first visit.

Linda Arntzenius: And her name?

John Dawson: Her name is Cheryl, spelled with a C.

Linda Arntzenius: Dawson.

John Dawson: Right.

Linda Arntzenius: Thank you.

John Dawson: And so very soon after I started looking at the papers, she said, "Well, I would be willing to try to learn the shorthand system if you can find some source." And we quickly set up a little division of labor. I said, "Well, I'm going to be very busy cataloguing the manuscript stuff, but I know there's a lot of these boxes that just contain books. So maybe you could just simply make an inventory of the books," which she was happy to do. And I'd say within the first two weeks we were here, she shows up one day at my office and says, "Look at what I found." He had saved his shorthand textbook.

So then she started reading that and trying to learn the system. It's a complicated system, and the textbook wasn't the kind that really was designed, I think, for self-study. It was very detailed, as German things tend to be, but not the quickest way into it. But at any rate, she started on it. And then, that was also at the time that the Einstein⁹ papers were here. They were just about to depart for Jerusalem. But I did know, or got to know, some of the people working on those papers, and so I asked them, "Do you have any shorthand?"

Well, they said no. Einstein did not use shorthand, but he did use the old-fashioned German longhand, which if you've ever seen it is almost as bad to read as the shorthand. It's really hard to read. Anyway, they said that we did have some assistance with that from a fellow from New York City, and he mentioned at the time that he also read that Gabelsberger shorthand, even though we didn't need it.

So I said, "Well, who is this?" And they said, "Well, he's somebody that the Institute knows because he's a photographer that took photographs of Einstein." And so that was Herman Landshoff. They had an exhibition about a year and a half ago of his photographs of Einstein. He was actually by profession a fashion photographer, and if you look on the web, you will find that his fashion stuff is very much in vogue and is collectors' items.

⁹ Albert Einstein (1879-1955), Professor in the Schools of Mathematics and Natural Sciences, 1933-1946; Emeritus Professor, 1946-1955.

So I wrote a letter to him, and what a delightful person. He was in his early '80s, but he was very willing to help, and he actually came here once a week. He would take the train from New York City. We would meet him at Princeton Junction, and he would dictate to my wife. He would read in shorthand and dictate in German, and she would copy it down. Then she'd study that evening. She would go back over it and compare the shorthand signs with the words. So it helped her to learn –

Linda Arntzenius: Enormously.

John Dawson: And he wouldn't even accept payment. The only thing he would let us do is buy his lunch here at the Institute dining hall. What a wonderful person! So that was basically how we got by the shorthand problem. Of course, I had to have that just to be able to catalogue the material, much less read stuff. But that was the breakthrough that enabled that to happen.

Linda Arntzenius: Well, I do have some more specific questions about your work in the archives, but before we go there, and about your book, I wonder if you could talk a little bit about your impressions of the Institute, what you knew of it before you came, and your first impressions when you got here, were taken down into the bowels [of the library]. And then perhaps since that time.

John Dawson: Well, I of course knew of the Institute. I knew something about its early history. I knew Einstein, of course, had been here and it had become sort of famous because they attracted him. And being in math, I knew a lot of new Ph.D.s came here for one or two years. But I never really expected to be invited myself. I had not been in Princeton before. I hadn't even been on the University campus, so I hadn't been here, and I remember coming and being impressed first by the solitude of the place. And I thought, "Boy, this really is a haven for doing work."

And when I was given the key to the cage and nobody supervising me, I thought, "This reminds me of MIT," because the thing that was so great there was the feeling of trust. That people trusted you and expected that you were good enough to know what you were about, and they weren't going to interfere with it. So immediately, I had that feeling that this is an unusual place.

Of course, I didn't have too much time to form an impression that very first time. But then when we actually came here, it certainly, on both those counts, reinforced my opinions. And then I discovered the Institute dining hall and how wonderful the food was, with Franz Moehn as the chef. Oh, fantastic.

Linda Arntzenius: Where were you staying at this time?

John Dawson: We were in [an apartment] right at the end of the drive in the housing complex directly across from the entrance drive. There's that one that's brown. It's not clapboard, but whatever. And so we were in that one right there on the corner on the ground floor, which they arranged so that our

dog could be outside in the back. And we were there the whole two years in that same apartment, which we liked very much. It was very comfortable housing.

Linda Arntzenius: Who were your neighbors? Do you remember?

John Dawson: We had more than one set of neighbors. Different the second year from the first year. You know, I don't remember the names anymore. I know the first year, it was a young fellow and his wife, and he was in physics, not in mathematics. We weren't too far from Otto Neugebauer,¹⁰ the historian of mathematics. He was there. I don't know exactly which one he lived in, but he was fairly close by. So we got to know, of course, mostly people in the School of Mathematics.

But we did live very close to Piet Hut¹¹ and his wife¹² at that time. They were Members. He was not a Faculty member at that point. And he was appointed a Faculty member just at the end of my time there. So I knew him and his first wife very well. So yes, I was very impressed by the Institute, and I loved the Institute Woods and still do. We would go just hiking there for solitude, and it was a wonderful place to walk the dog because there are all sorts of interesting smells as far as she was concerned. So yes, it was to me a sort of paradise of a place.

Linda Arntzenius: Did you have an incoming interview with the director, Harry Woolf?

John Dawson: No.

Linda Arntzenius: Interesting. Did you have an incoming interview with anyone?

John Dawson: I don't recall, other than just this very brief discussion with Armand Borel. But no, there was no formal interview at all. There were three people that were in charge of the papers at that point. Borel, John Milnor,¹³ and Enrico Bombieri¹⁴ were the three that were sort of in charge, but I didn't really see them very much either. I would go to them if there was a problem or something I wanted to discuss.

Milnor didn't really take a very active part at all. I think he was on the committee, but he was more or less in the background. It was the other two that I primarily talked to.

¹⁰ Otto Neugebauer (1899-1990), Member in the School of Mathematics, 1945-1946, 1950-1966; Member in the School of Historical Studies, 1950-1990; Member in the School of Natural Sciences, 1966-1990.

¹¹ Piet Hut (1952-), Member in the School of Natural Sciences, 1981-1984;), Professor in the School of Natural Sciences, 1985-2002; Professor in the Program in Interdisciplinary Studies, 2002- .

¹² Helen Northrup. Contrary to Professor Dawson's statement here, she was not a Member at IAS.

¹³ John Willard Milnor (1931-), Member in the School of Mathematics, 1966; Professor, 1970-1990; Visitor, 1999, 2002.

¹⁴ Enrico Bombieri (1940-), Member in the School of Mathematics, 1974; Professor, 1977-2011; Emeritus Professor, 2011- .

Linda Arntzenius: And did they give you any guidelines or any advice, or did they just say, "There it is. Have at it."

John Dawson: They didn't specifically give me advice, although they did at the end of the first year, they actually called in Dana Scott from Carnegie Mellon, who is a very well known figure in logic, to come here and just sort of give them a report on what he thought of the work I'd been doing.

But yes, I don't think they really knew much about archival work either, and the Institute did not have an archivist as such at that time. I had no archival experience. But the way I tackled that, the Society of American Archivists has a series of little paperback pamphlets that basically describe the archival field and give you advice on various aspects of it. So I got a couple of those, and there was one in particular that was about the cataloguing process itself that I found very useful.

In particular, the critical thing about archival work is, unlike library work, you don't catalogue things by subject. The idea is that you try to preserve whatever order the creator of those papers had them, unless it's just totally chaotic, because that says something itself about the creator. Well, Gödel of course was extremely logical, but the papers had been jumbled in collecting them. So really, it was kind of sorting them and trying to restore what order I could figure out for them. I quickly realized that to put all the correspondence in one series didn't quite work because a lot of the inquiries, for example, were from amateurs or cranks or publishers.

So I divided the correspondence into personal and scientific correspondence, and the institutional correspondence. And that – because if someone had an institution, how do you file it? Do you file it by the person's name that's on the letter or the institution? Well, it makes a lot more sense to file it by the institution. So I did that, and I think that helped.

The only person I had personal acquaintance with before I came here who had been here as a Member in the School of Mathematics was a Penn State grad student who had gotten his degree in math from Penn State just a couple years before, and that was John Cowles.¹⁵ So he was here – must have been around 1980, I think. And so of course, I asked him, what was his experience like. But he was the only one, and he was here – well, it had to be before 1980, actually. My timing is off because Gödel was still here when he was here. And he actually had a letter of admission signed by Gödel. So it must have been before '78.

Linda Arntzenius: '78, yes. So in terms of working with people here at the institute, I'm wondering – I know in your acknowledgments, you mention Elliott Shore, Mark Darby, Ruth Evans. I think Momota Ganguli.

John Dawson: Yes.

¹⁵ John R. Cowles, Member in the School of Mathematics, 1975-1976.

- Linda Arntzenius:* So could you just tell me a little bit about their involvement with you?
- John Dawson:* Evans and Darby, I didn't really have a lot of contact with. I don't remember them very well. I certainly did with the two librarians, who were very helpful.
- Linda Arntzenius:* Right. Elliott.
- John Dawson:* I have to say, very helpful in the case of Elliott at first. Later after I left the Institute, in 1995, there was a very serious conflict between Elliott and the archivist at Princeton, Skemer, Don Skemer, and our Gödel project group that was editing Gödel's papers. We wanted to do a preservation microfilming of the papers, and we got money from the Alfred P. Sloan Foundation to do that only to have strong opposition from both Skemer and Shore. And I have a large file of very unpleasant correspondence about that in which my integrity was impugned, and I was supposedly being very proprietary about the papers and wanting to have them microfilmed. It was really incomprehensible to me what the basis of their objection was.
- Linda Arntzenius:* So you were suggesting that, the papers are by this time in Princeton University Library...
- John Dawson:* Right, and many of them have now been published.
- Linda Arntzenius:* And you're simply asking to be allowed to microfilm them?
- John Dawson:* To have a professional microfilming company come in and make a preservation microfilm of those papers because for one thing, they're in pencil, and pencil fades. So we had had some trouble making Xerox copies of things. In fact, the fellow that helped us with the shorthand, Landshoff, since he was a professional photographer, actually advised us on some filters to use to make it show up better.
- But we got this grant – well, first of all, we talked to the University and were rather surprised.
- Linda Arntzenius:* And when you say we, you mean –
- John Dawson:* Sol Feferman and myself. The whole group, a group of editors. Because by that point, we'd had full agreement with the Institute from the beginning to have access to these papers and to publish what we wanted to. And by 1995, the first three volumes of the five had appeared. The third one came out just that year, and that as a selection of the unpublished papers. So it seemed to us an obvious thing to do. We approached them and were surprised at the sort of hostility they had.
- They sort of grudgingly said, "If you can get funding," and at that time, we hadn't applied for it. And I rather got the impression that they thought it was very unlikely we'd get funding. Well –

Linda Arntzenius: You did.

John Dawson: Quite quickly, within a matter of a couple of months, we got funding from the Sloan Foundation and went back and told them, "Okay, we have it." And that's when the thing really came to a head. And it was with extreme reluctance that they finally agreed, even though they don't own the papers, even though the Institute owns the papers.

Linda Arntzenius: And you were not asking Elliott Shore or Don Skemer to actually physically do any work themselves.

John Dawson: No.

Linda Arntzenius: This would be done by someone, paid for by someone.

John Dawson: Right. Yes, it was done by a professional company in Bethlehem, Pennsylvania that does that – I mean that's their whole business.

Linda Arntzenius: Was there some inconvenience to them that may have –

John Dawson: Well, I suppose minor inconvenience just in hauling the boxes out for the microfilming. I don't know exactly where they did the microfilming, but I do know the microfilm company came to them. I don't think they sent the papers out.

Linda Arntzenius: So even to this day, you haven't rationalized this in your mind.

John Dawson: No, and it really severed the relationship between Elliott and myself. And Don Skemer I have real difficulty being in the same room with. I mean he is, I think, what an archivist should not be. He is one who guards papers, and they're his, and others shouldn't want to see them. At least that's the impression I get from him. Anyway, and I think also, it really is a pebble in Princeton's shoe that the Institute owns those papers. I should back up and say I'm the one who suggested that the Institute lend the papers to Princeton.

Because at the time, the Institute did not have an archive and didn't want one. And their arguments were sensible. They said, first of all, "Since we don't have the facilities, we'd have to build the facilities, and that would be an expense. And it would probably attract scholars in numbers that would detract from the peaceful atmosphere and disturb the serenity of other members," all of which I agree with. So, since they didn't have an archive, they asked me, "Do you have any suggestions?"

And I said well, there's two that I can think of. One would be the American Philosophical Society in Philadelphia. But I said Gödel spent his whole American career here in Princeton, and Princeton has a large manuscript archive, and it's very easily accessible from here. It would be simple to transfer the papers physically over there. So that seems the most obvious place. But I did advise them. I said, "I think, whoever you give them to, you should retain the rights because I think you know better how to do it."

Now I had not had any real experience with Ivy League institutions other than as an MIT student. You know, Harvard is up the road, and the types of people that go to tech and the types of people that go to Harvard are very different. And I think each has a little contempt for the other. But I certainly found that dealing with Princeton in general, they're very stiff and formal.

And I had a very interesting experience when we went to publish Gödel's papers. We sent out the proposal for bids to various publishers, which is not something you very often get a chance to do. But there were enough eager to have these papers that we did. And the responses we got were surprising, I think to all of us. First of all, Springer dropped out because they didn't want to include as many photographs as we wanted, and there's not more than half a dozen in any one of these volumes. I couldn't imagine a major publisher like Springer having a problem with black and white photographs.

Linda Arntzenius: So you think that was an excuse.

John Dawson: I don't know what it was. I will say most of their books don't have very many photos in them, but it never occurred to me that that would be a stumbling block. Anyway, so they dropped out. MIT Press was extremely apologetic. They had to admit that they weren't yet able to accept computerized text, and they knew this was embarrassing for them.

Linda Arntzenius: What an admission.

John Dawson: Yes. So they dropped out. In the end, there were two presses that gave us identical terms, Princeton and Oxford. So by this point, I was – through Sol Feferman, I was a visiting scholar at Stanford for three summers, and I was out there in the summer. And so Sol said, "Well, what should we pick?" I said, "Well, I've gotten a fairly negative impression of Princeton University Press from some other people I've talked to that have published with them."

I said, "I also know that when Gödel's monograph, that they published, came up for a copyright renewal, they basically deceptively got him to sign away his rights." It turns out one of the consultants to our group was actually a copyright lawyer, and he looked at that and said, "You know, this correspondence is actionable. If somebody wanted to take this to a court of law, they could get them."

But anyway, down the hall from me in this building [referring to IAS West Building], I was originally in this building and then moved the second year over to the computer building. But anyway, one of the – not right next to me, but just down the hall I guess was Bigelow.

Linda Arntzenius: Bigelow?

John Dawson: Bigelow.¹⁶

Linda Arntzenius: Julian.

John Dawson: Yes. Julian Bigelow. And so we'd had some conversations. And I knew he had published a book with Princeton. I didn't know exactly what his experience had been, but I knew he'd published with them. So Sol Feferman said, "Well, I'd like to get somebody's opinion who actually has published with them." And I said, "Well, one person would be Julian Bigelow." He said, "Well, would you be willing to call him?"

Yes, sure, you know. So we looked up his number, and I called him, told him what the situation was, that we were trying to choose between these two publishers, and we knew he had published with Princeton, so could he tell us what his opinion was. He said, "Well, frankly, I think they're a bunch of horses' asses." I said, "Thank you very much. I think that's all we need to know." I quoted those words exactly to Sol, and he said, "Okay, we'll go with Oxford," which is what we did.

Linda Arntzenius: And how was that experience?

John Dawson: Very good. Especially at first. There was a guy that was just wonderful to work with. Unfortunately, he was homesick for Britain, and after the first three volumes, he did in fact go back to Britain.

Linda Arntzenius: Who was that? Sorry.

John Dawson: Donald Degenhardt. And then there was a succession of very short-term people that we dealt with, and so it was less satisfactory because it just kept changing. And eventually, for the last two volumes, we actually signed with the British branch of Oxford rather than the New York branch. And just recently, in fact, this week that actually came up because they're about to put out a paperback edition of the last two volumes. It turns out the terms of the royalties weren't the same on the last two volumes as they were on the first three, and so they were asking us if they could adjust them to the lower rate for the last two because of the expense of those.

I'm sure we'll go along with it. It wasn't a serious issue, but just a complication from having two branches like that.

Linda Arntzenius: Yes, interesting. All right, well we actually jumped ahead to some of my – some of the people that I wanted to also ask you about.

John Dawson: Right.

Linda Arntzenius: You talked about Elliott Shore.

John Dawson: Right.

¹⁶ Later on in the interview, Professor Dawson realizes that he misremembered. The person he spoke with was not Bigelow but Herman Goldstine.

- Linda Arntzenius:* Mark Darby, Ruth Evans, Momota.
- John Dawson:* Momota was wonderful, by the way. She was always extremely helpful.
- Linda Arntzenius:* Yes, she still is.
- John Dawson:* I saw her pass through the tea room. I don't think she saw me today, but she is just a wonderful person.
- Linda Arntzenius:* She's a treasure.
- John Dawson:* She did one favor for me just right before I left. I had checked out a book from the library, and I noticed on the card that I signed that it had been signed by Gödel about four times, and also by a couple of other people. Clifford Spector,¹⁷ a very famous logician, and a couple of contemporary people, Sue Toledo,¹⁸ who is a logician, not too well known. But anyway –
- Linda Arntzenius:* What was the book?
- John Dawson:* It's a book in French by Ferdinand Gonseth, and it's the results of a seminar held in Zurich, Switzerland. Don't remember the exact title, but it's something like *Les entretiens...*¹⁹ Anyway, it's a French title. I said, "Would you mind making out a new library card for this so that I can have the old one just as a little souvenir of something that has Gödel's signature on it?"
- Linda Arntzenius:* A keepsake?
- John Dawson:* And she did. And I really appreciated that.
- Linda Arntzenius:* That's very nice. Yes, that's very nice.
- John Dawson:* And of course, I still have it and will continue to have it.
- Linda Arntzenius:* You mentioned playing the flute, and I understand you may have had some dealings with one of the historians, Glen Bowersock.²⁰ Did you organize a little musical soiree?
- John Dawson:* You know, I don't specifically remember his involvement, but we-my wife and I-gave a joint recital here in the building, and that was the first year. So that would have been in April, I think, 30 years ago. It's hard to believe it's been that long. But I can tell you what we played. Yes.

¹⁷ Clifford Spector (1931-1961), Member in the School of Mathematics, 1960-1961.

¹⁸ Sue Walker Toledo, Research Assistant in the School of Mathematics, 1972-1974.

¹⁹ *Les entretiens de Zurich sur les fondements et la méthode des sciences mathématiques, 6-9 décembre 1938.*

²⁰ Glen W. Bowersock (1936-), Visitor in the School of Historical Studies, 1975; Professor, 1980-2006; Emeritus Professor, 2006- .

- Linda Arntzenius:* Do tell.
- John Dawson:* We started off with Duo for two flutes and piano-written by Franz Doppler, a Hungarian writer or composer. Then she did the Poulenc sonata for flute and piano. I did the Prokofiev sonata for flute and piano, and then I did a couple of short movements from the Claude Bolling suite for flute and jazz piano. And it was fun.
- Linda Arntzenius:* Did you get a nice little audience?
- John Dawson:* Yes, we did.
- Linda Arntzenius:* Excellent. All right, I'm going to throw a couple other names at you. Mary Wisnovsky. Remember her?
- John Dawson:* Yes.
- Linda Arntzenius:* And Paul Schuchman. Shuckman?
- John Dawson:* For some reason, that doesn't ring a bell. It probably is somebody I had some passing work with at the time. The people, of course, that I worked directly with were the secretaries, Caroline Underwood, and also especially Dorothy Phares. [Dorothy Phares] was the secretary over in the mathematics building over there just where I was actually doing my work. There was no secretary in this building when I was doing it.
- Linda Arntzenius:* Did you – again, before we go on to more specifics about your work, I want to ask you if you observed any – well, what were relations like between the Faculty and the Director? I want to ask you about Harry Woolf as the Director.
- John Dawson:* I wasn't aware-of course-I really didn't have that much contact with the Institute Faculty, but it seemed a very cordial group as far as I could tell. I wasn't aware of frictions. I know of course there had been a lot of friction earlier when-I can't think of the name.
- Linda Arntzenius:* Kaysen?²¹
- John Dawson:* Yes, Kaysen. Right, when Kaysen was here, there were some serious problems. But no, it seemed everything seemed happy as far as I could tell.
- Linda Arntzenius:* What was your impression of Harry Woolf?
- John Dawson:* I liked him the few occasions I had contact with him. I remember one time he invited us to a soiree over at the house there [Olden House, the Director's residence], and of course, he was a historian of science as I knew, so we chatted some about that. He seemed quite interested in the project. Yes, I liked him very much. The only amusing thing I remember,

²¹ Carl Kaysen (1920-2010), IAS Director, 1966-1976.

there was a police report in the little Princeton newspaper about this conflict he got into with somebody about their dogs.

Linda Arntzenius: You were here then?

John Dawson: Yes.

Linda Arntzenius: It wasn't your dog, was it?

John Dawson: No, no, we never had any problems with our dog. But Harry's dog [was] in a conflict with somebody else's dog, and it actually appeared in the newspaper. The writeup was very amusing. I remember a paragraph saying something like, "Remember, these are academics, not pugilists."
[Laughing]

Linda Arntzenius: I have to look that up.

John Dawson: Oh, it was hilarious. But look in the *Princeton Packet*. I think you'll find it.

Linda Arntzenius: I will look at that. So okay, so now we're in the archives. I wonder if you could talk about some of the particular challenges of this work. You have talked about the shorthand.

John Dawson: Right.

Linda Arntzenius: I was thinking of the location, and I understand there was a leak one Christmas.

John Dawson: Yes, that was very late in the cataloguing. That was right at Christmastime the second year when cataloguing had been going very well. What happened was I had left for the Christmas vacation, and in an attempt to conserve some power, I had turned down the thermostat in the room because I knew I wasn't going to be in there. At the time I left, the temperature was in the 50s, as I recall. It was pretty warm for December. And after I left and went back to York, there was a sudden cold snap and it got really cold. I don't know whether it was subzero, but it was very cold. A pipe burst in the ceiling.

Now fortunately, I had the materials-almost all the materials were in a closet and up off the floor in boxes. So the only things that were damaged-some of my own notes got soaked, but there were only a handful of Gödel's papers. The only ones that got damaged at all were laying on my desk right on the surface of the desk. So it was really just a matter of carefully drying them out. I remember I did check with one preservation specialist. There were a couple pages that were stuck together, and I remember going to somebody at Princeton and saying, "Okay, these pages are wet, and they're stuck together. Do I separate them while they're wet, or do I dry them first?"

And the advice was: very carefully separate them while they're wet because once they dry, they'll be so stuck, you'll probably destroy –

Linda Arntzenius: You'd have to wet them again to get them apart.

John Dawson: Yes, so that's what I did and hung them up to dry. But that was actually a good thing that Gödel wrote in pencil because unlike pen, it won't smear. So we didn't really lose – it wrinkled the paper, but it didn't really affect the legibility.

And it was only a handful. I don't think it's more than half a dozen pages. So we were really lucky. They did some investigation and discovered it wasn't my fault for being energy conscious, but rather, the insulation had been improperly blown in under the pipes instead of above them. So they froze, and just broke, and yes.

Linda Arntzenius: Before I forget, you talked about the boxes. Some of them contained Gödel's books, some of them his papers and ephemera. What happened to the books and the ephemera?

John Dawson: The books we segregated from the other materials, and we basically had the Institute go through them to see any that they wanted to retain, and we also – my wife, in particular, went through them looking for annotations. So we segregated any that had significant annotations. Now a lot of times, Gödel would read a book, and his only annotation would simply be a vertical line in the margin, around a paragraph that he found interesting, but there would be no comments, either in longhand or shorthand. The vast majority are that way.

So there weren't too many of the books that they felt were worth retaining. There was one set of books that were somehow lost between the time that we catalogued them and when the archive was opened to scholars, and that's the books on Husserl. And there were annotations in those. Now fortunately, one of the scholars on our project had had those books on loan and had returned them, but in the meantime, he had photocopied all of the pages with annotation, so we didn't lose those. It's unclear what happened to those volumes. I really don't know. It was about the time that Elliott left to go to Bryn Mawr, but he was contacted about it – he didn't know what had happened to them.

Linda Arntzenius: They may turn up yet.

John Dawson: They may. They may. One really strange thing is that I know that before the papers ever came here, Adele Gödel donated some books directly to the Princeton Library.

Linda Arntzenius: Public library.

John Dawson: No, the University library. They are there, but to my utter amazement, Princeton did not keep acquisition records on them, accession records. I know they're there because I've seen Gödel's signature in them, but they don't have a record of which books she donated. So there could well be others just somewhere there in the stacks that I wasn't able to find.

- Linda Arntzenius:* That's a shame, but you presumably catalogued those books that were here.
- John Dawson:* Yes.
- Linda Arntzenius:* Because just to know what books he had is valuable.
- John Dawson:* My wife made a multi-page list. We have a bound copy of it at home, and I think there was one bound copy here of the books that were in Gödel's library. The offprints that other people sent him, again, we asked the Institute what they wanted to do with them, and their feeling, rightly so, is most of these have probably appeared in print by now anyway. They take – they're very bulky in offprint form, or pre-print form I should say. Not offprints, but pre-prints.
- And so except for ones that had annotations in them, they were discarded.
- Linda Arntzenius:* And ephemera, what sort of things were there, things that he had kept?
- John Dawson:* Ephemera, they're part of the regular stuff that is at Princeton. They're items that just defy more general cataloguing. Small groups of items, like Nazi broadsides that were distributed to University of Vienna faculty. Occasional cartoons. Just political cartoons, that sort of thing.
- Linda Arntzenius:* That he cut out of a newspaper or something?
- John Dawson:* Yes, exactly. It's a very small category, but it's just these sort of leftovers that have no particular relevance. Concert programs, a few concert programs for things he went to, and they just – it wouldn't make sense to make a separate series for each of those. So they just got thrown in the ephemera category.
- Linda Arntzenius:* Going to go to your book now. Now it was such a pleasure to read your book. I have to say I didn't read all of it. I did study logic, but baby logic, so –
- John Dawson:* It's very difficult to write that kind of a book, and as I said in the introduction, the question is audience. Who do you aim it at? I felt that I couldn't really write a popularization. There had been a number of attempts to write popularization, some more successful than others.
- Linda Arntzenius:* What do you think of Rebecca Goldstein's book?
- John Dawson:* I don't like it at all. I think – well, first of all, it's very derivative of things that have already been published, including my book. When I say derivative, I'm not accusing her of plagiarism, but I just don't think there's very much in there. And I think it's a little bit scandal mongering, this kind of thing. But there's also simply some mathematical mistakes in it, and I

think she really didn't understand that well what she was writing about. So yes, I don't have much –

Linda Arntzenius: I had to ask that. I kind of guessed.

In your preface, you had two goals. One was to make Gödel's work comprehensible to the non-specialist. And two, to reconcile his personality with his achievements. Now I understand the first, but why did you feel compelled toward the second?

John Dawson: Well, because the, what should we say, the popular misimpression of Gödel is that he was this crazy individual who although he did brilliant mathematical work was just really psycho – pathological. Now he certainly did have long, continuing mental problems. There's no doubt of that. But I think the popular image makes way too much of that. And what's fascinating about his personality is despite having that from even before he came to the United States from his early years in Vienna, he's able to do this absolutely meticulous, completely rational academic work at the same time that there's this undercurrent in his personal life of these fears and these maybe visions or whatever.

And so the question is how did he keep them separate? How did he avoid becoming like John Nash?²²

Linda Arntzenius: Well, that was a question that was at the back of my mind because Nash at some point – in a sense, it was Nash's mind that brought him back.

John Dawson: Yes.

Linda Arntzenius: It's an extraordinary story.

John Dawson: It's almost unique.

Linda Arntzenius: Do you know if they had any dealings with one another, conversations with one another?

John Dawson: Not that I'm aware of.

Linda Arntzenius: That would have been fascinating.

John Dawson: I think Nash was probably institutionalized.

Linda Arntzenius: Yes, he was.

John Dawson: Gödel himself was a private person. He had a very small circle of friends. I think really, Gödel's stability was, to the extent that he was stable, due to his wife. He definitely had a series of people that served as caretakers who shielded him from the outside world. His wife was a primary one, but also Einstein, and then later Morgenstern. Those were the three main

²² John Forbes Nash, Jr. (1928-2015), Member in the School of Mathematics, 1956-1957, 1961-1964.

ones that looked after him and shielded him and who could appreciate his brilliance and realized that he was in many ways very childlike and naïve, and he had these fears. So you know, they did what they could to allay those fears.

Linda Arntzenius: In one of his letters to his mother, and I may be wrong here in my reading of it, but you mention it. It's on Page 18. It's a letter to his mother about the school that he attended, and you quote him saying that he wouldn't be surprised if it [the school] had a disreputable history. And then he makes a remark about spun threads.

John Dawson: Yes. Right.

Linda Arntzenius: What do you think he meant by that?

John Dawson: Yes, he's talking about things that later in life turn out to be significant that at the time seemed utterly random or irrelevant. I would say certainly in my own life and my wife's life, some of the work we did with German that we studied, never really thinking we'd use it professionally, and in her case, she actually had experience at MIT. She worked as a proofreader in the summers to make money. And boy, both of us have done a tremendous amount of proofreading since then, and we never thought at the time it was anything more... In Gödel's life, I'm trying to remember the specific context in which I quoted that. I don't remember it offhand.

Linda Arntzenius: Shall I find it in the book?

John Dawson: Yes, that would be helpful.

Linda Arntzenius: It's Page 18.

John Dawson: I remember the quote specifically.

Linda Arntzenius: I found it very cryptic, and my question was to ask if there were any other places where you had come across something that was cryptic, and you didn't – you couldn't follow it. You couldn't follow on from it.

John Dawson: Well, there were--certainly, Gödel had a very unusual view of history, a very Spenglerian view of history. And so sometimes, for example, he would see something we would regard as just utterly coincidental as a meaningful causal connection. And so that of course would play into this, too. Yes. Well, so what he's referring to, yes, I had forgotten that Houston Stewart Chamberlain was this apologist for Hitler, actually. He's best known as that. I mean he was really – has a rather disreputable reputation.

But in his early years, he wrote this biography of Goethe and Goethe's color theory, which is very much at odds with modern color theory, and generally is ignored. He's regarded as a great writer, but not a physicist. And he did have some conflict with Newton. So Gödel had read this biography apparently as a youth, and he felt it led indirectly to his choice

of profession. So I think what he's saying is, you know, "Here is this random book that I read, never really thinking that it was more than just a curiosity." Here's this German writer, and he has this – and then, later on, I would become interested in technical things, and now it seems this minor thing that somehow led me there.

Linda Arntzenius: There's no significance in his remark about the school possibly being disreputable.

John Dawson: I don't think so. The Austrian school systems had gone through a lot of turmoil, you might say, before Gödel really got in them. It was the typical sort of old fashioned sort of emphasis on classical learning versus technical education. And just recently, actually, I was reading a history of the early years of MIT, and I didn't realize how strong that was. There was really strong opposition to the founding of MIT, and in particular, by Harvard, which actually tried to absorb it at one point when there was financial difficulties.

And the idea that William Barton Rogers had in founding MIT as a school that not only would focus on science, but would focus on hands-on experimental stuff, was considered extremely radical. It's just hard to imagine now that anybody would feel that way. And I think it was the same thing in the Austrian school system. I tried to summarize in that one chapter the complications of all the reforms that went through.

Linda Arntzenius: But nonetheless, I still want to ask the question were there times when you found cryptic remarks or something that just came to a dead end that you couldn't follow?

John Dawson: Oh, definitely. Yes, there were. Well, sometimes, it was just a matter of reading correctly something he'd written just in terms of handwriting. Now usually his handwriting is very clear, I think, and even his shorthand, according to my wife, because I don't read the shorthand, she does. He wrote very much by the book, which is an advantage if you're trying to read shorthand. But I remember for a long time, there was this envelope, and it had just one name on the front, and it looked like Z-I-L-S-E-L. And when you opened it up, the first page, it was a manuscript, mathematical, philosophical manuscript. And it said "Vortrag," which is lecture, "bei Zilsel."

Bei, the preposition, B-E-I, is like the French preposition C-H-E-Z, which usually means at the house of. So at first, I didn't pay enough attention to that preposition, and I thought that he was saying lecture at, but I thought it was a place name. And so I was looking at maps of Austria, trying to see is there a town called Zilsel. And I asked a couple of other people, native Germans or Austrians. They didn't know such a [place] and I kind of laid this aside for a while. I thought, "I don't know what this is." It was a shorthand manuscript, and we didn't have the time to do the decipherment of the actual text at that point. Later, much later, I was cataloguing something else that was in context, and I suddenly realized that this thing I had taken as a Z, a capital Z, was in fact a capital F. I'm

sorry, the other way around. It looked like an F. Filsel was what I was looking for as the town, and I couldn't find the town of Filsel. It turned out really to be a Z, and as soon as I saw it was a Z, I recognized the name because Edgar Zilsel was a member, if not of the Vienna Circle, at least he was a close associate of it. And he had very briefly his own little circle in his home.

And Gödel had been invited to give a talk. And suddenly, it fell into place. Okay. And then eventually, we found a little notebook, very tiny one, called protocol. And that is both a German word and an English word, but it's a false cognate. It doesn't mean the same thing. In German, it simply means minutes. Minutes of a meeting. And it happened to be the meeting, the organizational meeting of that circle when Gödel was invited to give this talk. So that gave the background for it.

Linda Arntzenius: Did he put dates on his –

John Dawson: Not usually, which can be a big problem. There was one, I remember, puzzling thing in one of his shorthand books, and we never really came up with an explanation for it. But in longhand English at the top of this page with all this shorthand, it says, "Bobtail cat." And the only guess we have at the time, he was on vacation up in Maine, and I think he must have looked out the window and seen a bobcat. That's the only thing I can think of. In fact, we still don't know whether he really meant a bobtailed cat, a –

Linda Arntzenius: A Maine Coon or a bobcat, or a cat with a bobbed tail.

John Dawson: Yes, and there is a curious thing. If it weren't in Maine, I would have an explanation for it because while he was here in Princeton, he became acquainted with George Brown and his wife. Brown's wife was the one who did the illustrations for von Neumann and Morgenstern's book on the theory of games. And they lived next door to one another at that time [the Gödels and the Browns]. And his wife [Adele] became friends, and since the Gödels were childless, she was interested in the Browns because they had a young child, and she spent quite a bit of time with them.

Anyway, apparently the Browns had this Manx cat. And Adele was very interested in this Manx cat. And she got the idea at one point of making a Manx cat by amputating the tail. So it could have been a reference to that, but it appears to be on a page that was written during his time in Maine, which wouldn't, one would think, wouldn't correspond to –

Linda Arntzenius: And there aren't cats in like that in Maine. I was thinking of Maine Coons, but they have tails, don't they? I'm not sure.

John Dawson: Yes, I think Manx cats are really strange looking things. In fact, I'm not sure I've ever actually seen one. From things that George Brown himself said in correspondence that I had with him, he said Manx cats, it's not just that their tail is missing, he said the rear end is actually structurally

different. It sort of slopes, and they apparently are very, very unusual cats.

Anyway, at first, we thought that might be the reference, but it just didn't seem to be – why on this page in the midst of all this stuff. So that's an example. And then I guess the biggest most serious scientific puzzle are these voluminous notes he has in attempting to prove the independence of the Axiom of Choice and the Continuum Hypothesis, which is what Cohen²³ eventually did.

Well, Gödel acknowledged that he had tried to do that in the '40s and had eventually given up, and he said that he just had some partial results, and that he couldn't really reconstruct them from his notes without a lot of difficulty. Well, our editorial group knew, of course, that set theorists are very, very interested to find out what he did. And so we photocopied those pages. My wife did transcribe the shorthand so that the comments were now understandable. And we sent it around to a number of very prestigious set theorists, and really, none of them could figure out exactly what he was doing. There were several possibilities, but none of them could be definitively pinned down.

Linda Arntzenius: Who did you send it to?

John Dawson: We sent it to Tony Martin, for one, Bob Solovay,²⁴ who was on our committee. Those were two of the most prominent. I'm trying to think of who else they might have sent it to. And just nobody really was able to make much headway with it. So since Gödel himself said he would have difficulty, we finally – you know, if anybody ever does figure out what it's all about, I think it will be very interesting to find out what he did.

Linda Arntzenius: I'm wondering about his early interest in women – did that surprise you?

John Dawson: Well, since I never actually met him as a person, yes, I guess it did, because he was such a loner in most other respects that it did seem surprising.

Linda Arntzenius: And clearly, his brother did not share that passion.

John Dawson: Right, yes. I met his brother and interviewed him in Vienna. Well, actually, I'm sorry, not in Vienna. I'm trying to remember how that worked. No, that's right, we did interview him in Vienna before we actually took a train up to Brno. I wanted to see the Gödel house. So we did interview him, yes, actually, it wasn't right in Vienna, but in a suburb. But then we went up to Brno the day after that. He was a very genial person. Fortunately, spoke good English so we didn't have to struggle through my German or my wife's German.

²³ Paul J. Cohen (1934-2007), Member in the School of Mathematics, 1973-1974.

²⁴ Robert M. Solovay (1938-), Member in the School of Mathematics, 1964-1965,1972.

Yes, seemed like an interesting person. But apparently, a lifelong bachelor that never really had any interest, and I don't think he was gay or anything like that. He just –

Linda Arntzenius: Was a bachelor.

John Dawson: Exactly.

Linda Arntzenius: It surprised me.

John Dawson: Yes.

Linda Arntzenius: Perhaps he shared that with von Neumann. I was going to ask if there was anything in his papers that indicated that, like von Neumann, he enjoyed risqué jokes. Because apparently, von Neumann –

John Dawson: Yes, oh, von Neumann was famous for it. I've seen nothing at all of that sort of thing in any of the materials that I've looked at. Now there's one notebook that we never really transcribed, and I don't think other scholars have paid much attention to it. Conceivably it might have something like that. It's labeled "allgemeine Bildung," which literally means general formation, but formation in German really means your cultural development, and so sort of your cultural upbringing or whatever. It seems to be basically just notes he made on current events as though he were reading newspapers and copying down things.

So who knows what's in there. I mean there might be jokes and stuff in there as well as news events.

Linda Arntzenius: But he didn't seem to like comedy. He liked watching films, but not comedy films.

John Dawson: Right, in fact, his tastes were really pretty mundane, I would say. He liked, well, "O Mein Papa" he mentioned as one of his favorite songs, and his wife bought this pink flamingo and then painted it to look like a stork. He thought this was just lovely. So he liked that kind of popular music. They did, interestingly enough, go to the opera in New York, and that seemed actually out of character. Certainly, I don't think –

Linda Arntzenius: But which opera? Italian opera?

John Dawson: I assume Italian opera, although I'm not really sure. Certainly, his comments about a lot of the German composers were quite negative. He didn't like Bach. He didn't like Handel. And he didn't like –

Linda Arntzenius: What about Mozart? Some of that is very –

John Dawson: I don't think he mentioned Mozart, but I got the impression that most classical music except opera he didn't appreciate. I guess maybe that's not so unusual. I'm kind of the other way. I have a very strong interest in classical music, but I'm not much of an opera fan. So –

- Linda Arntzenius:* I think that's very unusual that he didn't like music. I mean I always think of mathematicians as somehow being really interested in music.
- John Dawson:* And well, he even said, you know, referring to Einstein's memorial service that he had trouble sitting through all this classical music, and I thought, "Boy, that's pretty strong, negative reaction."
- Linda Arntzenius:* I want to ask you about Adele because I've always been fascinated and rather saddened about her. In your book, you describe Gödel as a man-child, and I thought that was especially interesting when you consider his wife called him – and I don't know the German, [*speaking German*] or something, but it's strapping lad.
- John Dawson:* Yes, that's right. Yes.
- Linda Arntzenius:* You show sympathy for her. I don't think she had an easy time away from all her friends.
- John Dawson:* I know she didn't.
- Linda Arntzenius:* I want to ask did she have any friends at all among the Princeton, Institute faculty wives?
- John Dawson:* I don't think many. I think there were some that tolerated her, and I mean I don't think they exactly liked her, but they understood her situation and her background, one of which is Louise Morse, who I think appreciated Adele for what she was and realized that she was very important to him. Louise strikes me as a very sympathetic person, a very compassionate person. And I remember after I wrote the book, I sent a copy to her, and she read it and said she thought I had been very kind to Adele. And the other one is Dorothy Morgenstern Thomas, who I also interviewed here.
- Dorothy actually is, I think, a little more sympathetic because I think she's a little closer to Adele in personality. She was not a stuffy academic at all. And I think she had an appreciation for the more down to earth types of things. So I think she was able to – you know, I mean she's certainly more refined than apparently Adele was, but still, I think she wasn't harshly critical.
- And Elizabeth Glinka, who was the woman here in Princeton who served as a nurse for a while for Adele, I had a lengthy interview with her, and she certainly was very kind in what she said about Adele. So I don't know how long that association was, but she was eager to talk about her and seemed to be sympathetic to her. So yes, I think she had a few friends, but certainly not a large number. And the Browns. In the comments that he made about them when they were neighbors, it sounded like they thought the Gödel's were pretty unusual, especially keeping the windows open all year round, and bundling up in all his coats and stuff like that.

He was obviously pretty strange in a lot of ways. But I don't recall him [George Brown] – the only thing he said about it, he said, "Well, in some ways, she was a little strange, too," and he mentioned the cat incident. But other than that, he didn't seem to think that she was in any sense crazy, like he was...

Linda Arntzenius: Freeman Dyson,²⁵ I think, mentions visiting them. Was it Freeman? For tea. And it was like Viennese cakes, you know.

John Dawson: It's interesting. I just read in this historical novel, I just read a chapter in which they – the Gödels are entertaining a group consisting of Einstein and Pauli, and originally, I thought they were going to include Bertrand Russell, but apparently, Einstein and Pauli²⁶ met Russell at the train station, but Russell didn't accompany to the party. So it's just those two plus the Gödels. I'm unsure how much of that is fiction and how much is for real. I don't recall a specific thing about such a meeting, but there might be a reference to it that I've forgotten, some of the letters.

Certainly, Gödel did know Pauli, and what she says in there is really interesting to me. First of all, she mentions that Pauli was homely, and indeed, I'd never seen a picture of him until just the other day. I looked him up, and he was.

Linda Arntzenius: There's a bust²⁷ – there's a head of him.

John Dawson: Oh, is there? I didn't realize that. And anyway, she invents some dialogue between them to give an idea of Pauli's personality, and she mentions one fact that I haven't been able to track down, but I think she's probably right. His wife [Pauli's] was also a dancer. That I would like to find out more about.

Linda Arntzenius: Was she a ballet dancer, or –

John Dawson: I don't know. I went online to try to find out more about that woman, and although there were various little biographic sketches, none of them mention that. But there was a photograph, presumably of her, that appeared to be in costume and doing some sort of dance. So that would be an interesting connection between the two.

Linda Arntzenius: It seems that – in the book, your book, it seems that Kurt Gödel and his wife were always moving.

John Dawson: Yes.

²⁵ Freeman J. Dyson (1923-), Member in the Schools of Mathematics and Natural Sciences, 1948-1950; Professor in the School of Natural Sciences, 1953-1994; Emeritus Professor, 1994- .

²⁶ Wolfgang Pauli (1900-1958), Member in the Schools of Mathematics and Natural Sciences, 1935-1936, 1940-1946, 1949-1950, 1954, 1956.

²⁷ Wolfgang Pauli bust by Charles Otto Baenninger, 1962. Fuld Hall Common Room.

- Linda Arntzenius:* And I wondered if that was due to his illness, or whether it was her not getting along with the neighbors.
- John Dawson:* I think it was more his illness. In particular, his feeling that this bad air – the odd thing is he didn't seem to think that the outside air was bad. He seemed to be afraid of what we'd now call sick building syndrome. And there was a problem at the Institute because he thought the radiators were giving off stuff. There's actually comments in the Institute archives about these complaints that he was making about the radiators. So yes, I think that was the main cause of the moves, and then eventually, she persuaded him to buy a house. Once they were there, that was apparently fine.
- Linda Arntzenius:* He did seem to calm down. Yes. It seems – I mean it seems to me that she kept him alive.
- John Dawson:* Absolutely. Absolutely. I think she's the heroine of the piece, and that's what I wanted to bring out. I don't know how many people saw that except this French writer²⁸, and she very much saw that. The thing I like about her novel is that it is very much based on historical fact, and I think the dialogue she has invented and the characters she wrote just help to really convey and make Adele in particular, but also Kurt, more human, you know. There's really nothing in the historical record that we can do to make him more human because there just are no diaries. There's nothing about his personal life in the Nachlass.
- Linda Arntzenius:* He didn't draw. He didn't paint.
- John Dawson:* No. No. The only drawings are mechanical drawings in some of his geometry notebooks, which are very, very meticulously done, but they're not – I've never seen an example of any freehand drawing of anything by him.
- Linda Arntzenius:* I'd love to know what happened to all the dresses that Adele sewed and sent to children during the Second World War.
- John Dawson:* Yes.
- Linda Arntzenius:* I mean that's quite an achievement.
- John Dawson:* And what happened to the chandeliers in the house?
- Linda Arntzenius:* Yes, all of that material. I suppose it went to the woman to whom Adele left everything, Glinka.
- John Dawson:* I guess. That's a curious one. I mean I've been in the house a couple of years ago, and there's certainly nothing in the way of fancy chandeliers that I saw.

²⁸ Yannick Grannec, the title of whose novel about Kurt and Adele Gödel, *La déesse des petites victoires*, translates as *The Goddess of Little Victories*.

Linda Arntzenius: I presume that not every bit of your research found its way into the book.

John Dawson: Oh, definitely not.

Linda Arntzenius: And I wondered if you could share some of the items that were left out and why.

John Dawson: Oh, well it's really hard to think of particular ones. I think when you're writing something like that, you make lots of notes, and then you start winnowing. And so there were a lot of details, for example, in the last chapter where I'm talking about his decline, I originally included quite a bit more from Morgenstern's diaries and finally realized that it was depressing enough just what I already –

Linda Arntzenius: In what you had, that last piece, it's so moving. So sad.

John Dawson: Really poignant. I realized that that was enough, and that any more would actually maybe be less effective. So that's one thing that I had put in and then left out. I didn't put in anything about Gödel's apparent belief in ghosts for two reasons. One, I think the scandalmongers have made way more of that than is really appropriate. And secondly, I didn't really have any specific examples of that. It's all second hand. I'm not aware of anything in Gödel's own writings that testify to that. I don't doubt that he may have talked about such things with other people.

I don't doubt these other accounts, but I couldn't see that bringing that in would really be anything more than sort of scandalmongering.

Linda Arntzenius: And if it wasn't in the papers, if there weren't ...

John Dawson: Yes, exactly. I didn't want to be responsible for perpetuating these things when I couldn't pin them down. I did mention it in my interview with Dorothy Morgenstern Thomas, and she said, "Oh, well so do I." And she was serious. She did believe in ghosts. I was sort of taken aback.

Linda Arntzenius: Is there anything in his papers about religion? He has the ontological argument. But that's philosophical.

John Dawson: Yes. No, there's a lot about religion and what I would call comparative religion. He had many books in his library from just all sorts of religions. I mean everything from Islam to Mormonism to various things that just looked like a general interest in sects that had developed. And in his correspondence with his mother, there were these brief references to his own religious views, most of which were published in his collected works.

He was a believer. One of the ones I did quote was his comment that religion is good, but religions are bad. And he didn't like organized religion and the factionalism—you know, all the different sects fighting among themselves. But he did feel that religion itself was important, and he believed in an afterlife, in rather, what shall I say, sort of an intellectual's

paradise, or at least he thought it was a paradise. To me, it could be an intellectual hell.

The idea was that in the next world, we're going to know everything. We're going to see all the connections between everything. Everything will be crystal clear.

Linda Arntzenius: Well, that's his idea of paradise.

John Dawson: Right, that's his idea of paradise. It seems to me that if all the questions are answered, that's really not an intellectual's paradise because it's the thrill of discovering these things. So yes. Those are some examples. Originally in the book, I also had some more extensive quotes of Morgenstern's opinion of Adele that were a little stronger than what I put in there, and she [Dorothy Morgenstern Thomas] specifically asked me to leave those out.

She said, "I think my husband wrote those when he was agitated. I don't think he really felt that strongly."

Linda Arntzenius: But what you did put in was certainly strong enough.

John Dawson: Yes, exactly.

Linda Arntzenius: I mean a "Viennese washer woman type, garrulous, uncultured, and strong willed."

John Dawson: Exactly. He actually said a little more than that, and I did cut that out. But clearly, she didn't fit in with Princeton. She enjoyed a good time. She liked to dance, obviously. She liked her alcohol, I think. There were some reports – again, I had heard this just by word of mouth, basically, by one guy in Austria who I know is a scandalmonger. He just relishes that sort of thing. And he claimed that he had talked to Glinka, and also Louise Frederick was the other one he talked to. I think she was his main source. And that she [Louise Frederick] had said that there was some real rows, that Adele would get drunk and would shout at Kurt and this sort of thing. I did not put that in because I only have one person that has made that claim, and I don't really trust his views. So was it true? It might have been. I think she probably did occasionally get a little too drunk, but you know, I wasn't going to make much of it.

Linda Arntzenius: No, I feel a great deal of sympathy for her coming from Vienna to a very small town thousands of miles away from her family.

John Dawson: Absolutely. Yes, and I think the novel really brings that out, you know, her angst at the separation. There's no news because of the censorship and the war going on. She has no idea what's happening. They come over here with very little, just a trunk full of stuff. They've left a lot, and she's come into a high society type town, at least intellectually, and people like von Neumann, that are not only brilliant, but has this wonderful house and throws these parties.

Linda Arntzenius: Yes. Did they participate at all in those?

John Dawson: I think that they probably did in some of them. I don't have very much definite evidence. Again, if she kept records of that sort of thing, they weren't contributed. And of course, one of the things we do know is she apparently burned his mother's letters to him, because of his mother's opinion of her. It was not a happy mother-in-law/daughter-in-law relationship at all. Although the mother-in-law did come several times and visited them here at Princeton and stayed with them, so they were able to get along for short periods anyway. But yes, unfortunately, what's missing from the biography because it just isn't there in documentation is the personal life. There's very, very little except the letters to his mother, and even those don't really say that much.

Linda Arntzenius: Yes, it would have been better to have hers to him.

John Dawson: Yes, oh yes.

Linda Arntzenius: Absolutely. Well, that's why we have novelists.

John Dawson: Yes, I think it serves an important purpose, and I think this is exactly the situation where you need a novelist to fill in what you can't get from the [historic record].

Linda Arntzenius: Well, here is a question I have to ask you, and it's about the famous incident recorded by Morgenstern of Gödel announcing that he'd discovered a contradiction in the U.S. Constitution.

John Dawson: Yes.

Linda Arntzenius: I wondered if you had, in his papers, had you come across any reference to this.

John Dawson: Well, there have been a surprising number of legal scholars who have written to me afterwards asking that very question. There is one notebook called American Constitution and Government. And it's in shorthand, but because of the interest, my wife did transcribe that into standard German, and to the extent that we've waded through it, it appears to be just the sort of thing that anybody studying for a citizenship exam would write down.

It's just a lot of details about the U.S. Constitution and how officials are elected, and the order of succession, and all this stuff. Nothing at all about flaws. I once gave a talk up in Canada. This was during the Bush administration. And I said, you know, I told the story, and then I said, "These days, I don't see how anybody could doubt that the constitution can be twisted to do whatever you want," and it got quite a laugh from the Canadian audience.

But yes, as far as anything specific that he thought was a loophole, I don't.

Linda Arntzenius: Have you any idea what it might be?

John Dawson: No, I really don't.

Linda Arntzenius: So Morgenstern's wife wasn't able to fill you in?

John Dawson: No. Well, of course, she wasn't along. We also don't know, other than what he said to the judge. What he said to Einstein and Morgenstern was probably in German. And Dorothy Morgenstern Thomas does not know German or did not. In fact, I didn't know that at the time I interviewed her. I just sort of assumed that she did. Then I went down to these notebooks that she had donated, or the diaries, really, that she had donated, her husband's diaries. I went down to Duke, and that was very late that I had discovered those. First of all, they simply weren't available earlier, but when they did become available, I'd had these interviews with her. I thought, "Well, I don't know how much there is going to be in his papers, because I've already talked to her."

I thought there's not likely to be much. And I contacted the archivist. It turned out by sheer luck there was a meeting of the Association for Symbolic Logic at Duke. I think it's the only one they've ever had there. Anyway, it was right after this had opened. So I thought, "Well, I'm going to go down there, and while I'm there, I'm going to look at those." I contacted the archivist, and he said, "Well, there is a slim folder on Gödel, but you might also want to look in Morgenstern's diary. I think there might be something there."

So I went down, and the slim folder was exactly what I expected. Not much. You know, didn't really add anything. So then I said, "Okay, well can you show me the diary?" And they said, "Which volume?" I said, "How many volumes are there?" "Well, there's 60 years worth." I said, "Here's the dates they would have known each other, so bring me an initial few." And then I realized what a goldmine they were. So I actually went back later and spent an entire week just photocopying things and searching for the references to Gödel. And it was then that I began to realize that she must not read German.

She later confirmed that. Because Morgenstern was a very eligible bachelor for a while, he didn't marry until – I think he might even have been in his 40s, he was pretty well alone. And then, apparently, here comes Dorothy, and she sweeps him off his feet. And he's very candid about this in his diary, and in particular, he talks about how good she is in bed.

Linda Arntzenius: Oh golly gosh. So you know she didn't read it.

John Dawson: So I figured okay, she doesn't read German. It was the last thing I expected to find. I went on, and I didn't have time to really savor all that,

but I looked for the references to Gödel, and I just thought, “Huh, there’s obviously stuff here that she didn’t know.”

Linda Arntzenius: Did you get to read everything on Gödel in the Morgenstern diaries?

John Dawson: I think so. Yes. It was scattered, of course, and there was quite a bit of it. But fortunately, Morgenstern’s handwriting was pretty easy to read. I didn’t have a problem with that. So I could skim it and look for the names. And Gödel’s name was pretty easy with a little bit of practice to pick out in looking. The curious thing about his diaries is they’re always in German when he’s here, but they’re in English when he’s over in Austria.

I’ve asked several people, “What do you make of this?” There have been two explanations, and I don’t know which one is right. One is maybe he was just staying in practice in whatever language he wasn’t speaking, which if he was in Germany for a long time might make some sense, although I find it hard to believe he’d forget his English that much, and even if he was just there for a few months. The other explanation was maybe he was simply trying to conceal stuff from like maids or hotel staff because any German intellectuals would read English. So I don’t know. I’ve never really come to an explanation. It’s just a curious-

Linda Arntzenius: Quirk.

John Dawson: Quirk. Yes.

Linda Arntzenius: Interesting. Did you find it frustrating that there were so few people that knew Gödel that you could actually interview?

John Dawson: Well, not so much frustrating as a race against time to interview the few that were left, and indeed, within just a couple years, many of the sources did die. In fact, there’s very few that are left now, of course. Freeman Dyson is one of the few that’s still around, but Deane Montgomery²⁹ was one that I talked to, and he died not that long after I left the institute. Of course, now a lot of others are gone. I think Dorothy Morgenstern Thomas is deceased by now. I’m not positive, but I think so. I know Elizabeth Glinka is. Frederick, I don’t know about.

Linda Arntzenius: Who was she again?

John Dawson: She was a neighbor of the Gödels when they were on Linden Lane in their house. And the only interview I had with her was a telephone conversation. So it wasn’t all that long. I never met her personally.

Linda Arntzenius: Tell me, did you interview Herman Goldstine?³⁰

²⁹ Deane Montgomery (1909-1992), Member in the School of Mathematics, 1934-1935, 1941-1942, 1945-1946, 1948-1951; Professor, 1951-1980; Emeritus Professor, 1980-1992.

³⁰ Herman Goldstine (1913-2004), Electronic Computer Project staff, 1946-1956; Member in the Schools of Mathematics and Natural Sciences, 1951-1958; Member in the School of Natural Sciences, 1972-1985; Member in the School of Historical Studies, 1977-1985.

- John Dawson:* I talked to him some. Actually, you know, I made a mistake in what I said earlier. It was Goldstine rather than Bigelow.
- Linda Arntzenius:* Bigelow that was in this building [IAS West Building]?
- John Dawson:* Yes. And they published his book³¹. I'm sorry, it was Goldstine and not Bigelow.
- Linda Arntzenius:* It was Goldstine, yes, that makes sense.
- John Dawson:* They were both involved with the computer project, and that's why I confused the two.
- Linda Arntzenius:* So it was Goldstine who said horses' asses.
- John Dawson:* Yes, and that should be corrected there. Yes, that was a mistake on my part. That was Goldstine. So I did talk to him, yes.
- Linda Arntzenius:* Did you interview him about Gödel?
- John Dawson:* I don't recall doing so, no. I don't remember that he really had that much to say about him, and that I didn't interview him because I didn't think he likely had too much to say.
- Linda Arntzenius:* What about Julian Bigelow? Did you interview him?
- John Dawson:* No, I did not, and in fact, I don't think he was actually here at the time.
- Linda Arntzenius:* Now when you went to the ECP building, wouldn't he have been around there?
- John Dawson:* If so, I never met him. I have the impression that he was away somewhere those years, but I don't remember for sure.
- Linda Arntzenius:* Why do you think that Gödel was not involved with the Electronic Computer Project?
- John Dawson:* That's a very good question. He certainly made some comments about the future, and he thought that electronic computation would be very important and would change the nature of mathematics, give you experimental opportunities, for example. But he doesn't seem to have had any hands-on type interests in things. I mean I don't think he would have had any interest in actually building the computer.
- I don't know whether he had any electrical engineering background. The Institute's history, of course, with the computer is strange because you have von Neumann, one of the real pioneers certainly of the theoretical construction of the computer, but then you also had engineers like

³¹ *The Computer from Pascal to von Neumann*. Princeton University Press.

Bigelow who physically built the thing. I don't know how much of that work might have been classified. You might know more about that than I do.

Linda Arntzenius: It was von Neumann who brought those engineers in for that purpose. But I was wondering –

John Dawson: Clearly, they had military connections with that, and I wonder how much of that –

Linda Arntzenius: Well, the unusual thing was von Neumann wanted to spread the word out and published a lot of papers that went out, even while the machine was still being built.

John Dawson: Yes.

Linda Arntzenius: But I wondered why von Neumann – what his relationship was with Gödel. It seems to me that there would have been a lot – there would have been value for von Neumann to talk about these things with Gödel.

John Dawson: Right. I think there certainly would have, and we have that one famous letter that Gödel wrote to von Neumann in von Neumann's last year of life that turns out to anticipate the so-called P equals NP question.

Linda Arntzenius: Yes.

John Dawson: That document was in the Library of Congress and was misfiled, so it was actually found by some random person and brought to our attention later. Because I had been down there and thought I'd scoured the von Neumann correspondence, I was really surprised to learn about this. I went down later to see how I could have overlooked it, and I searched and searched and finally found it just misfiled. I actually went to the archivist there and said, "Do you mind if I put this in a different folder? Because I don't think anybody is going to find this." And they didn't argue a bit.

Linda Arntzenius: I mean did it strike you as odd? Maybe it's just me, but did it strike you as odd that here was Gödel, and here was this project? Didn't somebody think to clue him in and ask for his advice? I know they were building something, but nonetheless.

John Dawson: I do think the issue of classified work may play into it because von Neumann was very heavily involved with the government as an advisor to the Manhattan Project and to other things.

Linda Arntzenius: Yes, but this was later.

John Dawson: This is a little later, but you've still got the McCarthy era. I've forgotten exactly the dates on the Institute machine.

Linda Arntzenius: Yes, it's '47 to '57.

John Dawson: But I think one of Von Neumann's computer reports was available only as a pre-print for quite a while, and I think its distribution might have been restricted. Not so much because of the atomic bomb work, although there was a lot of ballistics work that was done with that computer, I think. I'm pretty sure Goldstine was involved with that. But also, cryptographic work, because if you know Turing's story, he was the other real pioneer.

Linda Arntzenius: It's a shame they never met.

John Dawson: Yes. And of course, Turing was heavily involved with Bletchley Park. So I don't know. Gödel might not have been considered trustworthy, just as Einstein wasn't. Remember that Einstein was not invited to take part in the Los Alamos stuff because he was a pacifist. Gödel's views--I don't know whether that really had anything to do with it or not--he and von Neumann were good friends, and I think they might have discussed such things, but I get the impression they discussed Gödel's work more than von Neumann's work when they were together, and von Neumann wasn't actually here at the Institute that much because he was in Washington or Los Alamos or whatever.

Linda Arntzenius: Yes. I was interested in--you mention very early on when, oh, I've got it written down here--when there's a conference in Königsberg.

John Dawson: Yes, right. And von Neumann comes up after the conference and pumps Gödel for information.

Linda Arntzenius: And then writes to him and says, "I'm writing this paper," I thought, "Wait a minute here." There have been some comments about von Neumann and the ECP doing similar sorts of things. So I wondered if there was a rivalry?

John Dawson: I think what happened, von Neumann is--was--one of the quickest minds in history. Everybody says that. So Gödel gave this talk, and later, he told Hao Wang³² – and Wang has recorded this in his books, that in this conversation that von Neumann had with Gödel, von Neumann said, "Well, this undecidable sentence that you have, is it a sentence just in the language of ordinary arithmetic?" And Gödel said, "No," and was apparently dubious that you could code it in such a way that it would become a statement of ordinary arithmetic.

Then not long after that, Gödel goes back and thinks about it, and suddenly realizes that he can use this theorem called the Chinese Remainder Theorem, which is an ancient theorem. That's why it's called that because it was discovered in ancient China. And he knows enough number theory that he realizes this is exactly the tool he needs, and in fact, the coding is not hard if you know that theorem.

And so there is a section at the end of his incompleteness paper where he does render this thing in an arithmetic form. And I'm kind of interested

³² Hao Wang (1921-1995), Visitor in the School of Mathematics, 1972, 1975-1976.

in that, actually, right now because I'm writing a paper for this conference in France, and the title of the paper is, "What have we learned from Gödel's Nachlass and what may we expect to learn from it?"

This group in France, what they're doing is looking at some of the philosophical notebooks. They're putting them into standard German, getting it out of the shorthand, and there's a bunch of philosophers that are interested in studying that. So I wanted to mention some of the things that are still there to be explored, and one of them is this thing that Wang brings up because there are a couple of shorthand notebooks that say, "unentscheid." That's his abbreviation, that means undecidable, "unentscheid unrein" and unrein means impure, that is, a rough draft. Because a reinschrift would be your final copy, the pure copy.

I've never looked at them. They are in shorthand, and presumably if you looked at those and compared them with the published paper, you might be able to see some differences and verify what Wang has reported. It depends. Again, they're not dated, so it depends how early on he wrote this stuff down. But it is kind of puzzling that that's all we have in the way of preliminary drafts, and then the incompleteness paper just seems to – there it is. You know? There doesn't seem to be any intermediate sort of steps, and one wonders does stuff get lost, did he – was he like Mozart that just writes this stuff out? It's really hard to know.

Now there's a couple things that are not in the papers at Princeton. Some of them are in the Director's office.

Linda Arntzenius: Here?

John Dawson: Here. For example, his shorthand textbook ended up in the Director's office along with his Medal of Science and that sort of thing. But there's also in the Rosenwald Rare Book Room a bound galley proof of the incompleteness paper with Gödel's handwritten annotations. And I have looked at that, and those are primarily just routine corrections. They don't seem to say anything about the real genesis of the paper.

One of the things we did certainly get out of the Nachlass that's not available anywhere else, are some of these occasional letters that he wrote, but in many cases didn't actually ever send to the inquirer. People would write and ask him, "How did you come onto your incompleteness theorem?" and he actually in about half a dozen cases wrote out a little bit about how he came onto this. But in most of those cases, he didn't end up actually sending these replies to the people, and one has the feeling he felt sort of the urge to write this down somewhere, but then had second thoughts about actually [doing so].

Linda Arntzenius: Because then they might write back to him, and then...

John Dawson: Yes, and many of these are just absolutely unheard-of figures. I mean one of them was a math education major at a small college in Illinois.

Linda Arntzenius: Someone who's curious.

John Dawson: Yes, exactly. So those I came on by accident just in the course of cataloguing--so that was certainly valuable. And the other thing that's attracted a great deal of scholarly attention is his correspondence with the French logician Jacques Herbrand. It's a very brief correspondence. There's only I think three letters.

Herbrand is a very tragic figure because he was killed in a mountain climbing accident just very shortly after that. In fact, Gödel's last letter to him, Herbrand never saw. And we actually know what happened. There were some climbing companions that were witnesses to it. He was apparently belaying another climber. I don't know much about climbing, but I know what belaying means. It means you're supporting them. Apparently, the other climber fell, and although the other climber was not killed in the fall, Herbrand didn't have his position properly braced, and it threw him off, and he fell to his death. A pretty awful thing.

Linda Arntzenius: Yes.

I do have quite a few more questions. Is that okay?

John Dawson: That's all right. Actually, I'm not in a hurry at all because I'm going to be driving up to Edison as it turns out to stay overnight, and I want to avoid Route 1 until all this traffic calms down.

Linda Arntzenius: That's great. I do have quite a few more questions. I figured you were here and I have to ask. Now you talk about Gödel's health quite a bit, and his position at the Institute went from year-to-year-to-year.

John Dawson: Yes, for many, many years. Right.

Linda Arntzenius: Do you think that contributed to his ill health?

John Dawson: No. I think the ill health was largely the cause of that. I think it was the other way, that there were serious concerns about just how severe this mental illness was, especially his concern about the food and air and so on. And also the other reason he wasn't appointed was his fastidiousness to the point of causing Institute business to just come to a halt because he couldn't make decisions. You know, we have that from various people, including Armand Borel, who said that he had witnessed Gödel at some of the meetings.

So I think those are the two primary things, and also apparently there was specific opposition from a couple people. Hermann Weyl,³³ for one, and Carl Ludwig Siegel³⁴ for another. I have no idea what the basis of that was, whether it was just a purely personal thing. Siegel and Weyl were

³³ Hermann Weyl (1885-1955), Professor in the School of Mathematics, 1933-1951; Emeritus Professor, 1951-1955.

³⁴ Carl Ludwig Siegel (1896-1981), Member in the School of Mathematics, 1935, 1940-1945, 1960; Professor, 1945-1951.

both, of course, Germans. It might have been a cultural thing. I really have no idea about that.

Linda Arntzenius: What do you make of Gödel's claims about Leibniz and...

John Dawson: Leibniz?

Linda Arntzenius: And set theory. I wondered if there was a future project there?

John Dawson: Well, it seems completely preposterous to me that Leibniz could have had anything in mind like what we now think of as set theory.

Linda Arntzenius: I don't know if you read Kant. Everything is in Kant.

John Dawson: *[Laughing]* And of course, Gödel had something to say about Kant, too, and this conference coming up, will have a lot of interest in that, strong interest in his views on Leibniz and on Kant. So it'll be interesting what I hear there.

There was a Leibniz scholar here at the time I was cataloguing the papers. Bob Sleight,³⁵ S-L-E-I-G-H. And I went to him before we had actually transcribed anything from shorthand because Gödel kept a lot of bibliographic notes on Leibniz, and I wanted to show them to Sleight to see what his reaction was to this stuff. So he looked at them for a couple of days, and he came back, and he said, "This is the most extensive list of Leibniz publications that I've ever seen." He said Gödel really scoured everything.

And there is this really strange story that I think I included in the book. I believe it was Morgenstern said that one day, Gödel called him up and asked him to come over to the Firestone Library and look at all these books that he'd pulled off the shelves with Leibniz's works, and along with him, he had this stack of articles about Leibniz by various scholars that referred to particular passages. And in every single case, the reference was to something that was in a volume that didn't exist or was to a page where the text stopped before that page. He said it was really almost inexplicable by any other explanation than that someone was trying to suppress Leibniz's writings.

He [Morgenstern] said he really didn't know what to make of it, that it was just stunning that Gödel had maybe a dozen or so instances of apparently spurious references, but there was so many of them, he said that it really made him pause and wonder if maybe Gödel was right that there was something going on. And then there was this long discussion they had about getting Leibniz's papers brought over to this country.

And finally, another scholar independent of them did in fact succeed in getting them brought down to the Library of Congress. But they disappeared. The Library of Congress doesn't have them. They have a

³⁵ Robert C. Sleight, Member in the School of Historical Studies, 1982-1983; Research Associate, 1986-1987.

record of having gotten them. Strange. Really strange. Now subsequently, I think they do have those papers now. But there was apparently some sort of a record of acquisition that they then couldn't find the papers. Really, really mysterious.

Linda Arntzenius: It certainly is. That's another Ph.D. thesis for someone to embark upon.

John Dawson: Indeed.

Linda Arntzenius: Can you say anything about Gödel's physics, his rotating universes and the time travel?

John Dawson: Not much beyond what I said in the book. I'm not a physicist at all, so I don't really understand all the details.

Linda Arntzenius: Did Einstein entertain these ideas?

John Dawson: Einstein? Well, Gödel contributed to these papers, to a volume that was honoring Einstein on his 70th birthday, and there were replies. The format of this living philosopher series was that people would write essays about these philosophers, or in Einstein's case, physicist rather than philosopher. And then the honoree would be given a chance to reply to these. Gödel, of course, was always submitting things late. So Einstein didn't have a lot of chance, but he did say that this was something that had occurred to him early on as something that should be investigated or that might be a possibility, and he regarded it as a step forward that Gödel had pointed out that there was this not exactly problem, but possibility.

And my impression is that's what happened – Gödel gives this lecture here at the Institute to the assembled mathematicians and physicists.

Linda Arntzenius: When are we talking about? This is '50s?

John Dawson: This is 1949, I guess. Yes. So he gives this lecture here at the Institute, and I don't know whether the title was not announced beforehand, or maybe it was, and now some people came out of curiosity. But at any rate, people were not expecting Gödel to talk about something that wasn't mathematical logic. And suddenly, he gives this detailed technical lecture, which has a lot of differential geometry. I mean I can't read it with understanding because I don't know enough differential geometry. There clearly were people here who did know the differential geometry and were stunned that after all these years of doing apparently nothing but logic, suddenly, Gödel knows exactly what he's doing. But I think his work has been regarded primarily as showing a possibility that does not in fact apply to our own universe.

In other words, he showed that if you take Einstein's equations and you don't assume anything beyond them, then consistent with those equations, you can have these strange universes in which time travel into the past is theoretically possible, and even possible without exceeding the

speed of light. And Gödel himself, one of the things that is in his Nachlass, are a lot of pages of observational data, astronomical data. He came up with a criterion that if there was a bias in the distribution of galaxies, observable galaxies in the universe, if they weren't sort of –

Linda Arntzenius: Equally distributed.

John Dawson: Uniformly distributed, but if there was a bias, there were more on one side than the other, then that would support the idea that our universe was in fact one of the kind he described. And he was very disappointed over the years that astronomical data did not show any bias. Freeman Dyson could tell you about that. He's one I talked to about that. He had vivid memories of Gödel coming to him repeatedly and asking him what the latest news was on the distribution of galaxies.

Linda Arntzenius: When did John Bahcall³⁶ get here?

John Dawson: That I don't know.

Linda Arntzenius: That was too late for Gödel, I think.

John Dawson: I think so, yes. I'm not sure, but I think so. There was also this strange misunderstanding that this very famous astrophysicist, Chandrasekhar,³⁷ who apparently just misread what Gödel said, and claimed to have found a contradiction, and had actually published a paper in which he made that claim. A couple of other people actually came to Gödel's defense, and one of them actually wrote Gödel and said, "Did you mean this?," which is what Chandrasekhar says, and Gödel said, "No, I didn't mean that at all." Apparently, it was just simply a misreading.

And whether that was ever retracted by Chandrasekhar, I don't know, but I think it did have an influence in that it caused people – because Chandrasekhar had such a big name, I think people believed him and didn't look back, and I think for that reason, a lot of physicists didn't pay attention to it for a long, long time. And it's only fairly recently that people have gone back, and it has created some interest.

Linda Arntzenius: It is fascinating. There's one period, and it comes up close to the end of the book, where Gödel's health improves for a three and a half year period. This is just after Morgenstern has seen him looking like death warmed up.

John Dawson: Yes.

Linda Arntzenius: Did that puzzle you, and did you find any explanation for that improvement?

³⁶ John Norris Bahcall (1934-2005), Member in the School of Natural Sciences, 1969-1970; Professor, 1971-2005.

³⁷ Subrahmanyan Chandrasekhar (1910-1995), Member in the Schools of Mathematics and Natural Sciences, 1941; Member in the School of Natural Sciences, 1976.

- John Dawson:* It did puzzle me, and I really don't have an explanation for it. It seemed almost miraculous that he would suddenly improve like that.
- Linda Arntzenius:* Because his wife was ill at this time. She was still alive, I believe.
- John Dawson:* She was still alive. Certainly, his final decline did coincide with Adele's hospitalization, and there she was hospitalized long enough that he was totally on his own to provide his own meals.
- Linda Arntzenius:* But this period –
- John Dawson:* - was earlier.
- Linda Arntzenius:* Three and a half years is a long time.
- John Dawson:* Right, yes.
- Linda Arntzenius:* I'm wondering, does it coincide with something he was working on? Did he get a new doctor in Princeton?
- John Dawson:* Either of those, I suppose, could be a possibility. The doctor I would doubt would have that much influence, mainly because Gödel was suspicious of doctors, and even though he went to them, he tended not to take their advice. I don't have a lot of medical evidence about Gödel. I did talk to one doctor here at Princeton, who is the guy who actually signed his death certificate. Medical confidentiality, of course, is an issue.
- And Gödel's brother was a little bit sensitive about allowing access to his brother's medical records, which I can understand. In fact, I have a letter in which he said, "I would give you permission to look at that after I die." I've never followed up on that. I don't know anything about how long medical records are retained for a person that's deceased. Do you have any idea?
- Linda Arntzenius:* I have no idea. But I do know it's become quite – I won't say fashionable, that's the wrong word, but common or usual nowadays for people to look back and diagnose –
- John Dawson:* Oh, yes, yes.
- Linda Arntzenius:* Dirac,³⁸ he must have had ADHD, that sort of thing.
- John Dawson:* Yes, right. I find that so speculative.
- Linda Arntzenius:* Well, it is, but it's also sad to think that was there a magic bullet that could have kept Gödel on the straight and narrow and saved him all this grief.
- John Dawson:* Well, I think certainly pharmacology has gone a long way in the treatment of mental illness, and probably there are drugs these days that might

³⁸ Paul Adrian Maurice Dirac, Member in the Schools of Mathematics and Natural Sciences, 1934-1935, 1946-1948, 1958-1959, 1962-1963.

have been used to help Gödel if he could have been convinced to take them because that, of course, is one of the big problems even now. People that are depressed, one of the symptoms is they don't want to keep taking their drugs.

Linda Arntzenius: I loved what he said. Loved it is the wrong expression. When he said, "Nowadays, I only say no." Remember?

John Dawson: Yes, "I can only say no. I've lost the power of yes."

Linda Arntzenius: And that's so typical of people who have Parkinson's or people who are suffering certain mental illnesses that they – it's partly fear, also, but yes.

John Dawson: Yes, it is. It's very typical of him throughout much of his whole career. Not that he didn't take medications that he thought were important, and I actually went to a friend of mine who's a retired pharmacist to identify some of these things. Because I ran across Gödel's notes, and he would have the name of this drug. Not the chemical name, but the brand name or whatever, and many of these are no longer in the pharmacopeia, so I went back to this pharmacist, and he said, "Well, you have to remember I've been retired for ten years." I said, "No, that's exactly what I want because you will recognize these." And he did. He told me what they were. So I could tell one of them was a stomach remedy, and one of them was a bowel thing and so on.

That was the only way I had of finding out. So that's another example of something that puzzled me in Gödel's notes because I didn't know what these drugs were.

Linda Arntzenius: Ten years after your book came out, the Institute marked the Gödel centennial.

John Dawson: Yes.

Linda Arntzenius: Did you observe a significant change in the Institute's attitude to Gödel at that time?

John Dawson: No, I don't think so. You know, they had that gathering here in November. There were lots of gatherings, at least in the western world, I don't know about in the east, many of which I was invited to, and it was a very hectic year, I must say. I think I went across the ocean five times in five successive months, and I was teaching at the same time. But no, I think Gödel has always been highly respected as far as I could tell, despite their reservations at first about whether they could really make him a faculty member because of his mental problems and his fastidiousness.

But I think the Institute has always been supportive of Gödel's studies, for example. I think that the problem they had when his papers were donated was simply that the papers were basically dumped on them. They had the opportunity. You don't turn down a donation, but if you don't have the facilities, and you have no other logicians on the faculty, there's nobody

really to talk to on the premises, so to speak. So I think it's natural. He died in '78, his wife gave the papers at some time after that before her death. So that's a pretty narrow window from '78 to '81.

And then I came in '82. So they really didn't have the papers that long, even though scholars always want to get at stuff, and there was some frustration among them, "Well, they're not catalogued yet," and all that. But looking back, that's really a pretty short amount of time.

So I don't think the Institute was trying to conceal anything. The only thing that seemed to be a sensitive topic when I first came, and I think I convinced Borel in particular that it really wasn't a sensitive topic, was the ontological proof because it had to do with the proof of God's existence.

Linda Arntzenius: What was Armand Borel's objection?

John Dawson: I think just that it's silly to try to use mathematics to prove something theological. It just seems preposterous to most mathematicians. And I remember talking to him about it because it came up fairly late in the discussion because I knew in the Russell papers up at McMaster University in Ontario... The first question is why are they there? Well, Russell auctioned his papers to raise money for his pacifist causes and McMaster was the high bidder. Anyway, I haven't actually been in that archive, but I've known people who worked with it, and they said that there are file cabinet after file cabinet up there, a number of which to this day are embargoed. You cannot get access to them. They're locked because there are statements in them that are libelous to living people, and they will eventually become opened once everybody has died. I don't know whether that's still the case, but it certainly was the case then.

So I said [to Borel], "Well, we have to discuss this. If we're going to give these to Princeton, does the Institute want to restrict access to anything? And that was the one thing that he was dubious about. And I said, "Well, I can tell you this, that while you and I as mathematicians think this is silly at best to think that you could possibly prove something like that from mathematical equations," I said, "Philosophers do not take this as silly." Philosophers definitely are interested in this, and they're interested in it for technical reasons. I said, "I really don't think it has anything to do with theistic beliefs so much as there is this classical argument for God's existence that's been around for a long time and that's always seemed slightly fishy, but they've had trouble pinning down what's wrong with it. And Gödel shows that from a strictly logical standpoint, there isn't anything wrong with it if you make very strong assumptions. And actually, Dana Scott has described it in exactly those words. He says it's a correct proof based on very strong assumptions, but it's a proof using what's called modal logic.

And so it is a topic, a mathematical topic that's of interest. I said I don't think there's anything scandalous about this or sensitive about it. And apparently, I convinced him because there are no restrictions.

Linda Arntzenius: Excellent. I mean the ontological argument has a long history.

John Dawson: Yes, a very, very long history.

Linda Arntzenius: It would be odd to suppress something like that.

John Dawson: I don't think Borel knew much about philosophy, and an awful lot of mathematicians, and I confess I tend to be somewhat that way myself, have a certain amount of contempt for philosophy as kind of a lot of hot air and arguing for the sake of argument over things that you really can't pin down in some sense. But there certainly is widespread interest in it. This conference in France is going to be interesting because I am not a philosopher, and I'm going to have to listen to a lot of heavy duty philosophy.

Linda Arntzenius: To get back to the Institute for a moment, you've known the Institute under a series of different Directors: Harry Woolf, Marvin Goldberger,³⁹ Phillip Griffiths,⁴⁰ Peter Goddard,⁴¹ and now Robert Dijkgraaf.⁴²

John Dawson: Right.

Linda Arntzenius: I wondered if you've observed differences in their styles that you could comment upon.

John Dawson: I haven't really been close enough to make that observation. I don't ever recall meeting Goldberger, although I knew he was the Director. I don't think I ever met him. I've certainly been acquainted with Griffiths to a slight extent, not a lot. And with Goldberger – I mean with Goddard, I've gotten to know him at a couple of these dinners. I've sat near him and his wife and really enjoyed talking with them. Now that doesn't say much about his management style. My impression is that things, for the most part, have been much calmer than they were under previous Directors, certainly up through Kaysen. I don't know much about Harry. Well, I wasn't aware at the time I was here that there was. I am aware of one serious incident that happened under Griffiths' direction, and that was the attempt to oust Piet Hut. Since Piet is a friend of mine, I heard about that.

That was smoothed over and now seems to be – everybody seems to be happy that he's got his own little – I don't know whether that was

³⁹ Marvin L. Goldberger (1922-2014), Member in the School of Natural Sciences, 1966-1970, 1976-1977; IAS Director, 1987-1991.

⁴⁰ Phillip Griffiths (1938-), Member in the School of Mathematics, 1968-1970; Visitor, 1981-1982; IAS Director, 1991-2003; Professor, 2004-2009; Emeritus Professor, 2009- .

⁴¹ Peter Goddard (1945-), Member in the School of Natural Sciences, 1972-1974; Member in the School of Mathematics, 1988; IAS Director, 2004-2012; Professor in the School of Natural Sciences, 2012-2016; Emeritus Professor, 2016- .

⁴² Robbert Dijkgraaf (1960-), Member in the School of Natural Sciences, 1991-1992; Visitor, 2002; IAS Director and Leon Levy Professor, 2012- .

smoothed over while Griffiths was still Director, or whether that was done later.

Linda Arntzenius: No, that was during Griffiths' tenure.

John Dawson: It was. Some time after that, I had talked to Piet, and he said, "Oh, yes, that's over with. That's passed." He didn't seem to have, at that point, strong feelings. So other than that incident, I wasn't really – that's the only one I know of that's received any publicity.

Linda Arntzenius: Yes. You've been here recently. Do you notice a different ambiance? How does it compare to when you were here? Is that too hard a question to answer?

John Dawson: Well, mainly I notice the difference in the buildings, the new buildings. And I remember being concerned when I first heard about them, is it going to impinge on the Institute Woods, which of course it didn't. And I see now that their signing is a little better. I noticed they had this Simons Hall, for example, and some of that. So the physical development I've noted. And of course, I noted the change in the chef when Moehn retired, and there's one thing that I think is an improvement there.

Moehn was a great chef, but he didn't know anything about vegetarian cooking. We had an embarrassing incident one time when we had a dinner here on Gödel's birthday. And I invited Saul Kripke from Princeton to come. He's a vegetarian, and the meal they served him was really pitiful. We, in fact, we said, "Look, you're not paying for this because this is really –" And it just seemed to be a gap in Moehn's abilities. And the new guy, there's a lot of emphasis on vegetarian stuff. So that, I think, is good.

Especially with the number of visitors you get from other countries.

Linda Arntzenius: Did Saul Kripke know Gödel?

John Dawson: Yes, he knew him. I don't know how closely, but certainly, yes, he would have known Gödel.

Linda Arntzenius: Would he be a good interview you think?

John Dawson: I think he might be worth talking to. I didn't have a lot of contact with Saul, but I did meet him when I came here, and I'd heard lots of stories about him. Actually, my first meeting with him, I was invited to give a talk during the two years I was here at Princeton. And I really didn't know the faculty over there. Apparently, they normally have their speakers come about a half an hour early and I guess talk to people. Well, somehow, this never got mentioned to me. So I didn't know about that. And I duly showed up for the talk but not for anything beforehand.

So anyway, I'm giving this talk, and there's this relatively young guy in the back. I actually wondered if he had Tourette's Syndrome or something. I

mean he was just – he wasn't saying anything, but he was just kind of gesticulating, and I thought, "Man, this guy has got real nervous tics." And afterwards, somebody said, "Did you know that Kripke was in the audience?" I said, "No, I've never met him." And they started describing him, and I realized it was this guy in the back of the room.

Linda Arntzenius: Was he trying to get your attention?

John Dawson: I don't think so. It almost looked – I don't recall him coming up afterwards, for example, and talking to me about it. Then later I met him, and he's very friendly. I liked the man quite a bit, and I don't particularly remember that trait in other contacts I had with him. It was really bizarre. It was very distracting to me, and I just thought it was some graduate student. I thought, "Man, this person has really got a problem." I couldn't believe it when he said it was Kripke.

Linda Arntzenius: I did my master's thesis on Kripke's Naming and Necessity. So I'm looking for an excuse to interview him.

John Dawson: Kripke – yes, Kripke, like Gödel, unfortunately, is one who doesn't publish stuff until he's got every last nail down. And he has this lovely short proof of Gödel's incompleteness theorem that he has presented at conferences orally, but he has never written it up. And I wish he would. Why, I don't know. So yes, I think he would be worth talking to. I think we – we being the Gödel editorial project – did survey a lot of people about correspondence they'd had with Gödel, and he I think replied, "Well, no, I don't have correspondence because I lived in the same town with him." Gödel was notorious as a telephoner who would have these long late night phone conversations, which is unfortunate because unless you've got his shorthand abilities and are scribbling away while he's talking –

Linda Arntzenius: Yes, that's a shame.

John Dawson: It is.

Linda Arntzenius: Having worked so closely with his papers, do you feel that you got to know Gödel?

John Dawson: Yes, originally when I came here, I was not thinking of writing a biography. I had done this bibliography, and I was very interested in being involved with his collective works, but initially, I didn't think of writing a biography. It was only after I came here and realized just what was in the Nachlass, just how much stuff was there. He threw out so little that I realized, well, I've seen a lot that nobody else has seen. And so just for my own career, I've got an opportunity to get a leg up on the competition, so to speak.

I waited. I took a lot of notes, but I didn't start writing it right away because I felt that I needed to digest things. And of course, when I was actually doing the cataloguing, I didn't have a lot of time to look at the contents of detailed items. So I spent quite a time, a couple of years at least after I

left the Institute, just looking over these documents, getting a feel for them, and thinking about them and trying it. And eventually, you reach the point where you figure if I'm going to write, I've got to start now before I start forgetting things.

Linda Arntzenius: Were there any revelations in the material?

John Dawson: Well, in a sense everything was, in that there was so little information about Gödel before I came here. I can literally remember when I first started working going to *American Men and Women of Science*, that standard little reference that just has people listed, and just very, very brief information, just to find out whether he was married. Something as basic as that didn't seem to be any place that I'd seen.

And really, during his lifetime, almost nothing about him appeared. Hao Wang did publish an article called "Some Facts about Kurt Gödel," which he wrote while Gödel was still alive, and he sent a copy to Gödel. But there are some fairly elementary mistakes in it that Gödel surely would have corrected if he hadn't been in the mental state he was because I did find the pre-print or the manuscript in Gödel's papers, not a single mark on it. Knowing Gödel's fastidiousness, he would not have let some of these things go.

That came out in 1981, three years after Gödel is gone and the same year that Adele died. So nobody really had a chance to correct those. And then, the first substantial memoir about him was Kreisel's⁴³ memoir that came out in the biographical memoirs of Fellows of the Royal Society. And that certainly had a lot more information than anything that had come out before, and he was allowed very brief access to the Nachlass before I catalogued it. So there were – probably still are somewhere in the library a small set of microfilms that were prepared for him. He got some funding, but of course, since the papers weren't catalogued, it's a random collection of things he was able to pick out and see. And he didn't really make that much reference in his memoir to things here at the Nachlass. He mainly relied on this family history that Rudolf Gödel had written.

Linda Arntzenius: And his own personal relationship.

John Dawson: And his own personal relationship, and also his own comments and interpretations. One of the problems with much of Kreisel's writing is that much of it is about him, and a lot of his interpretations are pretty off the wall. So you have to take a lot of what he writes with a grain of salt. But nonetheless, there's still – you know, I remember thinking, "Well, finally, we've got something here that really talks about him."

Linda Arntzenius: Were there any revelations about any others, such as Einstein or von Neumann?

⁴³ Georg Kreisel (1923-2015), Member in the School of Mathematics, 1955-1957, 1960, 1963-1964; Visitor, 1963.

John Dawson: Perhaps a little bit about von Neumann. I mean I didn't know originally about the friendship that Gödel and von Neumann had. It's clear that von Neumann had great respect for Gödel, and I think it was a case that von Neumann was used to thinking so fast and being ahead of virtually everybody. He talks to Gödel about this idea. Gödel goes home, thinks about it, realizes that, "Oh, yes," and then sends it off with that in there, and then a few days later, like three days later, he gets this letter from von Neumann in which von Neumann says, "I've done this," and Gödel says, "Oh, yes, so did I, and I've already sent it off."

My impression is that this was shocking to von Neumann. He hadn't been beaten very often, and the fact that he was impressed him, and he became thereafter a very strong supporter of Gödel.

Linda Arntzenius: Do you think--I know it was Veblen⁴⁴ who invited Gödel to come to the Institute--but do you think it was at von Neumann's suggestion?

John Dawson: Partly. Von Neumann, I'm trying to remember the sequence. One of the two, and I'm trying to remember whether it was von Neumann or Veblen, had heard Gödel lecture in Vienna and had been very impressed. And so they both were very interested. I have it in my notes. I don't remember which of the two it was. But anyway, they brought back word and said, "This is a person that we should have."

Linda Arntzenius: What impression did you take away from your research of Veblen?

John Dawson: I don't really have much of an impression, except that he was obviously very involved with the Emergency Committee in Aid of Displaced Scholars. I mean he really – well, first of all, he was very strong in simply building up the mathematics faculty to begin with. It was really his creation in a lot of ways, and he certainly had to fight Princeton [University] in particular, and eventually, there was this agreement that the Institute would not raid the Princeton faculty anymore. But I think Veblen was certainly very helpful with Gödel's attempts to come to this country and get released by the then Nazi-dominated government of Austria.

Aydelotte was the one who actually wrote the letter that sprung Gödel, so to speak. Von Neumann had a strong hand in drafting that letter. And before that, Veblen did too. So yes, I think Veblen was a very important figure, and certainly, of course both of them, both von Neumann and Veblen, very significant mathematicians who did really, really important work.

Linda Arntzenius: Your book was published in 1996.

John Dawson: Well, actually, it was submitted to the publisher in '96. It actually came out in '97, very, very early in '97.

⁴⁴ Oswald Veblen (1880-1960), Professor in the School of Mathematics, 1932-1950; Emeritus Professor, 1950-1960.

Linda Arntzenius: Have there been significant developments in Gödel's scholarship or in psychiatry that would enhance your further insight?

John Dawson: There have been certainly a lot of philosophical papers that have drawn on the things [in the Nachlass] that one could go further, and that I actually predicted in an early article that I wrote while I was still here. I published an article in the *Mathematical Intelligencer* called, "Kurt Gödel in Sharper Focus." And I predicted that the material of greatest interest in the Nachlass would probably be the unpublished philosophical material as opposed to the unpublished mathematical material, and that seems to have been the case.

There was a lot of interest in Volume 3 of his collected works, which was the unpublished, and that stimulated a number of scholarly writings. Of course, one could add to that. In the paperback edition [of my book], which came out in '90 – no, 2005. 2005. I did make some adjustments. There's a scholar over in Holland who did some work with items from the Nachlass, and looking at some of Gödel's library slips, slips for books he had requested, and this fellow, Mark van Atten is his name, knew enough languages that he could figure out what some of these annotations were on some of these library slips. And he wrote a paper. One of the questions was, Gödel's dissertation, so-called completeness theorem, is very, very similar to some work that the Norwegian mathematician Skolem had done. But Skolem never drew the pieces together. He had almost all of the individual pieces, but he never looked at them in a way that brought them together.

So there had been a question, was Gödel's work really independent of Skolem. Did he know about Skolem's papers when he wrote his paper? Because if so, it seems from one perspective a minor thing to do this to get a dissertation. And so this paper is about Gödel's awareness of Skolem's work. And I think it nails it down very definitively that Gödel was not aware of Skolem's work, that he tried to get books from the library that contained Skolem's papers and was unsuccessful. The libraries that he contacted simply, for one reason or another, didn't have those.

And he became aware of them later after his stuff was published. And there had always been this question, but I had looked at the slips. There was at least one strange notation that I couldn't make anything out of. It wasn't a German word, and I didn't know what it was. Mark recognized it and knew what it was. So that's one thing that would change. Another Austrian scholar went to the archives at the University of Vienna and filled in a lot of the details about courses that Gödel took at the University of Vienna, and that's a gap in the Nachlass. There's nothing there. But the University of Vienna does have records of this.

What it showed was that Gödel took a lot of physics, much more physics than most people would have thought for somebody who is in the field of math that he was. So that I thought was very interesting. As I'm writing this paper for the French conference, I'm realizing just how much has

been written since the thing was opened to scholars, and some of it since my book came out that have filled in details.

Much of the writing has been not biographical, but about the philosophy or the mathematics. Still, I think it's helped to draw attention and caused scholars to get really involved.

Linda Arntzenius: I think you're being modest.

John Dawson: Certainly, there's been more written – there's a book that came out by Palle Yourgrau⁴⁵ on the philosophical aspects of the relativity theory work. The title of his book is something like *The Disappearance of Time*. Actually, he's published two books, and the second one is a revision of the first, and he changed the title. And something happened to him in the meantime, I don't know what, but there's an appendix that is absolute junk. I actually wrote to a friend, and I said, "Has he had a mental breakdown or what? Because this appendix..." I was asked to review the thing, and I looked at it, and I thought, "This is mathematical nonsense. What is he doing?" I don't know. It's a mystery – but anyway, look for the earlier one because the earlier one is okay, and the later one is bizarre.

Linda Arntzenius: Well, here's my question. Why does logic still come under philosophy rather than mathematics? But I guess it doesn't always.

John Dawson: Well, it certainly doesn't always. I think now, it's in the minority the places that put logic in the philosophy department. There's to some extent a sort of dichotomy in the way logic is treated so that what's taught in philosophy departments is not mathematical logic. And logic is such a broad field that there's a lot of it that's not strictly mathematical. For example, this modal logic, which has a long history, actually. It goes back to the early 20th century, and in its original form had nothing to do with mathematics.

It has to do with the logic of possibility and necessity, and trying to write down axioms that capture this notion as we use it in ordinary language. And eventually, people noticed that the use of those words is awfully similar to the way we use mathematical quantifiers, like "all" and "there exists." So a standard thing in mathematical logic is that "not for all" is equivalent to "there exists not." Well, "not possible" is equivalent to "necessarily not" and so on. So there were these parallels, and Kripke and others developed this modern logic that, it's a development of modal logic, but it's applied to mathematics and to statements about truth and provability. It's called provability logic. It's fascinating stuff, but that would be – provability logic would be taught in the mathematics department.

Linda Arntzenius: In the mathematical department. Yes.

John Dawson: So that mathematical logic really has become kind of a distinct branch, and that's what's taught in the math department. But there's also these

⁴⁵ Palle Yourgrau has written *A World Without Time: The Forgotten Legacy of Gödel and Einstein* (2005) and *Gödel Meets Einstein: Time Travel in the Gödel Universe* (1999).

other kinds of logic. I don't even know. There's deontic logic, which is the logic having to do with obligation, "should"-type words and this sort of thing, and then there's – oh, there's just lots of different branches these days. And that's all taught in the philosophy end of it.

Linda Arntzenius: What are you working on now?

John Dawson: I'm working on another book. In fact I'm about to sign a contract on it, which is not strictly speaking logic, but it's based on a paper that I wrote in 2006. And the title of the book will be *Why Prove it Again? The Role of Alternative Proofs in Mathematical Practice*. There's a very long history going back to the ancients of multiple proofs of the same theorem. Well, if the theorem has been proved, why do we need to prove it again? It seems to me it's an interesting question, and oddly, one that hasn't been examined. I'm really surprised that nobody has drawn attention to this before. And so I published this short article on it and it got a lot of positive comments. Sol Feferman of the Gödel project said, "You know, you could develop this into a book." And so I thought, "Well, yes."

Now that I'm retired, I don't have competing teaching responsibilities, so I thought, "Yes, maybe I should." So I started writing some chapters, and I'm learning a lot of mathematics, I can say that. Number theory, in particular, that I never knew. And so it's an ambitious thing. I've got to limit the number of chapters I write because it really does test your breadth as a mathematician, you know, when you try to pick theorems that have been proved multiple times, well-known theorems. You quickly get into a lot of different areas of mathematics, some of which I have not much background in.

So it's a challenge, but it's fun. So hopefully that will come out in a few more years.

Linda Arntzenius: What is your relationship with the Institute now? I imagine that you're in AMIAS.

John Dawson: Yes, although that's a strange group. They never seem to send out renewal notices, and I'm –

Linda Arntzenius: Oh, you're there always.

John Dawson: I'm probably behind in my dues if there are such things. I thought there were.

Linda Arntzenius: I don't know if they have dues.

John Dawson: I thought there were initially at least. Anyway, yes, I attend their conferences, and recently, I've been invited to some of the events for the Einstein Legacy Society because my wife and I, since we don't have children, by choice, what do we do with our estate? Well, we have included both MIT and the IAS in our wills. And I'm quite happy about that on both counts. I think they're great institutions, both of them.

- Linda Arntzenius:* Well, this is very apropos my next few questions. The Institute, getting back there, it's now over 80, and in recent years, it's begun to take a look at itself. There's now an archive, for example, and I wanted to ask you how important that is, and what do you expect will come out of it in the future if I could ask you to speculate.
- John Dawson:* Yes, well, the archive in particular I'm glad to see it established. I think the Institute should pay more attention to its history because it's very important, and at the time of its founding, a very unique institution. There's been a lot of copies of it in other countries since, but – and it certainly played a key role, perhaps partly by accident, but in giving these refugee scholars a place to go. As you may know, there was one other – there's really two that I'm aware of. Two institutions that really absorbed a lot, and they couldn't be more unlike.
- One was the Institute. The other was Black Mountain College. Have you ever even heard of Black Mountain College?
- Linda Arntzenius:* No, I thought you were going to say the Courant Institute.
- John Dawson:* Well, Courant did – I think that's a little bit later that that came along. It certainly did employ a lot of scientists and mathematicians. Black Mountain College primarily absorbed figures in the arts.
- Linda Arntzenius:* Where is it?
- John Dawson:* It was just outside the town of Black Mountain, North Carolina, which is a small town to the east of Asheville a few miles. And it's an extremely unusual institution, but you'd be amazed how much has been written about that in spite of the fact that I had never heard of it either at first. It was an experimental institution that was founded by a bunch of dissident faculty from a college in Florida that had basically fired them. Rollins College was the name. It's still – it's a private school in Florida. Anyway, they apparently had this big upheaval, and a group of faculty that were fired or just really didn't like the dictatorial stuff, founded this college in the woods of North Carolina. It was sort of a co-op type thing. Students didn't pay tuition, but they worked. They literally built the college buildings. They helped with the cooking. And the most famous mathematician to be hired there was Max Dehn, who was much older than Gödel, but shares with Gödel – and in fact, one of the papers I think I gave you there, not sure, is about the two. He's one of the few that, like Gödel, took the Trans Siberian Railway to make it to the U.S. And he had trouble finding a job. He had a couple of temporary positions, but he finally ended up at Black Mountain, and he was the only mathematician there, but he was very broad. He also taught Greek, and I think Latin. And thoroughly enjoyed it.
- Linda Arntzenius:* And it no longer exists you say.
- John Dawson:* No, it died off in 1956, which was not that many years after it was founded really, for financial reasons. The curious thing is whereas the Institute is

authorized to grant degrees, but never has, Black Mountain College was not accredited, but it nonetheless gave even doctoral degrees by having outside faculty come in and serve--and so they were valid degrees. It was not a diploma mill at all. They would simply bring in outside scholars to serve as the referees, or whatever you want to call them on these dissertations. There's a number of very famous people in the arts that were at Black Mountain College.

Linda Arntzenius: I shall look that up.

John Dawson: Yes, it's worth doing. There's even a volume, fairly thick volume, of reminiscences of people about Black Mountain College. It's interesting. This woman in France knew all about Black Mountain College. And she's going to write, apparently, another book about some of these figures in the arts. She's focusing on Chicago, ones that went to Chicago, but she's an interesting gal.

Linda Arntzenius: Very interesting person. You mentioned that the Institute has had many other institutes modeled on it.

John Dawson: Yes.

Linda Arntzenius: Nowadays, that there are so many institutes for advanced study. How important is it that the IAS continues to be here? I don't mean in Princeton, I mean here at all.

John Dawson: Well, it's still really the only U.S. institution that has that structure that brings in these temporary visitors and has now these themed years, for example, in the mathematics department. It differs, I think, in the particular fields that it draws on from some of the foreign ones. I don't know a lot about these foreign ones, but the IHES in Paris, I think, not only does mathematics, but I think it has a broader mandate than that. And the Tata Institute in Bombay, I'm not sure whether that's just mathematics. It's all that I know of. So I think some of these institutions are narrower than the IAS, and a few may be broader.

But I think it's important that there be a number of these places. And of course, there are also some centers now in Germany, I think. Maybe not exactly like this. But it was a pretty unique experiment at the time, and I think it's held up. Obviously, I'm very fond of the Institute because it made a tremendous difference to my career--I mean that opportunity to catalogue those papers was really a major break, and in terms of my professional advancement, it made a huge difference. So I'm grateful for personal reasons, but I also just think it's a wonderful institution giving scholars this kind of chance. I've seen others like Feynman, for example, who was here for a while and left, and later wrote that he didn't like some aspects of the Institute.

And I can see his point, which I think was if you come here with a specific project in mind and it doesn't work out, you don't have any excuses because the Institute has so pampered you, has given you all this time

and solitude and pleasant surroundings, you have to blame yourself if you didn't come through. And I can see that that could be very frustrating. You know, if you really had a tough problem, and you simply didn't crack it while you were here or make progress on it, it would be tough to admit that you had no excuse for not doing so. I didn't have that because I had a specific external problem, and I think I was very different from most other visitors in that I had a specific project to do for the Institute that was quite different from a mathematical problem.

And I would never have been invited here because I haven't proved that many theorems.

Linda Arntzenius: That's interesting. So you're straddling mathematics and history in a way.

John Dawson: Yes, and I remember I've always been a little bit of a fish out of water. I enjoyed MIT thoroughly, but I was not a typical MIT student. I was not the kind of student who in high school was active in science fairs. I didn't do a lot of hands on stuff. I wasn't interested in it. I was interested in mathematics, but at the same time, I was interested in humanities. I can remember most of the guys in the dorm just dreaded their humanities courses, and I said, "They raise your cumulative average. What's wrong with that?" And they looked at me like I was nuts.

They said, "What do you mean it raises your cumulative average?" I said, "Well, I regard them as just something there that, you know, there is no problem. I don't have any problem writing." And I routinely got A's in these courses, and they were just stunned. They couldn't imagine doing that. So I was kind of a fish out of water there, too, and certainly here, I felt very different. I was awed by a lot of the mathematicians. But on the other hand, again, like MIT, I never felt disrespect on the part of the other people here. I got along with them well. We can have good, intellectual conversations.

And I might not be able to understand all of their mathematics, but there were plenty of other people who did and who could talk to them, and I can talk to them about my work and about other things. The same is true at MIT. The thing I liked there was everybody seemed to have respect for everybody else. They might disagree with you, but they knew you were good, or you wouldn't be there. And that made a tremendous difference. And so I felt very comfortable here in spite of the fact I knew I was an oddball in that sense.

Linda Arntzenius: Some people suggested that the Institute could quite easily get along without a permanent faculty. Have you ever thought about that?

John Dawson: Well, somebody has to direct what's going on. I mean even though the scholars here come with their own problems, I think you have to have somebody with enough knowledge of a particular field to create a nucleus of thinkers that will attract people. I mean if you just simply go out and routinely gather people together, even though they're all individually brilliant, if you don't know something about common interest or maybe

even how well they're likely to get along, I don't think it's going to work well.

Linda Arntzenius: So having schools, for example, is something that would –

John Dawson: Oh, yes, I think so. And within those schools, having a small number of people who are leaders in the field who know who some of the really brilliant people are and who have a feel for – you know, they can look at a young person's work and see, "This looks like a promising direction." I think that's vital. Because otherwise, how do you judge who is worthy to really come and who isn't? And certainly, if you don't have some big names, I think a newcomer to the field or a young person in the field is going to say, "Well, I'm going to be here at this place with a bunch of other people that are in the same situation I am, and there's not going to be a mentor."

I think they really serve as mentors in a lot of ways. Now in my case, again, we had no archivist here, so – and Borel was not a logician. None of the three that I worked for were logicians. But –

Linda Arntzenius: Was Morton White⁴⁶ here at the time?

John Dawson: Morton White was here.

Linda Arntzenius: Did you have anything to do with him?

John Dawson: I one time briefly interviewed him about his contacts with Gödel. Other than that, I never really got acquainted with him. And I'm sorry because he was apparently quite an interesting person from what I've heard from others. But yes, I didn't actually know him. I had my nose to the grindstone pretty hard getting all this stuff done within two years.

Linda Arntzenius: Well, I've come to the end of my questions, so I just want to ask my last question. If there's any question that you expected me to ask that I haven't asked –

John Dawson: No, not really. I didn't know exactly what to expect. Actually, I would ask you just what the nature of the Oral History Project is. How extensive it is.

Linda Arntzenius: Well, the purpose of it is to gather for future historians the impressions and remembrances of people who are associated with the Institute, and we've started with some of the more senior faculty emeriti, like Louise Morse, and spouses. It's almost like gathering an enormous amount of material so that, hopefully, in the future when someone does come to write the Institute's history, there will be material for them. Or if they're writing other biographies or whatever, there's material here.

⁴⁶ Morton White (1917-2016), Member in the School of Historical Studies, 1953-1954, 1962-1963, 1968; Professor, 1970-1987; Emeritus Professor, 1987-2016.

John Dawson: I know certainly that there is this oral history project at Princeton [University]. And I have looked at some of the materials there. I think oral history work is important.

Linda Arntzenius: Yes. Our conversation will be transcribed, and you will get a copy of the transcription to review.

John Dawson: Sure.

Linda Arntzenius: Is there anything else you would like to say before I turn the machine off? Is there anything that you'd like to comment on?

John Dawson: I think we've pretty well covered the material.

[End of Audio]