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The Princeton Mathematics Community in the 1930s
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ALBERT TUCKER

FINE HALL

This is an interview of Albert Tucker in his office at Princeton University on 11 April 1984. The interviewer is William Aspray.

Aspray: In this session, we will start by discussing the physical setting in Fine Hall. Dr. Tucker, will you tell me about the donation of the funds for the building of Fine Hall?

Tucker: Dean [Henry B.] Fine had been quite active in administrative matters at Princeton. He was a very close friend of Woodrow Wilson during the period that Wilson was president of Princeton. This helped Fine get to know members of the Board of Trustees and people who were concerned with fund raising for the University. There were two brothers by the name of Jones who lived in the Chicago area and who were very well-to-do. They attended Princeton and graduated in 1876, four years earlier than Dean Fine.

Aspray: First names?

Tucker: They were Thomas and David Jones. They were good friends of Dean Fine and were much interested in ideas that Dean Fine had for improvements that could be made in the facilities for the math department, and indeed for other scientific departments.

Dean Fine had originally been Dean of the Faculty, but then he was made Dean of Science in 1911 so that people could keep on calling him dean. Although he had no assigned duties, he felt that he should try to live up to the title of Dean of Science. So one of the things that he was interested in was trying to improve the facilities for the scientific departments, especially his own department, mathematics. He had in

the '20s discussed the need for the department of mathematics to have a building of its own, where it would have its special library and other facilities that would really make it a home for the members of the department. When Dean Fine died as a result of an accident late in 1928, the Jones family decided to offer funds for a building of the sort Dean Fine had been talking about for the department. They also decided that while they were at it, they would build not just any building, but a very special building.

Aspray: Did they have any models in mind?

Tucker: I suppose that one model was Eckhart Hall, which was being built at the University of Chicago for the math department there. Several of the Princeton mathematicians, Oswald Veblen, J.H.M. Wedderburn, and W. Gillespie had come from the University of Chicago. It was not quite true with Wedderburn; he was at the University of Chicago for one year.

Dean Fine had got a three million dollar endowment fund set up for the scientific departments, and the Jones family had contributed generously to that. After the death of Dean Fine they wanted to do something in his memory, so they proposed the math building. Veblen, I think, took the lead in the design of that building.

The building opened for use in September 1931 and was dedicated in October 1931. The formal ceremony involved people from the administration and Board of Trustees; the president of the University presided. It was held on the top floor of the new building. There were visitors from other universities: G.D. Birkhoff from Harvard, and G.A. Bliss, chairman of the math department at Chicago, and others.

The building was three storeys. The third floor was the library. It was built around a central court, so that it had natural lighting from four sides on the outside and from four sides on the inside. It was rectangular with a rectangular central court. It was beautifully furnished. The shelves were of oak and were permanently set in the floor. One long side of the library was the math side, and the other long side was the physics side. At the ends of the library were tables for reading and, of course, the card catalog and such. In the four corners of the library were rooms about fifteen by fifteen, which were conversation rooms with a blackboard. This preserved the quiet of the main part of the library, but at the same time, people who were studying together could go into one of these rooms and close the door and with the blackboard have an impromptu seminar.

Aspray: Was the library on the top floor also because it helped to reduce the noise?

Tucker: That is right.

Aspray: That it was a joint math-physics library was part of the intent?

Tucker: Yes. Before Fine Hall was built the math department had its library in Palmer Physical Laboratory, and when Fine Hall was built it was connected to Palmer so that you could walk directly from one to the other by a passageway. There were very close relations between the two departments. A particular bond between them was that mathematical physics was regarded as jointly in both departments. It was specified in the deed of gift for Fine Hall that there should be studies—this was the term used, not 'offices'—there should be studies reserved in Fine Hall for the staff in mathematical physics. This led, for example, to Einstein having his study in Fine Hall.

Aspray: Did the gift include money for books for the library or for its maintenance?

Tucker: I don't recall if there was any money specifically given for the library. The Jones brothers and others had earlier contributed to the building up of the math library before it was moved to Fine Hall. Indeed, there was something called a mathematics seminary. This went back to the late 19th century. In the original library building of the University there was a room that was called the mathematics seminary. That was where the math journals and frequently used mathematical books were kept. This collection was separate from the main library's collection. The University library never liked this separation, but Dean Fine and others, by the force of their personalities, preserved this separateness of the working library for mathematical research.

Aspray: Did the math library contain all of the books on mathematics that the University library system owned?

Tucker: Just about all. Books that were distinctly at the undergraduate level were in the main library, but there were probably duplicates in the Fine Hall library. The main library also had mathematical books that were of a semi-popular nature. I can't think of the names, but there was a rash of such books in the 1920s. Lancelot Hogben wrote a couple of books.

Aspray: *Mathematics for the Million.*

Tucker: *Mathematics for the Million* was the one I was trying to think of. Books of that sort were also in the main library, but all the serious mathematical books and journals were in the Fine Hall library. Of course, there were problems with certain journals, for example, the *Proceedings of the National Academy of Sciences,* which included mathematics, but contained many other things. Such journals and books were in the main library, but if they were really important to mathematics and physics, as the *Proceedings of the National Academy of Sciences* was, there would be duplicate copies in the Fine Hall library.

Aspray: Did the faculty have the opportunity to purchase any books they felt they needed or any journals they felt they needed?

Tucker: There was usually one member of the math department who was the representative for mathematics in the library administration.

Salomon Bochner served at one time, and when I first came to Princeton it was Einar Hille. If there was a book that you thought the library should get, you would tell Hille about it. If in his judgment the request was good, he would have the book gotten for the library. I am sure that there was a budget, but there was some support of that budget from the mathematics share of the income from the Scientific Research Fund. So certainly within generous reason, any book that someone wanted would be got.

Aspray: Would it be fair to say that this was a research library?

Tucker: Oh yes.

Aspray: Were you likely to find the most advanced and ambitious of the undergraduates using this library?

Tucker: That is right. If they had a serious purpose, they were encouraged to use the library, but it was not expected to be used for ordinary study purposes, only for special projects.

Aspray: Were graduate students provided with shelf space or carrel space?

Tucker: The library, being on the third floor, had dormer windows around the outside. There would usually be an assignment of two graduate students to each dormer. There was a table there, and they were supposed to share that table if they were both there. Then there was a sort of a cubby hole where they could store things, their own notes and things of that sort.

Aspray: Was there a professional librarian?

Tucker: Yes, Miss Margaret Shields. She was a very small, but very energetic woman. Because of her size she was affectionately called "Bunny Shields". She had some help in shelving and things like that, and then there was usually a grad student on duty in the evening. She was there during very generous daytime hours. The grad student there who was in charge of the library in the evening would perhaps do some shelving and things like that, but was there to help if help were needed. So the library was open, and one could get assistance, any time of the day, any day of the year.

Aspray: Someone might need a key to get into the building, but once they were inside the building they could go to the library.

Tucker: This, of course, created some problems. In particular, there was one man—this was during the Depression—who was apparently fairly well educated but had lost his job and was living in some sort of make-shift hut. He would come and study in the library. He was looking at mathematics books and was quite interested in things such as non-Euclidean geometry. But particularly in the winter it was so much more comfortable there than at home, that he would spend as much of the 24 hours a day as possible there. This finally became a problem

for Miss Shields. He did not seem quite right mentally, so she was afraid he might go beserk sometime. So there had to be a way found to ease him out of the use of the building. He would sleep in the lounge chairs overnight quite comfortably.

Mathematicians from elsewhere would come, especially in the summers, to work at Fine Hall library, not that they could not get the same books at their own university, but just that the conditions were lovely there. They would rent a room in town and do their library work at the Fine Hall library.

Aspray: One of the most serious problems for mathematicians is that librarians usually don't have the mathematical knowledge to catalog books in a way that mathematicians find useful. How was that handled?

Tucker: Miss Shields was trained in both math and physics. I think she had at least a master's degree in one or the other. She also had no hesitation in asking for advice and suggestions concerning shelving and cataloging. If there was a problem she would put it up to Professor Hille or Professor Bochner, until she really could read their minds as to what they would say. Then she would just go ahead.

I think now in the math library problems of cataloging are much more severe. This is because categories change. For example, when I was a young mathematician, the area known as graph theory was under topology, or analysis situs as it was first known. So if you wanted to look up something in graph theory, you went to the section on analysis situs. But in recent years graph theory has become such a large subject on its own that it was necessary to establish a new category. I happen to have been responsible for that change, because I found that it was such a nuisance to always have to look up things in graph theory by looking for them in topology or analysis situs.

Aspray: Can you give me an idea how large the library was in terms of numbers of journals and volumes and such?

Tucker: No, I can't. I can say that all the journals that were of any mathematical interest at that time were available. This was where the *Annals of Mathematics* came in handy, because many of these journals were obtained by exchange. For example, *Annals of Mathematics* would go to the London Mathematical Society, and the London Mathematical Society would send the *Proceedings of the London Mathematical Society* here. It was a straight exchange. There was a great deal of that at that time. I don't know how much there is now. At that time the best mathematics library in the country was considered to be the one at Brown University. This had been built up by a man named [R.C.] Archibald. His great success resulted from his trading books just the way stamp collectors trade stamps. He was glad to get duplicates of books, because then he would use them for trading purposes.

Aspray: How did the Princeton math library compare to the one at Brown and others in the country?

Tucker: The aim of the library was to have everything known to be of use to Princeton mathematicians, so it would be weak in some areas, such as number theory where there was no work being done at Princeton. That was because new books were gotten, as I said, mainly on the suggestion of members of the staff. Of course, there were some books that were in series and that sort of thing which were acquired rather automatically. So it was a collection that was as good in certain areas as you could find anywhere.

Aspray: I see.

Tucker: Archibald's work led to a tremendously valuable library, which you knew you could rely on. If there was a copy of the book in the U.S., then it was a hundred to one that there was a copy in the library at Brown. I have used the library at Harvard, but there the math library, at least in the '30s, was right in Widener, the main library. I've used the math library of the University of Toronto; again it was in the stacks of the main library. I have used the library at Caltech, which was a much smaller library and easier to use, but there mathematics was just a section of a larger scientific library. The outstanding feature of the Fine Hall library was its accessibility and its comfort. The atmosphere there seemed to make you scholarly.

Aspray: Was it a circulating library.

Tucker: The general rule was that books were not to be taken out of the library; journals were never taken out of the library. There was a provision for students to take books out overnight or over the weekend. This was particularly for married students; single students were expected to work in the library. To take books out was not against the rules, but against the spirit of the place. Miss Shields, the librarian, was very firm about letting books out, so to check a book out was a privilege accorded only for very important reasons.

Aspray: What about the faculty? Did they have a different status than the grad students in borrowing privileges?

Tucker: There was an agreed policy by the faculty that books should not be taken out of the library. In other words, they themselves made this rule. While it was understood that there could be exceptions to the rule, and this was a matter of individual judgment, nevertheless the group frowned on this. I never knew of anyone abusing this privilege. I am sure if there had been Dean Eisenhart, the chairman of the department, would have called that person in and, in a very nice, polite, courteous way, told him to mend his ways.

Aspray: Did the department own a set of models, used perhaps for teaching purposes?

Tucker: There was a set of models, but it was not kept in the library. It was kept in one of the seminar rooms on the second floor of the building. We haven't talked about anything except the top floor.

Aspray: Are there any other points you would like to make about the library?

Tucker: No, I think we have covered that pretty well.

Aspray: Why don't we move on to the second floor?

Tucker: All right. On the second floor, there was again a central courtyard. There was a hallway that went all the way around the building next to the central courtyard. Between this hallway and the outer wall of the building were the offices or studies.

Aspray: So all the offices or studies had outside windows and not inside windows?

Tucker: That is right. There were five or six offices along each long side of the interior court. The end of the second floor nearest the physics building, Palmer Lab, was a large room called the common room. This was a lounge with easy chairs, small tables, and a lot of chairs like this one I am sitting in—in fact, this is one of those chairs.

Aspray: Hard and upright.

Tucker: Hard upright chairs with leather cushions and a leather back. The common room was definitely the most used room of the building.

Aspray: Was it large enough to accommodate the entire mathematical community?

Tucker: If they were all there it would be pretty crowded, but you could have 20 or 30 people there and it still would not be crowded.

Aspray: And that was not uncommon?

Tucker: No, especially in the afternoon around 4:00 when tea and coffee and cookies were served there.

Aspray: This was every day?

Tucker: Every weekday. In the year that Fine Hall was opened, '31-'32, I had a Procter Fellowship. At the start of the year Professor Veblen called me into his office and told me that he was appointing me chairman of the tea committee. I tried to get out of it by saying that I did not particularly care for tea. "Well," he said, "have coffee or cocoa or whatever you like, but you are in charge." He said I could ask for assistance from any of the other people who held fellowships, even those who held post-doctoral fellowships. He said, "You organize it. Tea should be served every weekday at 4:00, and it should last until 5:00." So during that year I had to arrange for the tea to be served. The system we followed was that two of the fellowship holders would, on a given day, serve tea, get out the cookies, and so on. There was a kitchenette that was across the hall from the common room, and there was even a dishwasher in that kitchenette.

Aspray: Even in the 1930s?

Tucker: Yes.

Aspray: It must have been one of the early ones.

Tucker: It was. There was even an electric stove with an oven, so that you could warm things up. Fine Hall had all the amenities that you could think of. Two people would serve the tea, put out the cookies, and so on, and two others would come along and do the K.P. work at the end of the tea period. This was to include stacking the dishes in the dishwasher. Then the first thing that the janitor did when he came in the next day was to get the dishwasher going. But there was a certain amount of slackness. People did not do their jobs very well or did not show up. You could trade days with somebody else if you wanted to be free on a certain day. I had to direct all this, including deciding on how many cookies to order. We would get them wholesale from National Biscuit Company. It was quite an enterprise.

The final thing to tell is that at the end of the year the janitor persuaded Dean Eisenhart that it would be better to have the janitor do this. So he was paid two hours overtime a day, Monday through Friday. He ordinarily left between 3:30 and 4:00; that was the end of his janitorial day. Then he stayed on for a couple of hours to make tea, serve it, and so on. He was a superior janitor. He was a man who had had a much better job than that, but had lost it during the Depression, His name was Hahr. He did the work well and efficiently, and earned the overtime pay that he got, which, by the way, was paid from research funds. This was regarded as entirely proper because the social atmosphere of the afternoon tea facilitated research.

Aspray: What part of the math community would come to tea each day?

Tucker: Graduate students, almost all of them, except perhaps the married ones. All those who were living at the Graduate College or who had bedrooms in town came. There was a certain problem then because many of the grad students were low in funds. They might try to make an evening meal of the cookies.

Aspray: I see.

Tucker: So there had to be a little bit of policing there: there was a quota on the number of cookies that could disappear. I don't think there was any problem with the senior members.

Aspray: Did the faculty attend the tea regularly?

Tucker: Yes. Eisenhart did not very often come because he worked in his office in Nassau Hall. He came to Fine Hall only when he had a class to teach or a meeting to attend or something like that. But Veblen and Lefschetz came. I don't remember seeing Einstein at the tea, but von Neumann came.

One person who would come to tea, but always right at the end of the session, was Alonzo Church. He ordinarily worked at nights, so unless he had a class to teach or something like that, his day started at about 3:00 in the afternoon. He would come by the common room towards the end of the tea session, and he would take any milk or cream that was left in the pitchers there and dump that into one of the almost-empty teapots and drink this mixture of milk and tea. Then he would depart for his office, where he would work through the night. In the morning, Agnes Fleming, the secretary, would find material on her desk left there by Professor Church. It was always very clearly marked up in colored pencil to indicate any special handling of the material, such as special symbols.

Aspray: Can we talk more about the common room? I assume that post-doctoral fellows were regular visitors.

Tucker: Oh yes. There was no distinction made between pre-docs and post-docs.

Aspray: What happened in the common room when tea was going on?

Tucker: Games were played in the common room. Chess, of course. But there were some special games that came to be played. There was a game called Kriegspiel, which as you probably know is a form of blindfold chess. There is a referee. Each player can see only his part of the board. The player tries to make a move when the referee indicates that it is his turn. If it is a possible move, the referee makes the move. If it is not a legitimate move, then the referee tells him it is not legitimate, and he has to try some other move. Also, one must move within 30 seconds. That was a very popular game. Sometime later on the game "go" became very popular. Some other games were actually invented and tried out in the common room.

Aspray: What about mathematics?

Tucker: There was no blackboard in the common room. While there was plenty of mathematics talk there, if you wanted to talk seriously about mathematics, you went to an adjoining room where there was a blackboard. The adjoining room was just around the corner, very easy to get to. That was the room, incidentally, where the mathematical models were kept; also there was a blackboard and a table. You could have a seminar there with three or four people comfortably.

Aspray: Was a decision made not to put a blackboard in the common room?

Tucker: I don't know the answer to that. The common room was not large enough to really permit this. If you had some people working at the board there, it would sort of clutter the area, particularly at tea time. Later on, since there seemed to be a need for more than one blackboard, another blackboard was put up right on the wall of the hall. And in the passageway leading into Palmer Lab a couple of blackboards were put up. The passageway was six or eight feet wide,

so unless three people were coming along abreast, there was plenty of rrom to have a couple of people working at the blackboard there.

There was a great deal of socializing in the common room. Because of the Depression, many of the pre-docs and post-docs were living in town, where they would just have a room. So the common room served as sort of a living room for these people. You could go into that room any hour of the day or night, and the chances were high that you would find someone there. They might be sleeping, or playing a game, or reading science fiction. It was truly a lounge. It was a living room for the whole department.

Aspray: I understand that the common room also played an especially important role for some of the foreign students and faculty members that came over. It was one of the few places in town where a lot of people with a common interest could get together.

Tucker: That is right. Quite a few of the graduate students and some of the post-doctoral people lived at the Graduate College. There was a limited lounge for residents of the Grad College. The Grad College housed somewhere around 300, but it was at that time much more expensive than living in town. I think it cost all of $1000 to live at the Grad College and eat your meals there, throughout the University year. Whereas in town, because of the Depression, you could live on half that, getting a quite acceptable room for between five and ten dollars a week, within easy walking distance of the campus. It probably would not have a private bath, but you would share a bath with two or three other students. You could eat meals at some restaurant on Nassau Street. I myself lived at the Grad College only one year, the year that I had a Procter Fellowship; it was one of the terms of the Procter Fellowship that I live at the Grad College. Otherwise I lived in diggings, as the British would say, that I found for myself.

In the fall of '33 I came back to start my term on the faculty of the University. I was an instructor that year. I ate my meals, luncheon and dinner, at Lahiere's restaurant. It is now the most expensive restaurant in Princeton, but was having a hard time then because of the Depression and because it was not on Nassau Street. It was about 100 feet off Nassau Street, and in those days there was a sharp distinction. All the important business went on on Nassau Street.

I got my meals there, luncheon and dinner, seven days a week, for $8.00 a week. I could even get a 50 cent rebate for a meal that I missed, provided I gave 24 hours notice. I shared a table at that time with Bohnenblust, a chiropractor, and a photographer who worked for the zoology department. We had a table of four together in that restaurant. During that year Fine Hall was my home. I visited my room only to sleep. I would even do my leisure reading or letter writing in Fine Hall.

Aspray: I see.

Tucker: Of course at that point I shared one of the studies. My study mate was Edward McShane, who was married. So he was not around in the evenings and I had the study to myself. I was there for part of the summer. There were casement windows that opened out, and when I was there in the evening with the light on, the mosquitos were quite a problem. This wonderful janitor, Mr. Hahr, made a couple of screens for the windows. They were wooden frames with mosquito netting. When I opened the window I would have to set the screen in the window, and to close the window I would have to take the screen out. So it had to be something that was light and easily portable. This shows that I was using my study as my living quarters. I did not eat there and I did not sleep there, but otherwise it was my home.

Aspray: What else was there on the second floor.

Tucker: At the end of the second floor opposite to the common room was a large room, even larger than the common room, which was called the Professors' Lounge. The idea of having the Lounge and the common room certainly came from Veblen. In the school year '28-'29 Fine died and the decision was made to build the building. Veblen spent that year at Oxford. He had changed places with G.H. Hardy. Veblen's wife was English. She was the sister of a physicist named Richardson, who had, around 1910, been on the faculty at Princeton. He went back to England and ultimately became the director of the Physical Laboratory at the University of London.

Veblen had a great liking for things that were English, and in particular, for the way things were at Oxford and Cambridge. So Fine Hall copied aspects of the colleges there. In those English colleges there is a junior common room for students (and faculty). There is a separate, "senior" common room for the dons, where they can go and drink their coffee and port after dinner and have meetings about the business of the college. So Veblen, I think, planned Fine Hall along those lines with a common room for everybody and a special room for the professors. This room was a much better proportioned and much brighter room than the common room, but it was seldom used, only on state occasions.

Aspray: I see.

Tucker: Two or three times a year there would be some sort of a reception, perhaps in the early evening. On these occasions the Professors' Room would be used. It also had a kitchenette, with a dishwasher and so on, across from it. I remember that at some point, aound 1950, I proposed that the Professors' Room be made the common room, that tea be served in the Professors' Room instead of in the common room, and that the old common room become a game room, a place where people could go and play chess and that sort of thing, while the socializing that went on with the serving of tea be done in the Professors' Room. It is my recollection that this was actually tried for a while, but that nobody liked it. People had become so attached to the common room, that it did not seem right to be using another

room, even though the Professors' Room was at the west end of the building, so in the late afternoon it got the sun. This made it brighter than the common room, particularly in winter in the late afternoon. But somehow or other, the common room had acquired an atmosphere so that no other room in the building, even a better room, could take its place.

Aspray: The room didn't get used for private meetings for the faculty, for example?

Tucker: Oh yes, and occasionally when we would have a distinguished visitor and wanted to provide that visitor with a place where he could leave his coat and hat and sit in an easy chair and rest. He would be given a key to the Professors' Room.

It had a beautiful fireplace at one end. All the formal rooms of the building were completely panelled in oak. That is one reason the common room was somewhat dark. In the Professors' Lounge there was this beautiful fireplace, with carved figures, and these were mathematical. One of the figures was a fly exploring the moebius strip. Over the fireplace was something that Veblen had heard Einstein say in conversation on some occasion before Einstein came to Princeton: "Raffiniert ist der Herr Gott, aber boschaft ist er nicht." The mathematical physicist H.P. Robertson later gave this free translation, which is, I think, better than the somewhat stilted German: "God is slick, but he ain't mean."

I once met the man who had been the last chancellor of Germany before Hitler, Chancellor Bruening. He came to Princeton, and he came over to Fine Hall because he had heard of this fireplace. I happened to be at the mathematics office when he came. He explained what he wanted, so I took him to see the fireplace. He remarked that he didn't know whether it was appropriate to have a German quotation in an American building. So I told him the free translation, which he enjoyed very much.

At one corner of the second floor was the common room. At the other three corners were special offices, and one of these offices was the office for the professor of mathematical physics.

Aspray: The Jones Professor.

Tucker: Yes. His was the corner office that was nearest to the physics building. That was the office Einstein occupied when the School of Mathematics of the Institute was in Fine Hall.

Aspray: And later was the office of Wigner.

Tucker: After Einstein left it became Wigner's office. He stayed there until the move here to the new Fine Hall. Wigner would have preferred to have had his office with the physicists. He calls himself a theoretical physicist, and he objects to being called a mathematical physicist. He did not often attend the math department meetings—only

when he was especially asked for some reason to be there—but he attended physics department meetings regularly. So when the move was made here, he said said he wanted to have his office in Jadwin [the new physics building, adjacent to the new mathematics building] rather than in the new Fine Hall.

On the other hand, Arthur Wightman, who has been Jones Professor since Wigner's retirement, has an office in both places. He has an office which is next door here, which I never see him in, and an office in Jadwin. It was specified in the gift of Fine Hall—and Veblen and Eisenhart insisted on this—that the professor of mathematical physics be the Jones Professor and have an office in Fine Hall. The other two corner offices on the second floor were occupied originally by Veblen and by Alexander.

Aspray: Veblen held the research professorship?

Tucker: Yes, the Fine Professorship, and he had an office at the far end of the building. These two offices had the Professors' Lounge between them. Veblen had the office that had the southern exposure, and the one that had the northern exposure was Alexander's office. They both had western exposures. Now these corner offices had couches in them, as well as fireplaces. Veblen actually used his fireplace.

Aspray: Oriental rugs?

Tucker: Oriental rugs and easy chairs. You could have a meeting with six of eight of these chairs around a large table. There was a blackboard hidden behind the oak paneling, and the backs of the panels that opened up were also blackboards. There was a small clothes closet, that you could not see until you opened the door, where such things as coats and academic regalia could be kept.

Aspray: How large were the offices?

Tucker: Twice the size of this office.

Aspray: So maybe 20 or 30 square feet?

Tucker: Yes. The casement windows throughout the building had leaded glass, and in the more important rooms and offices the windows had mathematical designs and formulas, such as $E = mc^2$. The regular polyhedra were pictured on some windows. The side offices did not have paneling, except for the built-in bookshelves. Each office had built-in bookshelves and could have a blackboard and comfortable chairs. They would not have a couch, and they would not have a large table.

Aspray: Who was assigned to them?

Tucker: The junior members of the faculty.

Aspray: Did this include graduate students who were doing instructing?

Tucker: No. The graduate students, even those that were doing instructing, did not have office space. They had space in the library, about which I already spoke. The Missouri Club, that I spoke to you about in a previous interview, served the purpose of providing office contact between the grad students who were teaching and their students. If a student wanted to see a grad student who was his instructor, he would come to the Missouri Club the night that his instructor was there, if he particularly wanted to see him. But it was more or less a pooled arrangement: the person that was on duty there covered the waterfront for the department.

Aspray: What about the post-docs? Were they given office space?

Tucker: No. They again had library space. Yesterday when we were talking to Hassler Whitney, he said that he had not had office space. He was in Fine Hall its first year, '31-'32, but he had a place up in the library he could use if he wanted to. I've forgotten how many offices there were all together on the first and second floors, but it was somewhere between 20 and 30, so there was not enough for anyone except the members of the faculty, per se.

I forgot to mention another room on the second floor. The passageway between Palmer and Fine came in on the second floor. From the passageway to the front of the building was the common room. In the other direction, between the passageway and the office of the Jones Professor, was the room that served as the department office. There was room there for two secretaries' desks, filing cabinets, and the mail slots.

Aspray: The chairman was located outside the building at that time?

Tucker: The chairman, Eisenhart, had an office on the first floor, right underneath the Professors' Lounge. But because he was Dean of the Faculty (until about '33) and then Dean of the Graduate School, he worked out of his office in Nassau Hall. He would come to Fine Hall to teach his graduate course and for Department meetings and other things, but otherwise he did not come to Fine Hall, because he was very busy in Nassau Hall with his duties as dean.

On the first floor, in the center, where there was the central courtyard on the second and third floors, there was a lecture room that took up the whole inner rectangle. It seated about 100 and had a sloping floor. Ventilation was a bit of a problem in that room. There was supposed to be some sort of gravity-feed system of ventilation. But this pretty soon had to be replaced by forced-air ventilation, and unfortunately the fans that had to be used were noisy.

Underneath the common room on the first floor was a classroom, right in the corner of the building, so that it had outside light from two sides. It seated 45, very comfortably. It too was sloping and

tiered. Because the blackboards and the rows of seats went the long way of the room, whoever was at the blackboard had an intimate view of everybody in the room. The trouble with the central lecture room was that it was long and when you were at the blackboard, you could not see the audience at the back of the room. Also it did not have natural lighting, except from a skylight, and it did not have natural ventilation. So the most-used room, the room the was used every hour of the working day, was the corner room underneath the common room.

Underneath the Professors' Lounge was a room almost as deep as the Professors' Lounge, but not quite as long. It was the room that was designed for the chairman of the department, which was Dean Eisenhart. Because of the fact that Dean Eisenhart worked out of Nassau Hall, it was frequently used to house a guest or two. Next to Eisenhart's office, under the office of Alexander, was an office which I think Einar Hille had originally. But Hille left soon after the building was completed, and then it became Bochner's office. The corner office that was under Veblen's office, which was almost a duplicate, was Wedderburn's office. He was a bachelor, a lifelong bachelor, and he spent a great deal of his time in his office. He was rather a recluse, and he did not participate in common-room activities or any of that, but you always knew when he had come into the building because he smoked a cigar that could be detected.

Aspray: I see.

Tucker: Then in the corner of the building under the Jones Professor's office was the office of Professor William Gillespie, who was senior in the department next to Eisenhart. Well, I guess Veblen and Gillespie came from Chicago just about the same time. Gillespie too did not participate in social activities. He was an easy-to-meet person, but since he was not engaged in mathematical research, he felt that he was not a full-fledged member of the department. The research atmosphere was so strong there that I think he felt ill at ease in Fine Hall. He had sumptuous quarters as Master of the Graduate College, and he really used Fine Hall only just before and just after he taught his classes.

Along the front of the building, there was, next to the room that I said was such a successful classroom, a room that was designed to be a seminar room, but it was actually used as a classroom. Eisenhart usually taught his grad course in that room. He would then have ten or a dozen students. There was plenty of room for that; in fact, you could quite comfortably get 20 people in there. If there were more than 20, then you had to go to the room that seated 45. That room also, by the way, had cabinets with models, designs, and such things in it.

The front entrance of the building was right in the middle on the first floor. If you came in that front entrance, straight ahead of you was a large board with the names of the members of the faculty and the room-numbers of their offices on the two sides of the board. In the center was a corkboard for posting notices. There was another notice

board that was used more; it was on the second floor, right across from the common room. The more permanent notices went downstairs, and the week-to-week notices went on the board upstairs.

Aspray: I see.

Tucker: There was a small basement on the other end of the building toward Palmer Lab, in other words, under the department office and the common room. It was originally intended for storage, and the janitor had one of the smaller studies for the janitor's room. But when we became quite crowded in the building, a place was fixed up for the janitor down in the basement, and what had been the janitor's room was turned into an office for the department.

Aspray: What about the outside of the building?

Tucker: It was red brick with quite elaborate windows. I have mentioned that they were casement windows. The building had a slate roof, and this roof came down part way on the third floor, so there had to be dormers for the illumination that came from the outside. Actually the library was better illuminated from the inner court than it was from the outside, because the stacks were along the outside. they even blocked a bit the windows to the outside, but the windows to the inside were quite open.

Aspray: It sounds as though no expense was spared in construction of this building.

Tucker: That is right, nor in the furnishing. I think that Professor Alexander's mother, Mrs. John Alexander, who had had some experience in interior decorating, was the one who chose the furniture, drapes, and that sort of thing. The Jones family provided not only for the building itself, but they also provided for the furnishing of the building and an endowment for the upkeep of the building.

Aspray: What was the attitude of the Jones family towards such lavish accommodations?

Tucker: Any time there was an attempt to economize, Mr. Jones objected and said, "Nothing is too good for Harry Fine."

Aspray: I see.

Tucker: It was the daughter of David Jones, Miss Gwethalyn Jones, who represented the family at the dedication of Fine Hall. She used to visit Princeton about every five years to inspect it, so there was then a great deal of spit and polish to get Fine Hall looking its very best. Although the money had been given partly by her uncle, she somehow regarded it as her gift, and any change that was made, such as the transfer of the name when we came over here, was cleared with her. She is now dead, but she was alive when the transfer was made.

There was a small area with a shower and lockers. The reason for this was Alexander. He had a hand in the planning of the building, and he liked to play tennis. There were tennis courts at that time—there are none any longer—just outside Fine Hall and down the hill a bit. The idea was that he could keep his tennis equipment in the lockers there, and anytime he wished he could change into his tennis clothes, and afterwards take a shower and change back.

Aspray: Did other people use the facilities?

Tucker: Yes, but it was not very much used. I have used the facilities myself; I liked to play tennis.

Aspray: I see.

Tucker: Also there were some people who used it for squash. The gym with squash courts was only about 300 yards away. Of course most people used the facilities in the gym, showered there, took a dip in the pool, but there were a few of us who kept out squash equipment in Fine Hall. It was a little bit inconvenient coming back to take your shower; in the winter you had to wear an overcoat over your gym togs.

Aspray: When the Institute came to share Fine Hall, how was the space reallocated?

Tucker: Veblen and Alexander kept their grand corner offices. Von Neumann had one of the ordinary offices; he just kept the one he had had, which was on the first floor. Weyl was given one on the front of the building on the second floor, nearest to where Alexander had his office. The next office along was Robertson's, which, of course, he had as a member of the department. And the next one along was Bohnenblust's office. Marston Morse had an ordinary office. The people who had the best offices, the corner offices, the panelled offices, simply kept them, but two of them were people that switched from the department to the Institute.

Aspray: And Einstein?

Tucker: Einstein was first given an office on the first floor. I am not sure whether that was one of the corner offices or not, but then he was moved to a corner office on the second floor, next to the department office. That office became the office for the Jones Professor when the Institute people moved.

Aspray: There was no particular effort to put a set of offices together?

Tucker: No, and this served a useful purpose in that it meant the distinction almost completely disappeared between those with the University and those with the Institute.

Aspray: I understand that the Institute contracted to retain space in Fine Hall even after their own buildings were available in '39?

Tucker: Yes. The Institute paid rent to the University for office space in Fine Hall. The rent that came in from that was put into a special fund. I think Dean Eisenhart originally had the hope that that fund would grow to the point where it could be used to endow a professorship. I think the rent the Institute paid initially was something like $3000 a year, and then it went up to $5000 after a year or two. When they moved out, the arrangement was made that three offices be at the disposal of the Institute for Advanced Study for a period of five years, and the Institute contracted to pay $2000 a year. When I was chairman of the department, '53-'63, in the financial reports I received, there was listed the so-called "Institute Fund". At some point, without the department being aware of what happened—it was probably when the new Fine Hall was being built—the Institute Fund and the Fine Hall Maintenance fund were quietly absorbed into University general funds.

Aspray: I see.

Tucker: Some protests were made about this, but without success. It was a *fait accompli,* and the feeling was "You're getting this new tower and all. What are you fussing about?"

Aspray: Let me play devil's advocate for a moment. Everyone reinforces this attitude that the building was important to the productivity of the mathematics community here in Princeton. Wouldn't things have gone on just as well with this scintillating group of people no matter what your digs had been? What real significance did the building have?

Tucker: That is a hypothetical question that I don't think can be answered conclusively. If, in 1933, there had not been the building, Fine Hall, with some surplus space, the Institute would have had to set up shop somewhere else. There would have been nowhere else in Princeton to do it, except perhaps in a large house somewhere in town. Then the people housed there would have had to go over to Fine Hall when they wanted to use the library. There would not have been the afternoon teas, and the two groups would have had very little contact with one another. I don't think that the Institute's School of Mathematics would have been as desirable a place; some of the professors might very well have left. Nor would the situation have been as desirable for the young people who came to spend a year or two at the Institute.

Aspray: Presumably it would have been more devastating for the University.

Tucker: Yes.

Aspray: Because you would have lost the contacts with those major figures. I think it is important that that question be asked, because for someone who was not there it is hard to understand the importance that the building played.

Tucker: You find again and again in these interviews people saying what a wonderful thing the common room was. And the library, which was always open for people to use. It was the amenities of Fine Hall that caused me to come back to Princeton in 1933, after the year of my National Research Council Fellowship. I could have had a second year as a Fellow, just for the asking, but if I had, I would have had to spend it somewhere other than Fine Hall, because that was where I had gotten my doctor's degree. The experiences that I had had at Cambridge, England, and, particularly, at Harvard and Chicago, made me long for the comforts, the social atmosphere, and the library convenience of Fine Hall.

Of course there were other things: Lefschetz, Eisenhart, and so on. At the time Marston Morse told me I was a fool not to take the instructorship I was offered at Harvard, because he said the thing to do was to play hard-to-get, "You wait two or three years and Princeton will up the offer." This offended me, because I did not feel mercenary. I thought that if I had enough to live on, the size of the offer did not matter. What was important was the opportunity to be in the Fine Hall community.

Aspray: I understand that Fine Hall was a model for later mathematics buildings, that many departments took various features from the design of Fine Hall. In fact, when a book was written about mathematics facilities, discussion of Fine Hall had a prominent place.

Tucker: I think most of the young mathematicians who had been in Fine Hall, as a grad student or as a post-doc, carried with them memories of how congenial the facilities had been , and if later on they were chairmen of the department or otherwise in positions to influence their universities, they would often arrange to have features of Fine Hall copied.

I can mention someone that I know of. When John Kemeny went to Dartmouth as chairman of the math department in the mid '50s, one of the first things that he started working on with the administration was a building for math. That came about thanks to a grant from the Sloan Foundation. It is called Bradley Hall in honor of a Dartmouth alumnus who became a principal officer in General Motors. The Sloan Foundation itself is a gift of Alfred P. Sloan, who made his career with General Motors. Kemeny had a great deal to do with the design of Bradley Hall. It incorporates a common room, with an adjoining kitchenette, and its own library. Kemeny had to battle for the math library, because Bradley Hall was very close to the main library, and there did not seem to be any trouble in the mathematicians using the main library. But he was adamant on this issue, and he won. It is a very different-looking building than Fine Hall, but it has many of the same features. Another example is at the University of Western Australia, which I had the opportunity to visit three or four times. A building was built there under the leadership of the man who was the chairman of the department there and who took his Ph.D. here at Princeton about 1947.

Aspray: Who is this.

Tucker: A.L. Blakers. He got his Ph.D. in topology with Lefschetz and Steenrod. Fine Hall has a certain connection, certainly in Veblen's mind, with Oxford and Cambridge. So I am sure that at the University of Western Australia they thought of their math building as copying something at Oxford and Cambridge, rather than something at Princeton, but Blakers did not have any experience at Oxford and Cambridge and did at Princeton. I talked to him about it. I know that he was deliberately following the pattern that he had seen working so well at Princeton.

One other case I know of is at Arizona State University, where a building for mathematics was built under the leadership of Evar Nering, a good friend of mine. He was a Ph.D. of Artin here in the immediate post-war years. He was chairman there when the math building was built. It was built almost as part of a new physics building. The chairman of the physics department had a Princeton Ph.D. in physics. The two of them conspired to recreate something of the atmosphere that they knew from the old Fine Hall.

Aspray: I believe that Stephen Kleene, who helped design the math building at the University of Wisconsin, had Fine Hall as a model.

Tucker: The book you referred to earlier has the title *Buildings and Facilities for the Mathematical Sciences.* The author was J. Sutherland Frame, who was on leave from Michigan State University to write this book. He did it, I think, in '61-'62, and it was published in '63 by the Conference Board of the Mathematical Sciences. On the cover is a picture of Bradley Hall at Dartmouth. Inside are several pictures of rooms in Fine Hall: lecture rooms, the common room, the library, the Professors' Room. Although there is no separate section of the book on it, Fine Hall is a reference point in various places in the book. The consulting architect of Fine Hall helped Frame in the preparation of the book. The *Princeton Alumni Weekly* for October 30th, 1931, has a long article devoted to Dean Fine and to Fine Hall. Fine Hall was dedicated a week or so before this article appeared. The article contains the full text of the address which was given by Oswald Veblen on that occasion and which describes the circumstances that made it possible for Fine Hall to be built. The address also expresses the hopes that they had at that time for the impact on the world of mathematics that Fine Hall might have.