Oral History - Dr. C.R. Cassity

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Speaking for the Decatur Public Library, this is Betty Turnell with an oral history of Dr. C.R. Cassity, who lives at 32 North Drive in Decatur.

Q. Well, Mr. Cassity, you kindly gave me a resume of your background, but the earliest date you mention is 1929, the date you received your A.B. degree in mathematics from Millikin University. You went on to receive numerous other degrees that we'll talk about later and you have held important teaching and research posts and have written many publications in mathematics. I'll have to admit those titles sound almost like a foreign language to someone untrained in higher mathematics.

We'll talk about all these accomplishments, but surely before you embarked on this study of mathematics, you had to go through childhood and the traumatic teens. Can you tell us something about your early life?

A. My early life began, actually before I was born. My parents both registered at Millikin University the first day it way opened to the students. My father had previously taken one year of college in his home state of Iowa. My mother came from a farm five miles north of town, where she was born and lived until college days.

They met there and became interested in each other. They left Millikin, I think in 1906, without degrees. My father took a job with Westinghouse in New York City. The job was to build the first tunnel under the Hudson which I had thought for years was the so-called Hudson Tunnel or the Holland Tunnel, but I recently learned that that was not true. It was, as a matter of fact, a railroad tunnel. He moved over to New Jersey and rented a room for living quarters and the following summer the folks were married on the farm north of Decatur.

My mother went to New Jersey. This house was in Orange. A little over nine months later I was born in that room. My only knowledge of that situation is what my mother has told me. She said they looked out a rear window, some distance across a little ravine, directly into Tom Edison's shop. I have maybe stretched a point a tiny bit by stating that I was born looking into Tom Edison's shop. And since that seems to be true, I got a very early start on a scientific education.

The folks moved to Decatur nine months later. My father had been an electrical engineering student, and he set up an electrical contracting business in Decatur. I heard him say that he installed some of the first street lighting in the city.

Along about 1914 or so, by some process unknown to me, he got a contract to install the electrical materials in a cathedral being built in St. Paul. I went to first grade in St. Paul.

A year later my grandfather out on the farm was ready to retire. The folks took over the farm, and I spent the time from then until the summer or spring of 1929 on the farm up there.

Q. It must have been a shock to you to go from a school in St. Paul to ... did you go to a country school here?

A. Oh, yes, a one-room country school. As far as I can remember, I have no such recollection. I took it as a way of life; I don't remember much about the St. Paul situation, and I certainly had no feeling either for or against the one-room school.

Q. Well, it must have given you a good start, anyway.

A. It gave me the following kind of start. I will say something about my last couple of years out in the country school. Most people as old as I am know that in those days the country schools taught even-numbered grades one year and odd-numbered grades the next year. The year I was taking the eighth grade there was a tenth grade class being taught. I took the eighth grade and two subjects out of the tenth in the same year. The next year I took the ninth grade and studied independently the other two subjects out of the tenth. The next year I was through with the grade school and came to Decatur to high school.

The person in charge of the registration told me with no embarrassment whatsoever that Decatur High faculty did not expect students coming in from country schools to be very well educated. They told me that I would take first year algebra and plane geometry over again so I would be prepared for what followed. So I took both courses. At the end of the first period, approximately six weeks, I had discovered that the algebra teacher was being asked questions by her students, and she was giving them the wrong answers. I went to the head of the department and reported this fact to her. She took me out of that class and put me in her own second year algebra class.

Considerably later, the geometry teacher discovered me one day in class studying English instead of geometry. I needed it worse! I reported to the head of the department, and she put me in her own solid geometry class and gave me a job I almost failed to manage.

Q. What job was that?

A. Solid geometry, when I hadn't had the first half of it. I jumped in during the middle of the term.

Q. But you did get through?

A. I did get through.

Q. How and when did you decide that you wanted to devote your life to a study of mathematics?

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A.   I think it was about that time. It had been brewing for quite a while
       because I had never had any trouble with mathematics, arithmetic,
       geometry, or any of it. In fact, I discovered as time went by, the
       further I went, the easier the subject became.

Q.   Well, good!

A.   High school was easier than grade. College was easier than high school.
       Graduate study was easier than undergraduate study. Research was easier
       than any of them.

Q.   Because your faculties were improving all of the time?

A.   I was apparently prepared.

Q.   Well, now, I would like to list your degrees. In 1929 you received your
       A.B. from Millikin University. That same year you evidently went on to
       summer school at the University of Michigan, and another summer school
       in the years 1929 and 1930 at Michigan State. We'll skip to 1931 when
       you received your Master's Degree from the University of Illinois. In
       1938 you received your Ph.D. from the University of Illinois. Now it
       goes without saying that all of these degrees were in the field of
       mathematics. I don't think we need to go further into that because
       that's your study. In 1957--we're skipping a bit--you had a summer
       seminar in applied mathematics sponsored by the American Mathematical
       Society.

       Now, I'm sure you have done other studies, but that is really an
       impressive list of degrees. Now in addition to teaching, you have held
       positions in research and consultation with the Environmental Research
       Corporation, with General Electric computer department, and in their
       missile and space division. You've worked for the New Mexico Institute
       of Mining and Technology. You've worked with the Army Security Agency.

       Now that, again, is a very impressive list of activities. In your
       lifetime you have certainly spent much time in study. Did you take any
       part in any other activities? We know you had some interest in music
       because you served as president of the Community Concert Association,
       didn't you?

A.   Twice, I think.

Q.   Are you a musician yourself, or just a lover of music?

A.   As a musician, I'm very amateurish. I have played in several college
       bands for years. I have played in a few orchestras, but I am certainly
       not a professional. I have become interested in music mostly, well,
       people have asked me how I reached the level of musical understanding
       and appreciation that you have. I have a stock answer to the question:
       "By listening only to the best."

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Q. That would extend to other fields, too, wouldn't it? If we considered only the best, we wouldn't have any other examples.

A. You will, before we're through.

Q. I won't attempt to list your publications. It would take far too long. The titles of your articles and books sound like a foreign language to the average non-mathematician. There must be a great disparity between your understanding of mathematics and that of the average person. Do you ever find that frustrating?

A. Not unless I am supposed to be working with the people who prove to be deficient. If they don't even understand what I have to say, that doesn't annoy me in the least. Mathematics is a highly specialized field and an advanced field. One isn't born with it. One has to learn it. Some people are born with a certain amount of appropriate understanding. They learn faster than others, but it's not inherent.

Q. Do you think the way it is presented makes a difference?

A. That has a lot to do with it. I tell you, I have a very strong feeling that a lot of the mathematics teaching that was done in the past and is still true was done by teachers who have quite insufficient knowledge and appreciation of their subject and certainly far insufficient understanding and knowledge of what can be done with the subject. There are many teachers who know the manipulations, the theoretical subject, but they have no concept of what to do with it.

Q. When you say, "what you do with it", could you give us a little overview of what you think can be done with mathematics? Not a real lecture, but an example or two.

A. There is a society I belong to called "The Society for Industrial and Applied Mathematics"--SIAM for short, to all mathematicians. They put out a newsletter which every month describes the work being done by applying mathematics to other fields. Well, several fields are most common--physics and chemistry have been the major fields for many years. Others are coming in. A very noticeable one is medicine.

Q. Oh! And what relationship is there between mathematics and medicine?

A. Well, there are many. I can mention two or three. One is the propagation of disease through the public to produce what are called "epidemics." Another field that is being studied is blood and its method of moving through the arteries and veins.

Q. It does it through a mathematic formula?

A. Yes! More or less surprising to me and I think to most people is that field is closely related to shock waves.

Another field that has come up in the last couple of decades is economics. There was a mathematician named John Von Neumann, who introduced a subject called the "theory of games" and there was an economist named Von Morgenstern. And Von Neumann and Von Morgenstern got together and changed economics from "economics" to "econometrics."

Q.   Well, did they make money?

A.   I don't know. I don't think so. I'll tell you that one of the principal groups of people trying to use mathematics to predict what is going to happen in the future in certain fields are the economists because they are interested in making money and they have to know what's going to happen in the future. They have to predict the future. And it's a pretty tough kind of subject to predict. I will say that at one time I offered my services to AARP as a consultant or assistant in mathematical fields. One of the groups that asked for my assistance was the Red Cross.

Q.   Oh! Because of the reasons you have just given?

A.   The Red Cross, as everybody knows, takes a lot of blood. Most people don't know what they do with it. And they do different things with it. Some of it is used as whole blood. A lot of it is broken down into different parts of blood and used in different ways on different people, of course. The Red Cross man told me that they would like to be able to predict much better than they had ever before how much of each of those they could expect to need and the probable lifetime of the components. Different components last different periods, but they all go bad sooner or later. Then he gave me some references to materials which they had been using, but they were not satisfied with the results.

Q.   And you helped them?

A.   Well, no, as it developed. They told me before I got started that the man who was responsible for this was being replaced by another man. I asked him if the new man had been appointed and if he was on the job. He said, "No, not yet." I said that I wouldn't work under those circumstances. That fellow may have his own ideas as to what to do with this. My ideas might not agree with his. I wouldn't undertake it until that man is on the job. I never learned that he was on the job.

Q.   That's too bad! It's their loss!

A.   I don't know. There are a good many cases where mathematical techniques have been developed that have been good for some purposes, but that does not guarantee that they will be good for other purposes. I've had experience with a couple of cases of that kind. You just have to be versatile enough to pick up and find out what's needed, how to get it done, train other people to do it, and if no known method exists, try to develop a new one.

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Q. Well, Dr. Cassity, you have studied and worked and have done research all over the United States, but you came back to Decatur to live. Why did you do that?

A. Well, there are some specific reasons and some general reasons. The specific reasons are that I still have two brothers in this vicinity--one in the city and one a little distance out. I have a farm in this vicinity. I graduated from Millikin and I still have a few friends around from those days. And I had come to this part of the country seeking a place to live. I tried Champaign. I tried a few other places around and decided that Decatur seemed to be the most promising.

Q. Good for Decatur!

A. I've been disappointed since I've been here, however, in several respects.

Q. In what way?

A. One of them is workmen. I find good workmen impossible to find. There just don't seem to be any! People don't know how to do good work. I will criticize the Decatur management--they keep complaining because there are no jobs. Well, my story is, if there were jobs, there wouldn't be good workmen to fill them. There is no use having a job if you don't have someone to fill it. The workmen around here are so poor!

Q. Why do you think that's true?

A. I don't think that. I just know that it's true.

Q. And it hasn't always been like that?

A. I really couldn't say. I didn't think it was so in previous times. It may have been.

Q. You have known and worked with good workmen?

A. I have.

Q. So it's possible to improve workmanship?

A. It certainly is. But you're not going to do it in the schools.

Q. How will it be done?

A. I think that's a question that it's rather useless to answer. The first requirement and one that I have stated repeatedly is--in order to do a good job, the prime requirement is to know a good job when you see it. That is missing in this area. The people who are working around here now have never seen good work. They don't know what it is.

Q.   When you say "work", what are you referring to?

A.   I am referring to construction people particularly. Now I do not know about professionals around here. I haven't been around enough to know them. I am reasonably certain that there are some pretty good professional people here, people, probably at Staleys, a lot of them at ADM, maybe at Mueller's, but in the general public they are very, very scarce.

Q.   When you first came to Decatur, you were only nine months old--so you probably can't tell us about your first impression.

A.   My first impressions did not exist.

Q.   What about the time you were in high school? What was Decatur like then?

A.   Decatur then was about half as big as it is now in population, and not much over half as big in physical size. I remember driving in from what is now Route 51 and I think Pershing Drive did not exist. Division Street was about the outer limit of the city. My folks have told me that when they started at Millikin, it was out in the corn fields. So Decatur has certainly grown, but I rather question that it has matured.

Q.   But you still continue to live here so you must get some enjoyment out of it.

A.   Well, I have some other connection that I'll tell you about now. They are related to my coming here. I have been married twice. My first wife I first met at Michigan State College. She, at that time, was secretary to the English department in the college. We were married the summer after I got my Master's degree--two years after I went to Michigan State. We lived together for fourteen years. It was becoming clear that we were seeing life in different ways, and we were divorced.

My second wife at that time I had never met. I could tell you some long stories about meeting, but I'll cut them short. She was born in Humboldt.

Q.   Humboldt?

A.   Illinois. Ten miles north of Mattoon. She had graduated from Eastern. She was recruited by people sent out by the office of the Chief Signal Officer of the Army. The recruiters had been given two inviolable rules for people they would try to recruit. In the first place, the people had to be college graduates or graduating that June. At that time only one person in ten became a college graduate. The second rule was that among the college graduates they could talk only to the top 25%. Now you have one out of four on top of the one out of ten. You have now one out of 40 from the general population. When a particular girl reported to work, she was assigned to a group that had approximately 3,000 people in it. I was supervisor for 30 out of those 3,000--pretty near the top

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30. This girl within a couple of months had proved she was the top one out of my 30, which makes her the top one out of 3,000 in addition to starting with one out of 40. That is one person out of 120,000 people. Five years later we were married.

Q. And that marriage worked out well?

A. We lived together 34 years until she died seven years ago.

Q. That's too bad, but that was quite a romance--a mathematical romance I would say.

A. She had an undergraduate major in mathematics.

Q. So you certainly made a good choice. And that explains your reasons for returning to this area?

A. Partially. She was from this territory. She had a sizable family. At the time I first knew her, she had two living sisters and a living brother and four nieces and nephews and six grand nieces and nephews, who were distributed as follows: one of the sisters in Watseka, one of the sisters in Charleston, a brother in Decatur. The children in Charleston and the grandchildren mostly still to come. And as of right now, the sister in Watseka is in a nursing home in Alexandria, Virginia, where the daughter of the family lives. Another sister is in Charleston, a brother in mattoon, and the next generation in Charleston, in California, and in Springfield.

I graduated from Millikin in June 1929, but I had completed all of my courses and was ready for graduation in January, and had taken the required education courses to get a teacher's certificate, but the certificates were not given until one actually had the degree. In March, however, the Millikin mathematics department got a request from Shelbyville High School. They had lost a math teacher and wanted somebody to finish the semester. I went down and was hired without a teacher's certificate. At the end of that semester the principal said to me, "We don't want you back here next fall. You will never be a high school teacher. I suggest that you get yourself a college job." That September I was at Michigan State.

Q. Well, maybe he did you a favor?

A. He did! Here's another story. In the spring of 1942, I was at the University of Alabama and two men down there in the mathematics department, majors in algebraic geometry, received letters from the Chief Signal Officer of the Army, asking us if we would consider coming to Arlington to work for the Army. We both replied "no." We both got second letters, more insistent. We replied "no." I received a third letter stating "We have a training course of home study which we would like to have you take. When it is completed, we will again ask you if you will come to work for us after you have some knowledge of what we're doing."

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Summer was coming up. I had nothing else to do so I took their course and was offered a job at a significantly larger salary than I had been receiving. And it was war time and I really had no particular objection to trying the Washington, D.C. area. So I went there to work for one year in a very small subdivision.

At the end of that year I was transfered to a group that was needing people badly. They were expanding very fast. They were taking almost anybody they could get, including me. I was told immediately, "You will work for Mrs. Sinkov." I met Adelia Sinkov. I said, "A few years ago I was writing a Master's thesis. I found an article written by a man from the Canal Zone. His name was A. Sinkov. Are you related to him?" She replied, "I married him two weeks ago."

A week later this girl from Charleston showed up. She was told she would work for Mrs. Sinkov. There was no such thing. There was a man named Cassity in charge.

Q.   You had been assigned to that job?

A.   I had taken Adelia's job in two days after I showed up to work. She had gone to Brisbane, where her husband was a full colonel, on their honeymoon. When she returned, she did not return to that job. There is a related story which I will tell. About that time or just previous to that, there had been a group of soldiers who came to the post directly out of basic training. There were 20 of them. They had been told, after a while, if your work is satisfactory, you will be assigned to officer's candidate school and become officers. All of them went to O.C.S. except one. There was a corporal who didn't pass the physical. After that, we began receiving from the Pentagon, almost weekly, bus loads of generals who wanted to know what we were doing out there, two miles from the Pentagon. All of the people at our post met with the generals to tell them what we were doing.

No matter who else might be meeting with those generals, two people were always among the group meeting them. One of those people was Adelia Sinkov. The other was our friend, the corporal.

Another tale. When I first went to this post I learned that there was a man who was technical director for the whole post--everybody. He was the world's top notch cryptanalyst. I saw him several times a week, sometimes more than once a day, and learned something about the man. He had been born in Russian and brought to this country when hardly out of the cradle. In the course of time he got a degree from Cornell--a degree in plant pathology. At that time there was in Geneva, Illinois, a company known as Riverside Laboratories. They had two principal studies underway. One of them was a study of plants--a study which through various studies and time eventually produced hybrid seeds.

Q.   Amazing!

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A.   They needed William F. Friedman, with a degree in plant pathology from Cornell. Their other principal study was one that many people heard of but very few understand. That is the hypothesis that many of the works that we today assign to William Shakespeare were in fact written by someone else. Specifically, one of the candidates is Francis Bacon. Bacon is known as a man who was interested in cipher systems. It is thought that if Bacon wrote any of the plays, he buried in the play messages stating that "not William Shakespeare, but I, Francis Bacon, wrote this play." And the Riverside Laboratories had hired a woman named Elizebeth Smith from Midland College in Michigan to try to locate those secret messages.

Friedman became more interested in Shakespeare and Smith than he was in plants. They were married--the first husband and wife pair in standing in the field of cryptanalysis. The second, the Sinkovs, and the third, the Cassitys.

Q.   You have proved that mathematics can have some very romantic overtones. Dr. Cassity, we thank you for sharing your reminiscences with us. You have lived a very full and exciting life. We realize now that you didn't spend all your time in your study writing those books and articles, but that you did have a very exciting career.

We thank you for sharing all of these experiences with us. It really is an honor to salute such a distinguished citizen of Decatur, and we appreciate this.

You have been listening to the oral history of Dr. C.R. Cassity.