2009 Visions of

Computer Sciences Lecture

Socrates, Moore, and Computer Science Education

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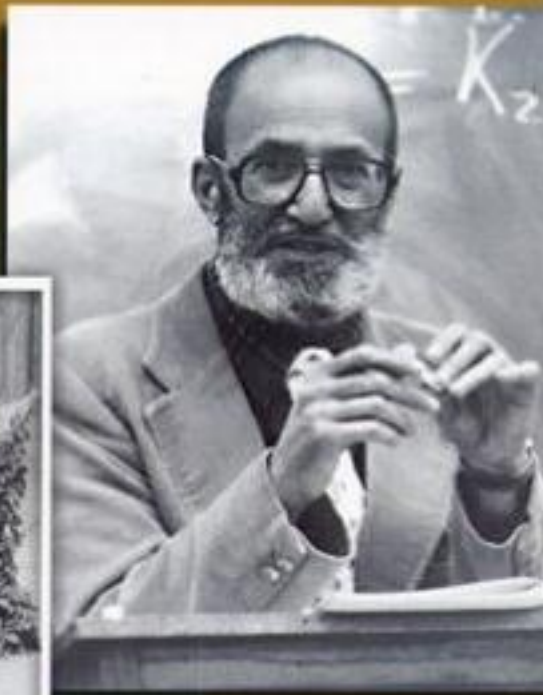
Outline:

- The experience with Halmos

- The effect on me

- How about computer science courses

And now for something entirely different…

The presentation of the Holloway Award

My Moore Method course with Paul Halmos

I Want to Be
a Mathematician...
an automathography

Paul R. Halmos

What was he like?

My Moore Method course with Paul Halmos

Set the scene:

Spring semester, 1968

University of Michigan

Functional Analysis I

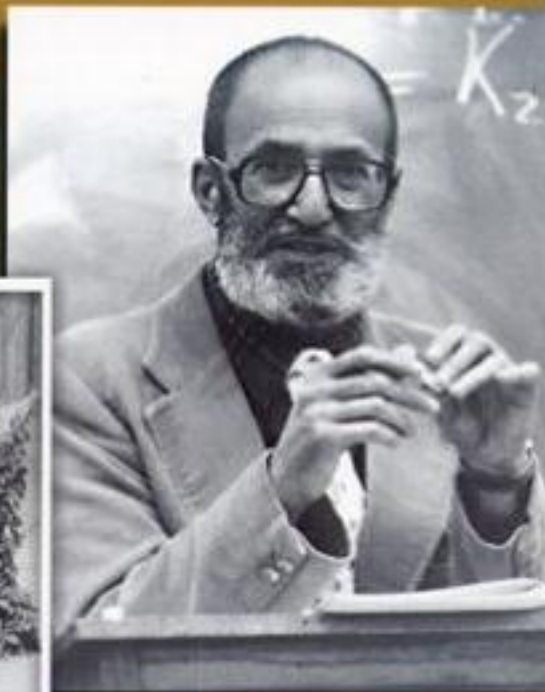7-8 students including one undergraduate

First Day Instructions:

- Moore Method or Lectures?

- Halmos:

    - "Borderline too large"

    - "2/3 coverage with Moore Method"

    - "Not like freshman doing homework on the board"

    - "If it takes 30-40 hours of preparation per week, that's what it takes"

The Format:

- Consult no books

- No collaboration

- Three one hour meetings per week

- Halmos generally called on students to present

- Sometimes he asked for volunteers

- Two or three or four presentations per class

- Following student presentations, he introduced definitions then the theorems and problems (meaning theorems not subsequently used) for us

The Course Changed my Life

The Course Changed my Life

Was this good or bad?

The Course Changed my Life

- A lifelong mastery of the material

- Supreme confidence

- A certain guilt/consternation associated with reading others' work

- Nonreliance upon books, or journals, or colleagues

The Course Changed my Life

How much of that was caused by the Moore Method ?

and

How much of that was caused by my own situation ?

Moore Method Courses

Paul Halmos:

"Some say that the only possible effect of the Moore method is to produce research mathematicians, but I don't agree. The Moore method is, I am convinced the right way to teach anything and everything. It produces students who can understand and use what they have learned. It does, to be sure, instill the research attitude in the student – the attitude of questioning everything and wanting to learn answers actively – but that's a good thing in every human endeavor, not only in mathematical research.

"There is an old Chinese proverb that I learned from Moore himself:

> *I hear, I forget;*
> *I see, I remember.*
> *I do, I understand.*"

Is the Moore Method Suitable
for all Computer Science Courses?

Halmos said:

"The Moore method is, I am convinced *the right way to teach anything and everything.*"

"everything"?

Anatomy?
Organic Chemistry?
French?

…

Our department has been a world leader in offering Moore method classes

At one point courses were being offered by

- Bob Boyer,
- Vladimir Lifschitz,
- J Moore,
- Alan Cline

… which was more than the UT Mathematics Department.

So, When is the Moore Method Suitable for Computer Science Courses?

When the

- class size,
- instructor,
- material,
- and (possibly) resources,

are appropriate.

Moore Method Instructor:

The instructor must be prepared to listen carefully to questions…
and then refuse to answer - which doesn't mean anything like ignoring the question.

So, When is the Moore Method Suitable for Computer Science Courses?

When the

- class size, if oral presentations, small enough to keep pressure
- instructor, prepared for diverse responses
- material, small axiomatic system
- and (possibly) resources, graders for large classes

are appropriate.

So When is Something Like the Moore Method Suitable for Computer Science Courses?

Almost always
(in some form or another)
and we may be already doing it
(to a degree).

What is Something Like the Moore Method?

A course that a has a well crafted set of exercises that:

expects a good deal of work to be done by the students
but not so much as to be discouraging

allows for students to be in states of confusion
but not to the point where nothing is accomplished

gives students the feeling of discovery and
personal participation in the process.

This could be theory

       or programming

              or systems

                    or computer applications

but it is important that students know enough about the what they are doing to be able to answer questions such as

How do I know when I am wrong?

How do I know when I should do better?

"Here's an outline of the problem,

what would you do?"

"Here's an outline of the problem,

what would you do?"

"And what would you do next?"