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Reflections on Professor Miklos Hetenyi An SESA Founder, Graduate Advisor and Friend

by

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In retrospect my association with my thesis advisor, Professor Miklos Hetenyi, at both Northwestern University and Stanford University was most beneficial and pleasant. There was no question that he was very intelligent, congenial and an outstanding scholar. I will forever be indebted to him for accepting me as a graduate student, taking me with him to Stanford when he left Northwestern and for his assistance in obtaining the fellowship funds and student loans necessary for me to complete my education. I elected to work with him due to Pat MacDonald, a former student of Hetenyi at Northwestern and the Head of the Engineering Mechanics Department at N. C. State College while I was serving as an instructor in the department. Hetenyi came to campus as a seminar speaker and, in fact, I invited him to speak to my strength of materials class hoping that he would inspire them to be better students. Instead, his excellent extemporaneous speaking ability and good humor on that occasion influenced me to seek his support in continuing my education.

I admired Professor Hetenyi (I was never able to refer to him as Myklos even though he suggested such in our long relationship after I graduated) for his accomplishments, his congeniality and especially his anecdotes about many of the famous people in the history of mechanics in general and photo-mechanics in particular. He was extremely proud of being a student of Professor Steven P. Timoshenko and enjoyed telling stories of his days at the University of Michigan and the hardships that some students of the 30's endured while working on their Ph.D.'s. He would reminisce about how Timoshenko came to the U.S., began working at Westinghouse and his move to Michigan and later to Stanford. I'm sure Hetenyi felt he followed in Timoshenko's footsteps relative to coming to the U.S. and his position at Westinghouse after he left Michigan. Hetenyi's move to Stanford was likely influenced, at least in part, due to Timoshenko having made the same move many years earlier as well as having the opportunity to join his colleagues Norman Goodier and Don Young. Both had written books with Timoshenko and had maintained a close relationship with him after his retirement. For some who read this article it might be interesting to know that Goodier married Timoshenko's daughter and Hetenyi's wife (Jean, a lovely lady from Scotland) was a former secretary of Timoshenko.

I remember Hetenyi describing how Timoshenko, after teaching his morning classes, would then walk to the desk of each student and spend some time with each on his studies and/or thesis. As a result, I found it surprising that Hetenyi did not do the same. We did spend time together but

there were no regular meetings to discuss my research progress until late in my thesis process. At the time I would have appreciated more guidance but I have come to realize that he did me a great favor by forcing me to be independent and to essentially guide my own efforts. Later while directing my own graduate students I came to realize that micromanagement of a student's research is, in fact, often a disservice.

Hetenyi seemed to know and to have met many of the "old masters" of mechanics including such men as von Karmen, Prandtl, Koiter, Michell, Nadai, etc, and had an interesting (and sometimes humorous story) about each, many of which I have passed on to my students. He was especially close to Professor Theodore von Karmen (a fellow Hungarian) of Cal Tech and had several humorous anecdotes about this interesting and outstanding man. Of course, he often spoke of the early pioneers of photoelasticity as well as his contemporaries in the field. Hetenyi's work in the late 30's on the stress-freezing and slicing technique used for 3-D photoelastic analysis was well received by the photoelastic community and established him as a leader in the use of the technique for the solution of difficult three dimensional elasticity problems. His 1938 paper in the Journal of Applied Mechanics was the first to provide a firm foundation for the technique from the then emerging knowledge of the molecular structure of polymers. It is interesting to note that R. D. Mindlin (another SESA Founder) and D. C. Drucker (SESA Past President) as well as M. M. Frocht wrote discussions of this paper in which they complimented him on his contribution but did make a few suggestions as well.

Professor Hetenyi was equally at home in both theoretical and experimental mechanics. His 1946 book "Beams on Elastic Foundations" was widely acclaimed as was his solution of the elastic quarter-plane problem. Together with Pat McDonald he published a solution to the contact problem under both pressure and twist which was verified using the stress freezing and slicing technique. I'm sure it was his influence that led me to the conclusion that experiment and theory should go hand-in-hand and that neither is as strong alone as together.

At Northwestern, I was introduced to his excellent approach to such classes as elasticity, plates and shells as well as a unique course in stress analysis where I became acquainted with his method of initial conditions for solving indeterminate beam problems. His teaching methods, I believe, were reminiscent of his early education in Hungary at the University of Technical Sciences of Budapest. He taught from notes prepared on heavy paper which I'm sure he had used for many years and were likely closely related to notes from his classes with Timoshenko. At Northwestern I had a course in thermal stress analysis from another of his former students, John Dunders, who is well known in elasticity circles as contributing to inclusion problems.

Near the end of my first year at Northwestern in the early 60's, Professor Hetenyi accepted the opportunity to move to Stanford to set up a new experimental stress analysis laboratory and asked me and a fellow graduate student, Wes Brill, to move with him and assist him in the task. While our first year at Stanford primarily involved obtaining the necessary equipment and supplies for the laboratory, he suggested several thesis topics to each of us. Wes selected photoplasticity and I initially selected the Moire' technique but later changed to photoviscoelasticity. We each found these to be very difficult topics but for different reasons. Wes found an over-abundance of references on photoplasticity as Hetenyi had published a survey paper on the subject in 1960. However, other than Hetenyi's papers in the late 30's that documented both mechanical and optical creep of Bakelite, I initially found only one highly mathematical paper on photoviscoelasticity published by SESA/SEM Founder, Ray Mindlin. The intense period of research led me to understand that many of the people that did early work in the area of photomechanics moved on to make major contributions to various areas of analytical mechanics. Ray Mindlin and Dan Drucker are but two outstanding examples and I might add that Hetenyi spoke highly of each for both their contributions and their character.

During my years at Stanford I had the pleasure of meeting Timoshenko who came back to campus from retirement in Switzerland to attend the dedication of the new building that housed the Engineering Mechanics Division. We had an open house for Hetenyi's new Experimental Stress Analysis Laboratory followed by a chance for faculty and students to meet and chat with Timoshenko over punch and cookies. Two photos of this event are shown below,



M. Hetenyi, S.P. Timoshenko and D. H. Young



Hetenyi and Timoshenko with students

The first is a photo of Hetenyi with his mentor, Timoshenko, and his close friend Don Young. The second is a group photo including Hetenyi, Timoshenko and several of the graduate students in attendance including two of his own that later became SEM Presidents. (I'm sure all will recognize Bob Sullivan but wonder if anyone will recognize a slimmer yours truly!) It is my opinion that of all the possible ways that Professor Hetenyi could be remembered, he would prefer that associated with the above two photographs.

I came to know and understand Hetenyi much better after graduation than during my student years. After he retired, I would visit him at least once or twice a year at Stanford when I was in the area discussing research with my grant monitors at NASA-Ames. We would have lunch in the Stanford faculty lounge and later coffee or tea at his nearby home. He would again regale me with stories of his early life in Hungary and his associations with colleagues near and far. He even played the violin for me on one occasion and showed me some of his early paintings. He hastened to tell me that his paintings were not very good, especially when compared to those of his brother who was an accomplished artist.

It goes without saying that Hetenyi was very proud of his contributions to the establishment of the Society for Experimental Stress Analysis, his role in creating the first Handbook of Experimental Mechanics, his contributions to the literature of experimental mechanics, and his associations with the early leaders in the society. As he neared retirement in 1972 and afterwards he did not attend SESA/SEM meetings. However, during my term as President of SEM, and at the encouragement of several fellow SEM members, I was able to bring him to the 1979 San Francisco meeting and to have him say a few words at what is now the Awards Luncheon. I remember that he was very pleased by the invitation as he recalled the event on several of my subsequent annual visits.

After his death in 1984, I was honored to be asked by Professor Tom Hughes to give a memorial seminar at Stanford for my mentor, Professor Miklos Hetenyi. I can only hope that I was able to convey a fraction of my affection and gratitude to this outstanding scholar and friend to his Stanford colleagues. Similarly, I hope that this article will convey the same to all my colleagues and associates in SEM.