Your magnificence, spectabilis, honorabiles, dear colleagues, honored guests, ladies and gentlemen:

HOW I GOT HERE

First of all, I would like to thank the rector, the dean, professor Hajicova and all others who were active in gaining for me this great honor. It seems to me that I am extremely lucky to stand before you. It won't surprise you that I will try to recall how it came about that I got here. It is generally believed that scientific talent reveals itself in early youth. The child collects specimens, dissects animals, or sets on fire some laboratory. This was certainly not my case. I somehow slid into my scientific profession. My mother wished for me to become a physician, just like my father. My parents planned to have me educated in one of England's famous public schools. To teach me German, they engaged a German governess. I myself wanted to be a lawyer, defender of the unjustly accused. But my career is the result of political circumstances, academic possibilities, and lucky accidents.

I was born in Kladno where my father was a dentist. When I completed second grade, an Nazi edict prevented us Jews from further school attendance. We were taught the the subjects of the third and fourth privately in small, constantly changing groups: my classmates as well as my teachers were being progressively sent to various concentration camps. My family was banished from Kladno in the summer of 41 and we found ourselves in Prague.

Beginning with the summer of 42, all instruction was forbidden. The officials of the Jewish community divided us into four "asylums" where we played games, participated
in competitions, were being familiarized with different aspects of culture. For instance, the well known translator of Shakespeare E.A. Saudek talked to us lovingly about the Bard. We skated and played soccer, probably till 1944, at the old Jewish sporting club Hagibor in the suburb of Strasnice. We had to walk there from the Old Town because without special permits Jews were not allowed to use public transportation. Toward the end of the War, there remained almost none of my friends in Prague and those who were left were reduced to playing in the yard of a certain house in Maisel street or in the Jewish cemetery which the former Communist regime destroyed to make room for Prague's ugly television tower.

When the War ended I successfully completed the entrance exam into the fourth form of the gymnasium. Of course, I lacked 3 years of school attendance and so I started with four D's. I progressively lowered their number until only one remained. But during my entire studies I never received a single A in any subject. Fortunately, when I reached the last, eighth form, my mother emigrated with us into the United States. Besides, the activists of the school's communist youth organization declared in any case that they will never allow me even to take the graduation examination.

It took enormous effort for my mother to succeed in emigrating. She didn't want to emulate my father's big mistake. After the Nazi occupation, he prepared everything for a departure for England, including the shipping of his dentistry tools. Although he had both a passport and a visa, he finally decided to stay put, and this decision later cost him his life in the concentration camp Terezín.

The real reason we left for America was that my mother wanted to safeguard for me the opportunity to be educated: in 1949 it seemed very likely that the Communist regime will never allow me to attend any university. Upon her arrival she earned her living as a cook, first for families and later in restaurants. I completed high school and then contributed to the family economically by working in a factory in New Jersey to which I commuted by bus across the river Hudson.

As I already mentioned, my original desire was to be a lawyer. But once in New York, I said to myself that with a foreign accent I could never succeed in court. Besides, the study of law required at least 7 years, while it was possible to earn an engineering degree in 4. So I took up electrical engineering in the Evening Session of the City College of New York, having shown no previous inclination toward that profession. For the last two years of study I received a stipendium for MIT. Stipendia were provided by the Committee for a Free Europe to which I pledged my willingness to help rebuild Czechoslovakia when it became free again.
I didn't seek employment after I received my bachelor's degree, but continued to study for a doctorate. Fortunately, to electrical engineering there belonged a discipline whose aim was not the construction of physical systems: the theory of information. It was its golden age at that time: its pioneering contributors led by the founder Shannon lectured at MIT.

Both at Harvard and MIT there was active the great Russian linguist Roman Jakobson who spent the inter-war years in Czechoslovakia. From time to time he used to invite my friend Matejka and me to dinner at his house. Jakobson arranged for a MIT fellowship for my wife Milena when she was finally allowed to join me in the US. At MIT she started to attend the lectures of Noam Chomsky who aimed to formalize linguistics. So it occurred to me that I could follow her and thereby escape engineering even more completely. About 6 months before finishing my doctoral dissertation I mentioned this idea to my thesis supervisor Fano. Upset, he advised me in no uncertain terms that I should first complete what I started, that I will have left my entire life to carry out any changes.

When I finally received my doctorate, I started looking for a faculty position. After my interview lecture at Cornell I was approached by the linguist Hockett who suggested that I could join him in applying Information Theory to linguistics. That decided me to accept Cornell's offer. When I arrived in the fall of 62, I hoped that Hockett will contact me. When he didn't, I looked him up in his office. To my surprise he told me that he is not as interested in linguistics as before, that he is concenetrating on writing operas. So during the next ten years I continued to devote myself to Information Theory.

A US professor is remunerated for 9 months of work, but it is up to him to arrange for his summer support. In the summer of 72 I inquired at IBM Research whether they wouldn't have a job for me. Their answer was that they are just beginning to work on speech recognition and that they would be delighted if I came to join them. I accepted immediately: finally an opportunity to conduct research related to language. Recognition actually means transcription, so it is a sort of dictation to a computer that should write down what it "heard".

When I arrived in May, I found that the group manager was being promoted to a "better" job. After several weeks the management of the group was offered to me. I accepted for a year, then for another, but when I then still didn't want to return to Cornell, I was forced to resign my professorship. I remained at IBM for 21 years.

Our group completely revolutionized the standard approach to speech recognition. This...
was made easy by the fact that practically none of us was educated in any subject related to speech. Those who contributed most had their doctorates in Information Theory or physics. Their creativity, determination, originality, and courage to risk was what accounted for our success. Before we took things into our hands, the method of recognition consisted of the following steps: segment the spoken signal into phones, recognize those phones, compare the sequence of (well or badly) recognized phones with possible word pronunciations, and finally accept that transcription hypothesis that differed least (according to specific criteria) from the recognized sequence of phones. Phone recognition took place in accordance with rules that were promulgated by experts who also determined the comparison criteria. But my IBM colleagues did not believe it possible that appropriate rules could be adequately specified by experts. Speech is a much too complicated affair. We were convinced that our intuition will lead us to an effective architecture of a statistically behaving recognizer, and that it will be possible to estimate the values of its parameters from speech training data.

Our fundamental contribution was that we formulated mathematically the recognition problem and thereby clarified what needed to be solved. Today our statistical methods have spread even to natural language processing and to mechanical translation. The secret of our success probably resided in our somewhat naive approach to language, fortuitously combined with knowledge of relevant Information Theory. That afforded us a fresh look at the given problem.

My years spent at IBM were also made interesting by our occasional visitors to whom we were being displayed as a sort of avant-guard curiosity. Among them were Nobel laureates, people equipped with great self-confidence. They always offered us plenty of advice, since they believed themselves fully conversant with such a trivial, every-day phenomenon as speech. When one of them, Arlo Pernzias (at the time head of AT&T Research) completed the ritual of advice giving, he looked down at my shoes and declared that I have still not learned how to tie them. He had a theory that parents do not teach this art purposely to their children who will be more firmly attached to their mothers on account of the untied laces. Since that time I tie my laces exactly as Penzias taught me, and I have to admit that they seldom untie. I didn't keep this skill secret from my children either and I even spread it to my colleagues.

Immediately after the fall of communism, I attempted to initiate relations with Czech linguists and speech scientists. I helped to persuade IBM to donate a computing center to Charles University and the Czech Institute of Technology. My wife Milena accepted a Fulbright fellowship and lectured for a year at the film academy FAMU. During my visits to her I taught speech recognition at the Institute. I also hired several Czech
scientists to work in my group at IBM. Most of them returned to their homeland, but several continue to be active in the US. For many years it is my honor and pleasure to participate yearly in the Mathesius Lectures organized by profesor Hajicova. This year I am happily spending my sabbatical at the Institute of Formal and Analytical Linguistics at Charles University.

By now it is certainly obvious that my life was full of detours and compromises. Opportunities for success were afforded me in the United States, the land of freedom, land of work, land of civilization, to quote an old song of the famous Czech clowns Voskovec and Werich. The US is not a perfect country, but it contributed to the founding of Czechoslovakia, and to its liberation from Nazism and later Communism. For me the United States means their universities, their libraries, their farsighted support of science and culture. But my view of life, my relation to culture, and my basic attitudes were formed in Czechoslovakia, and I was always interested in its destiny that I tried to aid from near and far. I am therefore very grateful for having received this rare honor exactly here at Charles University. I am very happy about it, and I will always endeavor to be worthy of this attention.