

The work of Academician László Kalmár in the field of computer science

(On the occasion of his 70th birthday)

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Having completed my secondary school studies I was admitted to the Szeged University where I got acquainted with the inner rules of development and mysteries of mathematics. I am firstly indebted to this launching if I had achieved results and acquired knowledge in the field of mathematics. I learned from László KALMÁR mathematical analysis and it was under his auspices that I took my first steps towards scientific activity. I learned in Szeged the basic concepts which have led me to problems related to measure theory and mathematical statistics. 20 years ago we celebrated to 50th birthday of Laszlo Kalmár, a young man at that time, and commemorated of his achievements in the most diverse mathematical disciplines. He established a scientific school and it is a pity that I could return to this workshop only now and then. I had the opportunity to get an insight into the mysteries of other large schools so that I have ground for comparison as regards the impact of Kalmár on science and scientific organization. Youthfulness, relentless search of novelty, these criteria of a genuine scientist are all preserved by him while he strives with incredible tenacity to promote the triumph of what is new.

During the last 20 years an important change was brought about in his life due to the appearance of computational techniques, of modern computers. We met again in this field, — that is in the domain of computer science — although Kalmár had started from more distant bases and deeper roots in approaching the problem from the side of mathematical logic. Also at this juncture could I be impressed by his assessment of other trends and by his esteem for other attitudes. The activity of László Kalmár for the last 20 years has resulted in an addition to the values of computer science. His first paper was published in 1958 about digitally operated machines, logical machines. Since then he has dealt in further 36 papers and studies with the most various research issues. Over and above the topics of linguistics, biology and medicine, he has been engaged in the everyday problems and teaching of cybernetics. His widespread work embraces every small detail of research and organization. Of the mathematicians of our country he is the one who follows recent results with the greatest attention and knows more than many of us of the situation and potentialities of computer science. There will be many to work further on the important problems of research trends delineated by Kalmár. Instead of their detailed enumeration and the general characterization of Kalmár's activity may I

remind the reader to his two papers by highlighting their impact on home and international research.

Let us consider Kalmár's paper, presented in Esztergom in 1968, on modern programming languages. At that time we here in Hungary got acquainted with recent programming languages, with the novelty of Algol 68, PL/1, Almo. Kalmár suggested, besides educational issues, the implementation of the partlanguages existing at that time. Out of his suggestions related to issues which had not been then put forward elsewhere or had hardly been investigated, may I point to the following ones:

1. Having discovered that the substantial time interval between the writing and running of a program endangered the possibility of full machine utilization, he suggested, in order to reduce this interval, the automatic error correction of programs similarly as in the introduction of error correcting codes as it had been developed in information theory. This keen insight of Kalmár has been justified by the way of later development and it is only to be regretted that in the wake of his suggestion no adequate research has been undertaken in Hungary.

2. He was already at that time well aware of the importance of non-numerical applications with respect to the works put on the computer. He drew the attention to the role played by COBOL. At that time not only the mathematicians but the majority of computer experts were unable to give the matter due consideration. Kalmár's guidelines are important also in this field.

3. He suggested to exploit in the programming languages the possibilities of getting closer to human language. He felt that the development of algorithmic programming languages got too much out of touch with the users. His suggestions conformed to the concepts developed worldwide since then in the field of man-machine interaction.

4. In the field of setting theoretical tasks he urged the establishment of closer contacts with mathematical logic. This was responsible for the substantial progress achieved since then not only in the field of the description of machine languages but also in that of data bases. There were likewise important results in the description of two stage grammars achieved in mathematical linguistics, considered also as an important task by László Kalmár.

As to his second paper to be reminded here László Kalmár did a pioneering work in 1962 by publishing an article in the Communications of the Math. Phys. Section of the Hungarian Academy of Sciences in the subject of interrelationship between information theory and logic. Working on issues of qualitative information he pointed out that not only in the field of communication engineering, but also in that of computers it is possible to achieve another kind of introduction of information which requires logical building up. In this area important moves were made in mathematical research also independently from Kalmár. The necessity of logical foundation was investigated also by Kolmogorov in his research activities and this tendency has led to a lot of very interesting results in the last decade. It suffices to refer here to the basic problems and results of the complexity.

In the various mathematical disciplines as well as in their applications László Kalmár discovers, moreover forecasts the appearance of the most essential forthcoming new trends. The appreciation of his mathematical activities and work is proven by the fact that László Kalmár was the first Hungarian mathematician

in the wake of whose work a circle of applied mathematicians has come about in this country. Either Jenő Egerváry, or Alfréd Rényi had not been able to achieve this to such an extent. The applications of neither the differential equations, nor of mathematical statistics could give such a reliable foundation for the education of mathematicians as is assured by the direction of programming and computing techniques suggested by Kalmár.

As a teacher and educator of computer science, he not only teaches his students the knacks of the science but supports them, too, in their work. He provides his students not only with problems for a long period, but also with useful advices. Let us do our best availing ourselves of these counsels.

From the realization of his ideas he hopefully will derive also hereinafter much pleasure not only in Szeged and Hungary, but also outside of our country. To this effect we wish him good health and much success.