

## EDITORIAL: SIXTY YEARS OF CYBERNETICS

This year the science whose name we use in the title of our journal celebrates the 60th official anniversary of its birth. Norbert Wiener's seminal book *Cybernetics or Control and Communication in Animal and Machine* was published in 1948, and this event was generally taken as being the beginning of the cybernetic era of mankind. Together with the development of nuclear physics and aeronautics, cybernetics has formed our image of the 20th century and the new millennium.

Like other great scientific discoveries, the roots of cybernetics reach far back into history. Not only mechanical gadgets supporting complex computations, such as the Greek astronomical clock found in the sea near Anticythera, but even more theoretical ideas preceding basic cybernetics can be observed many years before the year 1948. Strictly speaking, even the term *cybernetics* had already been used in 1854 by Adrien Maria Ampère in his classification of sciences. He used it to name the anticipated (but not existing in his time) science on the control of human society.

We can commemorate, for example, the automatic regulator of the steam machine constructed by James Watt in 1765, or the theoretical studies of automatic control conducted by James Clerk Maxwell in the second half of the nineteenth century.

The papers written by Jaroslav Grdina (born in the Czech city of Plzeň in 1871 as Jaroslav Hrdina), professor of the Technical University in the Ukrainian town of Jekaterinoslav, and published between 1898 and 1924 also deserve a mention. The papers established an analogy between human or animal limbs and the moving parts of machines. Norbert Wiener mentioned Grdina's contribution to the roots of cybernetics at the World Congress of IFAC in 1960 and noted that he and Arturo Rosenblueth were inspired by it in their own work.

The results published by Alan Turing in the thirties established algorithms and complexity theory as important components of prospective cybernetics. Stefan Odobleja, a Romanian scientist living in Paris, published a book on psychology and cooperative behaviour containing many of the fundamental ideas of cybernetics in 1938.

Many authors consider the very beginning of cybernetics, even without its special name, to be the publication of the paper *Behaviour, Purpose and Teleology* written by Norbert Wiener, Arturo Rosenblueth Stearns, and Julian Bigelow, which introduced the exciting paradigm of the cybernetics – the study of general structures existing in living organisms, machines and human society.

Nevertheless, the most significant feature of cybernetics is not its history or pre-history, but its revolutionary impact on human civilization and lifestyle. Even if it seemingly relinquish its place to other creative scientific fields and resolved in successive branching of information and control sciences or data processing methods, it

still exists and influences our world. The growth of so called “new cybernetics” or “cybernetics of cybernetics” in recent decades demonstrates its potential perspectives.

This is, why we have decided to commemorate the 60th anniversary of cybernetics by devoting several papers to it in this issue of the journal *Kybernetika*. We have asked four outstanding specialists in different branches of cybernetics to contribute to this issue with their personal reflections of the anniversary. The first part of this issue is devoted to their papers. We believe that their contributions can offer our readers interesting views on the science which is a significant part of their and our professional lives.

By sheer happy coincidence the four papers cover a wide area of the life of cybernetics. Ladislav Tondl submitted an interesting and well-founded analysis of the philosophical roots of the cybernetic thinking and its links to the scientific trends of the second half of the twentieth century. George J. Klir has turned his attention to the development of cybernetics and its contribution to our understanding of the modern world and complex structures. Vladimír Kučera presents an analysis of a recent problem of control theory and of advanced methods for resolving it. Ivan M. Havel concludes this set of contributions by inspirational thoughts about the present state of cybernetics and its position at the beginning of new century.

We believe that this reminder of the science which has changed the image of modern times submits not only interesting texts but also an opportunity to think about the further development of our field of science, as well as about its role in the future of humanity on our planet.

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