

Algorithmic Complexity and Applications

Preface

This volume is a contribution to the celebration of Ludwig Staiger's Sixtieth birthday on the 26th of February, 2008.

Ludwig Staiger studied mathematics at the University of Jena, then in the German Democratic Republic (East Germany); he graduated in 1970 and continued research studies there and at the university of Yerevan, Armenia, leading to a doctorate in 1977 and the habilitation in 1979, both in Jena.

Further stations in his career were the Academies of Sciences in Moscow and in Berlin and, until 1989, the university of Magdeburg. Between 1990 and 1995, a time of vast changes in Germany, he was a faculty member, for extended periods, at the universities of Aachen, Siegen, Cottbus and Vienna. Since 1995 he holds the Chair of Theoretical Informatics at Martin-Luther-Universität Halle-Wittenberg Institut für Informatik in Halle.

The main theme of Ludwig Staiger's research publications concerns infinite strings of symbols, that is, ω -words and ω -languages. His contributions include characterisations of classes of ω -languages in terms of topology, automata theory and logic; he investigated randomness, descriptive complexity, algorithmic information, disjunctivity, entropy and many similar related properties of ω -words; also his work on codes is closely connected to this theme.

Ludwig Staiger's list of publications exceeds 150 by far. To highlight specific contributions here and to neglect others would not do justice to this impressive and comprehensive research opus.

His publications have appeared in some of the most prestigious journals including: *Acta Cybernet.*, *Acta Inform.*, *Ann. Pure Appl. Logic*, *Commun. Nonlinear Sci. Numer. Simul.*, *Elektron. Informationsverarb. Kybernet. (EIK)*, *Fund. Inform.*, *IEEE Trans. Inform. Theory*, *Inform. and Comput.*, *Inform. and Control*, *Inform. Process. Lett.*, *Internat. J. Found. Comput. Sci.*, *J. Autom. Lang. Comb.*, *J. Comput. System Sci.*, *J. Inform. Process. Cybernet. (EIK)*, *Math. Log. Q.*, *RAIRO Inform. Théor. Appl.*, *Theoret. Comput. Sci.*, *Theory Comput. Syst.*, *Theor. Inform. Appl.*, *Problems Control Inform. Theory/Problemy Upravlen. Teor. Inform.*, *Problems Inform. Transmission*, *Z. Math. Logik Grundlag. Math.*

We illustrate the continuity and diversity of his work by the titles of a few of his papers, randomly chosen from a listing spanning the past 35 years as compiled from the Mathematical Reviews: 'Remark on the characterization of ω -languages by sets of words' (1972, in German); 'Regular null sets' (1976, in German); 'Algebraic coding theory' (1977, book with Lindner, in German); 'Hierarchies of recursive ω -languages' (1986); 'Kolmogorov complexity and Hausdorff dimension' (1993); 'On ω -power languages' (1997); 'How large is the set of disjunctive sequences?' (2002); 'Constructive dimension equals

Kolmogorov complexity’ (2005); ‘The entropy of Łukasiewicz languages’ (2005); ‘The Kolmogorov complexity of infinite words’ (2007). We refer readers unfamiliar with Ludwig Staiger’s research to his survey article on ω -languages in volume 3 of the *Handbook of Formal Languages* (Springer-Verlag, Berlin, 1997, 339–394) for a first impression of the spirit of his work.

The editors of this collection first met Ludwig Staiger sometime in the 1980s. For C.C. this was in 1993 at the DLT Conference organised in Turku, Finland; but their first joint paper – in Algorithmic Information Theory – was published in 1985; H.J. remembers meeting him at a conference held in Greifswald in 1984, were they made a first joint attempt at analysing disjunctivity, work which lead to numerous publications involving the three of us as (co-)authors. They are grateful for the intensive co-operation in research, which resulted from these first encounters and which has been ongoing now for more than twenty years.

This volume expresses the recognition of Ludwig Staiger’s contributions to mathematics and computer science. Our invitation was received with enthusiasm. The fifteen papers present original research in areas closely related to his work. While invited, all the papers were refereed in the usual way. We thank the authors and also the reviewers for providing for this birthday present.

From all of us contributing to this volume, a warm “Happy Birthday, Ludwig!”

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