PREFACE:

SPECIAL ISSUE DEDICATED TO JÜRGEN DASSOW ON THE OCCASION OF HIS 75th BIRTHDAY

This special issue of the *Journal of Automata, Languages and Combinatorics* is dedicated to Professor Jürgen Dassow on the occasion of his 75th birthday. This Festschrift contains 10 contributions from the areas of formal languages and automata, where Jürgen Dassow is a leading expert since many years. All the authors of the papers published in this special issue have a strong connection to Jürgen Dassow: not few of them co-authored papers with him or co-edited journal issues or conference proceedings with him, some of them were his students or mentees, and, in one case, one author is a student of one of his mentees. But, all the contributors to this special issue learned, and still learn, a lot from him.

Jürgen Dassow was born on July 11, 1947 in North Germany. He studied mathematics at the University of Rostock and obtained his doctoral degree in 1972 with a dissertation in algebra, entitled *Über das Verhalten von lokalen Ringen bei monoidalen Transformationen*. He finished his Habilitation in 1978 with a work entitled *Ein modifizierter Vollständigkeitsbegriff in einer Algebra von Automatenabbildungen*, which signaled that his research focus was moving closer to what would become his main field of work in the years to come: formal languages and automata theory. Both the doctorate and the habilitation were obtained from the University of Rostock, and his first academic appointment was at the same university, as research associate. In 1980, Jürgen Dassow became a lecturer at the Technical University of Magdeburg. In 1987, he became a professor of mathematics in the same

Jürgen Dassow at the DCFS 2017

university and five years later he became a professor of computer science in Magdeburg, at the same university, with a focus on theoretical computer science, in general, and formal languages and automata theory, in particular. The Technical University

of Magdeburg became the Otto-von-Guericke-University of Magdeburg, and Jürgen Dassow continued his position of computer science professor in the newly founded university, until his retirement.

The research work of Jürgen Dassow started and has its roots, as mentioned above, in algebra (more precisely, algebraic geometry), but soon became focused on theory of formal languages from which it extended naturally to many related areas, such as computational complexity or biologically inspired computing. Jürgen Dassow had major contributions, which are at least partly reflected in the broad topics covered in the papers collected in this anniversary special issue, in areas as diverse as regulated rewriting, cooperating distributed grammar systems, the theory of subclasses of the class of regular languages, Lindenmayer systems, picture grammars, non-conventional models of automata, contextual grammars, bio-inspired language generators and acceptors, or networks of language processors. Jürgen Dassow's work in all these areas was well received by the scientific community, and he has published more than 200 research papers (published in scientific journals or conference proceedings), gave numerous talks in national and international conferences (both contributed and invited talks) as well as invited lectures at universities around the world, wrote four monographs, and edited 18 conference proceedings. He has published with more than 70 co-authors or co-editors. From 1996 to 2015, he was the Editor-in-Chief of the journal which hosts this special issue, the *Journal of Automata, Languages and Combinatorics* (JALC), which is the successor of the *Journal of Information Processing and Cybernetics* (EIK).

Jürgen Dassow played an important role in organising scientific events. As such, he was instrumental in establishing two conference series which continue to this day and are important to the formal languages international community. In 1995, he organised in Magdeburg the second International Conference on Developments in Language Theory (DLT), which is still the main scientific event dedicated solely to automata, formal languages, and closely connected fields. DLT has reached now its 26th edition and it is no surprise that among the authors who present regularly their papers in this conference there is a significant number of researchers who are strongly connected to Jürgen Dassow. Four years later, in 1999, he organised the First International Workshop on Descriptional Complexity of Automata, Grammars and Related Structures (DCAGRS), which is continued nowadays by the International Conference on Descriptional Complexity of Formal Systems (DCFS). DCFS reached now its 24th edition. At national level, Jürgen Dassow was very involved in establishing the theory of formal languages and automata as a core component of the theoretical computer science area in Germany. He is one of the founders of the special interest group on automata and formal languages of the German Association of Informatics (Gesellschaft für Informatik) and served in the leadership of this association for 14 years. Nevertheless, he organised the annual meeting of the aforementioned special interest group, the Theorietag, three times, in 1991, 2001, and 2011.

Jürgen Dassow has been also very active in mentoring young researchers. At the University of Magdeburg, he supervised many Master and PhD candidates (including Bianca Truthe, one of the guest editors of this issue). Five researchers spent one or two years in his research group at the University of Magdeburg with Fellowships from

the Alexander von Humboldt Foundation of Germany, including Florin Manea the other guest editor of this special issue. Countless many other guests were hosted by Jürgen Dassow for short-term visits, and some of them contributed to this special issue with their contributions. For all these reserachers, working with Jürgen Dassow boosted forward the careers and enriched their lives.

Jürgen Dassow's service to his community extends well beyound science-related activities. For several years, he served as the prorector and rector of the University of Magdeburg and as the dean of the Departments of Mathematics and Computer Science. In particular, he was the founding rector of the Otto-von-Guericke-University of Magdeburg. His activity as rector of the newly founded university can be seen as a full success, with several new institutes being founded within the University, and many new professors being appointed in Magdeburg. Interestingly, many of the collaborators of Jürgen Dassow from that time invariably mention his capability to focus excellently both on his administrative job and on his research work.

This brings us back to this special issue. It is our pleasure and honour to be able to celebrate Jürgen Dassow's 75th anniversary with a collection of papers on his favourite topics: from classical topics on formal grammars and automata, to descriptional complexity, regulated rewriting, combinatorics on words, or bio-inspired computing. Each of these papers was reviewed by at least two referees to ensure that they are up to the standards of the *Journal of Automata, Languages and Combinatorics*. We are very grateful to all the authors and the reviewers of the contributed papers, who joined us and helped to realize this anniversary issue. The external reviewers were (in alphabetical order):

Cezar Câmpeanu	Maria Kosche	Shinnosuke Seki
Henning Bordihn	Tore Koß	Stefan Siemer
Carsten Damm	Andreas Malcher	Taylor J. Smith
Joel Day	Robert Mercaș	György Vaszil
Szilárd Fazekas	Victor Mitrana	Petra Wolf
Pamela Fleischmann	Markus L. Schmid	

The scientific part of this volume is complemented by a series of letters or testimonials written for this anniversary moment by some of the closest collaborators of Jürgen Dassow who could not contribute otherwise, namely (also in alphabetical order) Erzsébet Csuhaj-Varjú, Henning Fernau, Markus Holzer, Victor Mitrana, Gheorghe Păun, Grzegorz Rozenberg, and Arto Salomaa (who inspired us to this idea). These short texts are published immediately after this preface.

To conclude, there is only one thing left. On behalf of all the people involved in producing this special issue, dear Professor Dassow, dear Jürgen, we thank you for your influence to our careers and lives, and wish you a very happy anniversary and all the best for the years to come!

July 2022   Florin Manea (University of Göttingen)
                                                 Bianca Truthe (University of Giessen)

GREETING MESSAGES

From Erzsébet Csuhaj-Varjú

My collaboration with Jürgen Dassow started in the early 1980s, by studying grammar forms that are models of grammatical similarity. At the end of the 1980s, together with Jürgen and Jozef Kelemen, we launched the theory of cooperating distributed grammar systems, which are grammatical models of distributed problem-solving. Since the topic was in line with the current trends in computer science at the time, researchers soon became involved in the research. Together with the theory of parallel communicating grammar systems, co-founded by Gheorghe Păun, these and related new research directions rapidly developed into the theory of grammar systems. Our team

At Grammar Systems Week 2004

of four published a monograph on the subject in 1994. The field still has some interesting open problems to solve. Together with Jürgen, I have carried out fruitful joint research not only in grammar systems but also on some other topics. Working with him has always been a pleasure and an experience. After reading his articles one becomes strongly motivated to participate in research on the subject. His ideas are not only original and well thought out but also based on deep and broad knowledge. I am fortunate to have worked with him and grateful for the nearly four decades of collaboration.

Dear Jürgen, I wish you a wonderful birthday!

Budapest, June 2022   Erzsi

From Henning Fernau

In these days, virtual meetings became more and more popular, driven by the pandemics. However, virtual meetings of nowadays are far more real than virtual encounters used to be more than 30 years ago. I still remember quite well the times when I wrote my diploma thesis in the first half of 1989 under the supervision of Dietmar Wätjen in Braunschweig.

When thinking about limited Lindenmayer systems, the main sources of works that I had to study have been those of Dietmar Wätjen and of Jürgen Dassow. So, even without ever seeing each other, which was not that easy in the days of the Iron Curtain, Jürgen did influence me from the very beginning in my scientific career. Also, the results of my diploma thesis got later published with EIK, the predecessor of JALC, with Jürgen as Editor-in-Chief. Also later research of mine was triggered by Jürgen's work, for instance, the relations of limited Lindenmayer systems and programmed grammars with unconditional transfer inspired several papers of mine on regulated rewriting with unconditional transfer. Therefore, it was very nice meeting Jürgen and his Magdeburg group a bit later, and then regularly, which again led to several common papers with the Magdeburg group.

Therefore, I cordially wish you further active years to come, for scientific research and for family life, as you wish.

Henning

Trier, June 2022

From Markus Holzer

Dear Jürgen, we personally met the first time at the beginning of the 1990s, shortly after the fall of the Berlin Wall, during your visit at the Technische Universität München. You were doing research with my to become doctor father Klaus-Jörn Lange on automata with abstract storages. Since then we met almost regularly during conferences and the annual GI-Theorietag "*Automaten und Formale Sprachen.*"[a] It took us nearly 15 years to become co-authors, and till your retirement in September 2012 at the Otto-von-Guericke-Universität Magdeburg we further worked on papers together. I was extremely honoured to be invited by the organisers of the Festkolloquium on the occasion of your retirement to give the scientific lecture there. Later in 2016 you offered Martin Kutrib and me the possibility to continue your work as editors of the Journal of Automata, Languages, and Combinatorics (JALC). Hence I personally feel the obligation to continue your legacy work. The warmth, hospitality, and support of you always impressed me. Thanks for being a friend.

I would have liked to contribute a paper to this Festschrift, but research never happens in a straight line. With the planned contribution, which would have been a perfect fit to your research interests, I got stuck and time was running out for the submission. Thus, I declined the invitation, but Karma never leaves and will come back in unexpected ways, as one of the editors of this Festschrift approached me and offered the opportunity to submit a short personally message, which I happily accepted. So here we are.

Dear Jürgen, I wish you a Happy Birthday and I hope you enjoy this Festschrift. I'm looking forward to meet you someday, somewhere!

Giessen, June 2022

Markus

P.S.: By the way, I managed to overcome the problems on the originally planned contribution, which is now ready for publication—I'll send you a copy.

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[a]The *Gesellschaft für Informatik* (GI) is the German Computer Science Society, which has a number of Special Interest Groups (Fachgruppen), among them the mentioned one on "*Automata and Formal Languages.*"

From Victor Mitrana

Between 1993 and 1996, Jürgen Dassow was the first Rector of the *Otto-von-Guericke University of Magdeburg*, newly founded thorugh the fusion of the Technical University of Magdeburg, Pedagogical College and the Medical Academy. Between June 1995 and December 1996, I was a Fellow of the *Alexander von Humboldt Foundation* and Jürgen was my host.

Naturally, a Rector is very busy with a lot of matters, and this was the case with Jürgen as well. However, he always found a time slot in his very busy agenda to have at least a weekly meeting with me, in the Rectorate, for discussing on the ongoing scientific joint works. What I am going to emphasize in this very short note is my bewilderment at almost every such meeting. Jürgen received me between two meetings with other people, many of them being local politicians, businessmen, etc. No matter who was the person before me or the person who was to be after me, he had an astonishing ability to connect rapidly and completely to the technical topics we were going to discuss. Furthermore, he was able to come with fresh ideas and give useful suggestions. Sometimes our discussions were so intense and enthusiastic that he forgot about his next meeting until his secretary informed him that the next person was already waiting. Even now, I am amazed by his incredible ability that made it possible to produce over a dozen of joint scientific papers. My initial stay has been followed by two other equally fruitful stays in Magdeburg sponsored by the same *Alexander von Humboldt Foundation*. He always continued to be equally involved in all the scientific matters we discussed during my stays.

Dear Jürgen, thank you for the wonderful scientific collaboration and for your hospitality during all my stays in Magdeburg.

Victor

Bucharest, July 2022

From Gheorghe Păun

It was in old, old times, during the Cold War, Iron Curtain, matrix grammars, L systems... We probably got acquainted with the papers (about the latter two topics, of course) of each other sometimes at the beginning of the Eighties, last century. Then, in 1983 I got for the first time a (Romanian) passport and a (GDR – for the very young readers: this stands for German Democratic Republic, East Germany, for short) visa. My first trip outside Romania! By train, from Bucharest to Magdeburg. Many things to recall about this trip, but not of interest for... regulated rewriting... The start of a long lasting and incredibly efficient collaboration. The Humboldt scholarship was a typical continuation, grammar systems (theory and book) a typical output. He was then the Rector of the Magdeburg University. The post-unification time, everything had to be reconstructed. A lot of administrative activity to coordinate. We often used to work in his office. Definitions, proofs, details, references, phone calls, intruders, the secretary coming and leaving — repeat! For several hours. I was simply amazed — and tired, and confused sometimes. He was not! He was able to instantaneously switch from a proof to a phone call, resuming the math ideas, interrupted again, resuming again -- repeat! Continuously smiling. I had at that time the definition of a brilliant researcher. Fully enjoying what he was doing -- remaining the same along the years. A model for all his collaborators, for sure. Among them, I had the privilege to be one of the first. It was in old, old times... it was like yesterday...

Thanks a lot, Jürgen!

Bucharest, July 2022

George

From Grzegorz Rozenberg

Dear Jürgen: Best wishes on the occasion of your 75th birthday and congratulations on your achievements until now. The Theoretical Computer Science community, in particular the Formal Languages and Automata community, is certainly indebted to you for your contributions on many levels:

- your research contributions, you have a very impressive publications record,
- you have inspired and coached many young researchers, who became well established scientists,
- you contributed to the development of our scientific community in many ways, e. g., by creating and maintaining the Journal of Automata, Languages and Combinatorics, a respected publication forum.

Wishing you an active and satisfying life for many years to come.

Grzegorz

Leiden, June 2022

From Arto Salomaa

I got to know Jürgen Dassow in the early 70's. He wrote a paper *Eine neue Funktion für Lindenmayer-Systeme.* This interesting paper was, in fact, the first paper about L systems written in the 'Eastern bloc'. This was the beginning of a vivid cooperation. The cooperation was made easier by the fact that it was easier to travel from the East to Finland than to the other western countries. Our work was soon extended to controlled derivations and several variations of grammar systems. Some members of our groups joined the work. We were always happy to see Jürgen in Turku. He also acted in some official duties, such as of the chosen opponent in a Ph.D defence. Later on, we extended our work to patterns and pattern grammars, biologically motivated questions about automata, and even to Richelieu cryptosystems. In the 90's, I visited Magdeburg several times. The main language theory conference, DLT, was arranged in Magdeburg in 1995.

Although I have not been personally involved, I have to some extent followed Jürgen's very active work up to the present year. It consists of many new topics but comes some times also back to Lindenmayer systems, where a new control by ideals and codes is introduced. I would have liked to contribute a paper to this festival issue. But being plagued by several serious illnesses I am not able to do it. But I remember with great pleasure our time together, also during my fairly recent birthday celebrations in Turku. Dear Jürgen, my wife joins me in wishing you Many Happy Returns, Continuing Success in Science, as well as Happiness in Life.

Kauhajoki, March 2021   Arto

NB: The date in the letter above is correct. It was Arto Salomaa who had the idea of a greeting message and who sent us his message already a year ago. We thank him for this nice suggestion.

The Guest Editors