



## **Professor Alexander Meduna**

---

Department of Information Systems  
Faculty of Information Technology  
Brno University of Technology  
Božetěchova 2  
612 66 Brno  
Czech Republic

Phone: +420 541 141 232  
Fax: +420 541 141 270  
meduna@fit.vut.cz  
<https://www.fit.vut.cz/person/meduna/>

### **General Orientation**

Theoretical Computer Science

### **Areas of Special Interest**

Formal languages, Compilers

### **Education**

**Ph.D.** in Computer Science  
1988

Brno University of Technology  
Brno, Czech Republic

**M.S.** in Computer Science  
1982

Palacky University  
Olomouc, Czech Republic

**B.S.** in Computer Science  
1981

Palacky University  
Olomouc, Czech Republic

## Professional carrier

### Full Professor

2005 - present

Brno University of Technology  
Department of Computer Science  
Brno, Czech Republic

### Associate Professor

1998 - 2005

Brno University of Technology  
Department of Computer Science  
Brno, Czech Republic

### Senior Researcher

1996 - 1998

Brno University of Technology  
Computing Center  
Brno, Czech Republic

### Visiting Assistant Professor

1988 - 1996

University of Missouri–Columbia  
Department of Computer Science  
Columbia, MO, USA

### Senior Researcher

1985 - 1988

Brno University of Technology  
Computing Center  
Brno, Czech Republic

### Researcher

1982 - 1985

Palacky University  
Laboratory of Computer Science  
Olomouc, Czech Republic

## Classes Taught

2003 – present

- ◇ Compiler Construction
- ◇ Formal Languages
- ◇ Modern Theoretical Science

Brno University of Technology  
Department of Computer Science  
Brno, Czech Republic

1999 – 2005

- ◇ Principles of Compiler Design

Brno University of Technology  
Computing Center  
Brno, Czech Republic

1999 – 2001

- ◇ Theoretical computer science

Brno University of Technology  
Computing Center  
Brno, Czech Republic

1988 – 1996

- ◇ CS341 Automata Theory I
- ◇ CS441 Automata Theory II
- ◇ CS343 Compilers I
- ◇ CS443 Compilers II
- ◇ CS345 Principles of Programming Languages
- ◇ CS352 Operating System Theory

University of Missouri–Columbia  
Department of Computer Science  
Columbia, MO, USA

1985 – 1988

◊ Automata and compilers

Brno University of Technology  
Computing Center  
Brno, Czech Republic

1982 – 1985

◊ Compilers

Palacky University  
Laboratory of Computer Science  
Olomouc, Czech Republic

## Publications

### Books

- Meduna, A., Horáček, P., Tomko, M.: *Handbook of Mathematical Models for Languages and Computation*. The Institution of Engineering and Technology, 2020
- Meduna, A., Soukup, O.: *Modern Language Models and Computation: Theory with Applications*. Springer, 2017
- Meduna, A., Zemek, P.: *Regulated Grammars and Automata*. Springer, 2014
- Meduna, A.: *Formal Languages and Computation: Models and Their Application*. Taylor & Francis, 2014
- Meduna, A., Techet, J.: *Scattered Context Grammars and Their Applications*. WIT Press, UK, 2010
- Meduna, A., Zemek, P.: *Regulated Grammars and Their Transformations*. The FIT BUT press, CZ, 2010
- Meduna, A.: *Elements of Compiler Design*. Taylor & Francis, 2008 (translated into Chinese in 2009)
- Meduna, A., Kopeček, T.: *Conditional Grammars and Their Reduction*. The FIT BUT press, CZ, 2009
- Meduna, A., Švec, M.: *Grammars with Context Conditions and Their Applications*. Wiley, 2005
- Meduna, A.: *Automata and Languages: Theory and Applications*. Springer, 2000

### Book Chapters

- Meduna, A., Zemek, P.: One-Sided Random Context Grammars: A Survey, in *Computing with New Resources*, Springer Verlag, p. 338-351, 2014
- Meduna, A., Zemek, P.: One-Sided Random Context Grammars with Leftmost Derivations, in *Languages Alive - Essays Dedicated to Jürgen Dassow on the Occasion of His 65th Birthday*, Springer, p. 160-173, 2012
- Meduna, A., Leupold, P.: Finitely Expandable Deep PDAs, in *Automata, Formal Languages and Algebraic Systems*, World Scientific Publishing, p. 113-123, 2010
- Meduna, A., Kolář, D.: Descriptive Complexity of Parallel Grammars with Respect to the Number of Nonterminals, in *Words, Sequences, Languages: Where Computer Science, Biology, and Linguistics Meet* (Carlos Martin-Vide, ed.), Kluwer, p. 212-225, 2001
- Meduna, A., Kolář, D.: Descriptive complexity of multi-parallel grammars with respect to the number of nonterminals, in *Grammars and Automata for String Processing: from Mathematics and Computer Science to Biology and Back*, p. 212-225, 2000
- Meduna, A.: On the Number of Nonterminals in Matrix Grammars with Leftmost Derivations, in *New Trends in Formal Languages: Control, Cooperation, and Combinatorics*, Springer, p. 27-39, 1997
- Meduna, A.: Symbiotic EOL Systems, in *Artificial Life* (Gh. Paun, ed.), Black Sea University Press, p. 122-129, 1995
- Meduna, A.: Matrix Grammars under Leftmost and Rightmost Restrictions, in *Mathematical Linguistics and Related Topics* (Gh. Paun, ed.), The Publ. House of the Romanian Academy, p. 243-257, 1994

## Refereed Journal Articles (since 1987)

- Meduna, A., Krivka, Z.: Scattered Context Grammars with One Non-Context-Free Production are Computationally Complete. *Fundamenta Informaticae*, (in print)
- Meduna, A., Martiško, J., Krivka, Z.: CD Grammar Systems with Two Propagating Scattered Context Components Characterize the Family of Context Sensitive Languages. *International Journal of Foundations of Computer Science*, (in print)
- Meduna, A., Kocman, R., Krivka, Z.: General CD Grammar Systems and Their Simplification. *Journal of Automata, Languages and Combinatorics*, p. 37-54, 2020
- Meduna, A., Krivka, Z., Kučera, J.: Jumping Pure Grammars. *The Computer Journal*, p. 30-41, 2019
- Meduna, A., Krčmář, R., Kövari, A., Beníčková, Z.: On Operations over Language Families. *Computer Science Journal of Moldova*, p. 255-282, 2019
- Meduna, A., Charvát, L.: Internally Expandable Pushdown Automata and Their Computational Completeness. *Romanian Journal of Information Science and Technology (ROMJIST)*, p. 232-237, 2018
- Meduna, A., Kocman, R., Krivka, Z.: On Double-Jumping Finite Automata and Their Closure Properties. *RAIRO - Theoretical Informatics and Applications - Informatique Théorique et Applications*, p. 185-199, 2018
- Meduna, A., Krivka, Z., Kučera, J.: On  $k\#$ -Rewriting Systems. *Romanian Journal of Information Science and Technology (ROMJIST)*, p. 278-287, 2018
- Meduna, A., Soukup, O.: Jumping Scattered Context Grammars. *Fundamenta Informaticae*, p. 51-86, 2017
- Meduna, A., Csuchaj-Varjú, E., Soukup, O.: On Tree-Restricted Regular-Controlled Context-Free Grammars. *International Journal of Computer Mathematics: Computer Systems Theory*, p. 147-163, 2017
- Meduna, A., Krivka, Z., Zemek, P.: Phrase-Structure Grammars: Normal Forms and Reduction. *The Computer Journal*, p. 1180-1185, 2016
- Meduna, A., Kučera, J.: On State-Synchronized Automata Systems. *Schedae Informaticae*, p. 221-237, 2016
- Meduna, A., Soukup, O.: Simple Matrix Grammars and Their Leftmost Variants. *International Journal of Foundations of Computer Science*, p. 359-373, 2016
- Meduna, A., Soukup, O., Zemek, P.: Ordered Pure Multi-Pushdown Automata. *Theoretical and Applied Informatics*, p. 25-47, 2016
- Meduna, A., Krivka, Z.: Jumping Grammars. *International Journal of Foundations of Computer Science*, p. 709-731, 2015
- Meduna, A., Horáček, P.: New Grammar Systems and Their Application Perspectives. *Schedae Informaticae*, p. 47-68, 2014
- Meduna, A., Koutný, J.: On Normal Forms and Erasing Rules in Path-Controlled Grammars. *Schedae Informaticae*, p. 9-18, 2014
- Meduna, A., Krivka, Z., Tesař, R.: Alan Mathison Turing - život a dílo [in Czech]. *Pokroky matematiky, fyziky a astronomie*, p. 1-19, 2014
- Meduna, A., Vrábel, L., Zemek, P.: Solutions To Four Open Problems Concerning Controlled Pure Grammar Systems. *International Journal of Computer Mathematics*, p. 1156-1169, 2014
- Meduna, A., Zemek, P.: Controlled Finite Automata. *Acta Informatica*, p. 327-337, 2014
- Meduna, A., Zemek, P.: One-Sided Random Context Grammars with a Limited Number of Right Random Context Rules. *Theoretical Computer Science*, p. 127-132, 2014
- Meduna, A., Zemek, P.: Generalized One-Sided Forbidding Grammars. *International Journal of Computer Mathematics*, p. 172-182, 2013
- Meduna, A., Zemek, P.: Left Random Context ETOL Grammars. *Fundamenta Informaticae*, p. 289-304, 2013
- Meduna, A., Zemek, P.: On the Generation of Sentences with Their Parses by Propagating Regular-Controlled Grammars. *Theoretical Computer Science*, p. 67-75, 2013
- Meduna, A., Čermák, M., Horáček, P.: Rule-restricted automaton-grammar transducers: Power and linguistic applications. *Mathematics for Applications*, p. 13-35, 2012
- Meduna, A., Čermák, M., Koutný, J.: Parsing Based on  $n$ -Path Tree-Controlled Grammars. *Theoretical and Applied Informatics*, p. 213-228, 2012
- Meduna, A., Horáček, P.: Synchronous Versions of Regulated Grammars: Generative Power and Linguistic Applications. *Theoretical and Applied Informatics*, p. 175-190, 2012
- Meduna, A., Koutný, J.: Tree-controlled Grammars with Restrictions Placed upon Cuts and Paths. *Kybernetika*, p. 165-175, 2012
- Meduna, A., Vrábel, L., Zemek, P.: An Infinite Hierarchy of Language Families Resulting from Stateless Pushdown Automata with Limited Pushdown Alphabets. *Lecture Notes in Computer Science* 7386, p. 236-243, 2012
- Meduna, A., Zemek, P.: Controlled Pure Grammar Systems. *Journal of Universal Computer Science*, p. 2024-2040, 2012
- Meduna, A., Zemek, P.: Jumping Finite Automata. *International Journal of Foundations of Computer Science*, p. 1555-1578, 2012
- Meduna, A., Zemek, P.: Nonterminal Complexity of One-Sided Random Context Grammars. *Acta Informatica*, p. 55-68, 2012

- Meduna, A., Zemek, P.: On One-Sided Forbidding Grammars and Selective Substitution Grammars. *International Journal of Computer Mathematics*, p. 586-596, 2012
- Meduna, A., Zemek, P.: One-Sided Random Context Grammars with Leftmost Derivations. *Lecture Notes in Computer Science* 7300, p. 160-173, 2012
- Meduna, A., Křoustek, J., Židek, S., Kolář, D.: Scattered Context Grammars with Priority. *International Journal of Advanced Research in Computer Science*, p. 1-6, 2011
- Meduna, A., Zemek, P.: One-Sided Random Context Grammars. *Acta Informatica*, p. 149-163, 2011
- Meduna, A., Zemek, P.: Workspace Theorems for Regular-Controlled Grammars. *Theoretical Computer Science*, p. 4604-4612, 2011
- Meduna, A., Čermák, M., Masopust, T.: Some Power-Decreasing Derivation Restrictions in Grammar Systems. *Schedae Informaticae*, p. 23-34, 2010
- Meduna, A., Goldefus, F., Masopust, T.: Left-Forbidding Cooperating Distributed Grammar Systems. *Theoretical Computer Science*, p. 3661-3667, 2010
- Meduna, A., Lukáš, R.: Multigenerative Grammar Systems and Matrix Grammars. *Kybernetika*, p. 68-82, 2010
- Meduna, A., Techet, J.: An Infinite Hierarchy of Language Families Generated by Scattered Context Grammars with n-Limited Derivations. *Theoretical Computer Science*, p. 1961-1969, 2009
- Meduna, A., Masopust, T.: On context-free rewriting with a simple restriction and its computational completeness. *RAIRO - Theoretical Informatics and Applications*, p. 365-378, 2009
- Meduna, A., Masopust, T.: On Pure Multi-Pushdown Automata that Perform Complete Pushdown Pops. *Acta Cybernetica*, p. 537-552, 2009
- Meduna, A., Rychnovský, L.: Infinite Language Hierarchy Based on Regular-Regulated Right-Linear Grammars with Start Strings. *Philippine Computing Journal*, p. 1-5, 2008
- Meduna, A., Techet, J.: Scattered Context Grammars that Erase Nonterminals in a Generalized k-Limited Way. *Acta Informatica*, p. 593-608, 2008
- Meduna, A., Masopust, T., Šimáček, J.: Two Power-Decreasing Derivation Restrictions in Generalized Scattered Context Grammars. *Acta Cybernetica*, p. 783-793, 2008
- Meduna, A., Masopust, T.: On Descriptive Complexity of Partially Parallel Grammars. *Fundamenta Informaticae*, p. 407-415, 2008
- Meduna, A., Bidlo, R., Blatný, P.: Automata with Two-Sided Pushdowns Defined over Free Groups Generated by Reduced Alphabets. *Kybernetika*, p. 21-35, 2007
- Meduna, A., Bidlo, R., Blatný, P.: Context-Free and EOL Derivations over Free Groups. *Schedae Informaticae*, p. 14-24, 2007
- Meduna, A., Kopeček, T., Švec, M.: A formalization of derivation similarity in the formal language theory and its illustration in terms of Lindenmayer systems. *International Journal of Computer Mathematics*, p. 1555-1566, 2007
- Meduna, A., Masopust, T.: Descriptive Complexity of Semi-Conditional Grammars. *Information Processing Letters*, p. 29-31, 2007
- Meduna, A., Masopust, T.: Self-Regulating Finite Automata. *Acta Cybernetica*, p. 135-153, 2007
- Meduna, A., Techet, J.: Canonical Scattered Context Generators of Sentences with Their Parses. *Theoretical Computer Science*, p. 73-81, 2007
- Meduna, A., Křivka, Z., Schöneck, R.: Generation of Languages by Rewriting Systems that Resemble Automata. *International Journal of Foundations of Computer Science*, p. 1223-1229, 2006
- Meduna, A., Lukáš, R.: Multigenerative Grammar Systems. *Schedae Informaticae*, p. 11, 2006
- Meduna, A.: Deep Pushdown Automata. *Acta Informatica*, p. 114-124, 2006
- Meduna, A., Lorenc, L.: Self-Reproducing Pushdown Transducers. *Kybernetika*, p. 533-539, 2005
- Meduna, A., Techet, J.: Generation of Sentences with Their Parses: the Case of Propagating Scattered Context Grammars. *Acta Cybernetica*, p. 11-20, 2005
- Meduna, A., Kopeček, T.: Simple-Semi-Conditional Versions of Matrix Grammars with a Reduced Regulating Mechanism. *Computing and Informatics*, p. 287-302, 2004
- Meduna, A., Víttek, M.: New language operations in formal language theory. *Schedae Informaticae*, p. 123-150, 2004
- Meduna, A.: A Simultaneous Reduction of Several Measures of Descriptive Complexity in Scattered Context Grammars. *Information Processing Letters*, p. 214-219, 2003
- Meduna, A.: On the Degree of Scattered Context-Sensitivity, *Theoretical Computer Science*, p. 2121-2124, 2003
- Meduna, A., Švec, M.: Descriptive Complexity of Generalized Forbidding Grammars. *International Journal of Computer Mathematics*, p. 11-17, 2003
- Meduna, A., Švec, M.: Forbidding EOL Systems. *Theoretical Computer Science*, p. 256-276, 2003
- Meduna, A.: Coincidental Extension of Scattered Context Languages. *Acta Informatica*, p. 307-314, 2003
- Meduna, A.: Simultaneously One-Turn Two-Pushdown Automata. *International Journal of Computer Mathematics*, p. 1-9, 2003

- Meduna, A.: Two-Way Metalinear PC Grammar Systems and Their Descriptive Complexity. *Acta Cybernetica*, p. 126-137, 2003
- Meduna, A., Kolář, D.: Homogenous Grammars with a Reduced Number of Non-Context-Free Productions. *Information Processing Letters*, p. 253-257, 2002
- Meduna, A., Kolář, D.: One-Turn Regulated Pushdown Automata and Their Reduction. *Fundamenta Informaticae*, p. 399-405, 2002
- Meduna, A., Švec, M.: Reduction of Simple Semi-Conditional Grammars with Respect to the Number of Conditional Productions. *Acta Cybernetica*, p. 353-360, 2002
- Meduna, A.: Descriptive Complexity of Scattered Rewriting and Multirewriting: An Overview. *Journal of Automata, Languages and Combinatorics*, p. 571-577, 2002
- Meduna, A.: Simultaneously One-Turn Two-Pushdown Automata. *International Journal of Computer Mathematics*, p. 111-121, 2002
- Meduna, A., Vurm Petr: Multisequential Grammars with Homogeneous Selectors. *International Journal of Computer Mathematics*, p. 6, 2001
- Meduna, A.: Descriptive Complexity of Partially Parallel Grammars. *DCAGRS*, p. 15-21, 2001
- Meduna, A.: Uniform Generation of Languages by Scattered Context Grammars, *Fundamenta Informaticae*, p. 231-235, 2001
- Meduna, A., Kolář, D.: Regulated Pushdown Automata. *Acta Cybernetica*, p. 653-664, 2000
- Meduna, A.: Context-Free Multirewriting with a Reduced Number of Nonterminals, p. 164, 2000
- Meduna, A.: Generative Power of Three-Nonterminal Scattered Context Grammars. *Theoretical Computer Science*, p. 625-631, 2000
- Meduna, A.: Terminating Left-Hand Sides of Scattered Context Grammars. *Theoretical Computer Science*, p. 423-427, 2000
- Meduna, A.: Prefix Pushdown Automata. *International Journal of Computer Mathematics*, p. 164-182, 1999
- Meduna, A.: Descriptive Complexity of Multi-Continues Grammars. *Acta Cybernetica*, p. 375-384, 1998
- Meduna, A.: Economical Transformations of Scattered Context Grammars to Phrase-Structure Grammars. *Acta Cybernetica*, p. 225-242, 1998
- Meduna, A.: Middle Quotients of Linear Languages. *International Journal of Computer Mathematics*, p. 281-289, 1998
- Meduna, A.: Uniform Rewriting Based on Permutations. *International Journal of Computer Mathematics*, p. 57-74, 1998
- Meduna, A.: Six-Nonterminal Multi-Sequential Grammars Characterize the Family of Recursively Enumerable Languages. *International Journal of Computer Mathematics*, p. 179-189, 1997
- Meduna, A.: Four-Nonterminal Scattered Context Grammars Characterize the Family of Recursively Enumerable Languages. *International Journal of Computer Mathematics*, p. 465-474, 1996
- Meduna, A.: Syntactic Complexity of Context-Free Grammars over Word Monoids. *Acta Informatica*, p. 457-474, 1996
- Meduna, A.: A Trivial Method of Characterizing the Family of Recursively Enumerable Languages by Scattered Context Grammars. *EATCS Bulletin*, p. 104-106, 1995
- Meduna, A.: Symbiotic EOL Systems. *Artificial Life: Grammatical Models*, p. 122-129, 1995
- Meduna, A.: Syntactic Complexity of Scattered Context Grammars. *Acta Informatica*, p. 126-139, 1995
- Meduna, A., Gopalaratnam, A.: On Semi-Conditional Grammars with Productions Having either Forbidding or Permitting Conditions. *Kybernetika*, p. 309-323, 1994
- Meduna, A.: Matrix Grammars under Leftmost and Rightmost Restrictions. *Mathematical Linguistics and Related Topics*, p. 243-257, 1994
- Meduna, A., Crooks, C., Sarek, M.: Syntactic Complexity of Regulated Rewriting. *Kybernetika*, p. 177-186, 1993
- Meduna, A., Csuha-Varju, E.: Grammars with Context Conditions. *Kybernetika*, p. 199-213, 1993
- Meduna, A.: Canonical Scattered Rewriting. *International Journal of Computer Mathematics*, p. 122-129, 1993
- Meduna, A.: A Formalization of Sequential, Parallel, and Continuous Rewriting. *International Journal of Computer Mathematics*, p. 24-32, 1992
- Meduna, A.: Symbiotic EOL Systems. *Acta Cybernetica*, p. 164-172, 1992
- Meduna, A.: Controlled Systolic Automata. *Parallel Computation in the Midwestern Academic Environment*, p. 56-66, 1991
- Meduna, A.: Generalized Forbidding Grammars. *International Journal of Computer Mathematics*, p. 31-38, 1990
- Meduna, A.: Global Context Conditional Grammars. *Journal of Automata, Languages and Combinatorics*, p. 31-38, 1990
- Meduna, A.: Parallel Compilers Based on L Systems. *Parallel Computation in the Midwestern Academic Environment*, p. 215-224, 1990
- Meduna, A.: Regulated Rewriting. *Missourian Annual Conference on Computing*, p. 25-31, 1990

- Meduna, A., Horvath, G.: On State Grammars. *Acta Cybernetica*, p. 4-14, 1988
- Meduna, A.: Context-Free Derivations on Word Monoids. *Acta Informatica*, p. 781-786, 1988
- Meduna, A.: Evaluated Grammars. *Acta Cybernetica*, p. 169-176, 1987