
CURRICULUM VITÆ OF BENJAMIN STEINBERG

PERSONAL DATA

Current School of Mathematics and Statistics
Academic Carleton University
Affiliation: 1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
Canada
Position: Associate Professor (tenured)
Telephone: 613-520-2600 Ext: 2151
E-mail address: bsteinbg@math.carleton.ca
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Citizenship: American and Canadian
Marital Status: Married

EDUCATION

Ph.D. Mathematics, University of California at Berkeley, Berkeley, California, May 1998.
B.A. Mathematics and Statistics, Rice University, Houston, Texas, May 1994, Summa Cum Laude.

ACADEMIC EMPLOYMENT HISTORY

Carleton University	Associate Professor	7/2004–Present
University of Leipzig	DFG Mercator Visiting Professor	12/2008–8/2009
Carleton University	Assistant Professor	7/2002–6/2004
The University of Porto	Auxiliary Professor	1/2001–6/2002
The University of Porto	NSF-NATO Postdoctoral Fellow	12/1999–12/2000
The University of Porto	Praxis Postdoctoral Fellow	10/1998–12/1999

AREAS OF INTEREST

Algebra including semigroup theory, geometric group theory, and representation theory; applications to automata theory and computer science

ACADEMIC HONORS/FELLOWSHIPS

Deutsche Forschungsgemeinschaft Mercator Visiting Professorship at the University of Leipzig 2009; Nominee of the Carleton Faculty of Sciences for the Petro-Canada Young Innovators Award 2006; NSF-NATO Postdoctoral Fellowship 1999–2000; PRAXIS Postdoctoral Fellowship 1998–1999; NSF-NATO Postdoctoral Fellowship Honorable Mention 1998; U.C. Berkeley Nominee for Sloan Dissertation 1997; U.C. Berkeley Math. Dept. Block Grant, Spring 1996, Spring 1997; Graduate Student Instructorship 1994–1998; NSF Graduate Student Fellowship Nominee 1994–1995; DOD Fellowship Nominee 1994; Phi Beta Kappa 1994; Summa Cum Laude 1994; Rice University Award for Best Science and Engineering Junior 1993; National Merit Scholar 1990–1994.

LANGUAGES

English, Portuguese and French

PUBLICATIONS**Books**

- (1) J. Rhodes and B. Steinberg, “The q -theory of finite semigroups,” Springer Monographs in Mathematics, 666 pages, 2009.
- (2) B. Steinberg, “Representation theory of finite groups: An introductory approach,” Springer Unitext, to appear.

Special Journal Issues

- (1) “International Conference on Semigroups and Groups in Honor of the 65th Birthday of Prof. John Rhodes,” papers from the conference held at the University of Porto, Porto, June 26–29, 2002. Edited by S. W. Margolis and B. Steinberg. *Internat. J. Algebra Comput.* **14** (2004), no. 5-6. World Scientific Publishing Co. Ptd. Ltd., Singapore, 2004. pp. i–xii and 525–827.
- (2) “A Special Issue in Memory of Bret Tilson.” Edited by J. Rhodes, S. W. Margolis and B. Steinberg *International Journal of Algebra and Computation* **20** (2010), no. 2, World Scientific Publishing Co., Singapore pp. i–xx and 115–341.

Papers Accepted for Publication in Refereed Journals

- (1) K. Henckell, J. Rhodes and B. Steinberg, *An effective lower bound for group complexity of finite semigroups and automata*, *Trans. Amer. Math. Soc.*, to appear.
- (2) Z. Izhakian, J. Rhodes and B. Steinberg, *Representation theory of finite semigroups over semirings*, *J. Algebra*, to appear.
- (3) B. Steinberg, *Strong Morita equivalence of inverse semigroups*, *Houston J. Math.*, to appear.
- (4) B. Steinberg, *Yet another solution to the Burnside problem for matrix semigroups*, *Canad. Math. Bull.* DOI: 10.4153/CMB-2011-030-1.

Papers in Refereed Journals

- (1) A. Costa and B. Steinberg, *Profinite groups associated to sofic shifts are free*, *Proc. London Math. Soc.* **102** (2011), 370–394.
- (2) S. W. Margolis and B. Steinberg, *The quiver of an algebra associated to the Mantaci-Reutenauer descent algebra and the homology of regular semigroups*, *Algebr. Representat. Theor.* **14** (2011), 131–159.
- (3) M. Lohrey and B. Steinberg, *Tilings and submonoids of metabelian groups*, *Theory Comp. Syst.* **48** (2011), 411–427.
- (4) B. Steinberg, M. Vorobets and Y. Vorobets, *Automata over a binary alphabet generating free groups of even rank*, *Internat. J. Algebra Comput.* **21** (2011), 329–354.
- (5) J. Funk, M. Lawson and B. Steinberg, *Characterizations of Morita equivalent inverse semigroups*, *J. Pure. Appl. Algebra* **215** (2011), 2262–2279.
- (6) B. Steinberg, *A groupoid approach to discrete inverse semigroup algebras*, *Adv. in Math.* **223** (2010), 689–727.
- (7) M. Lohrey and B. Steinberg, *An automata theoretic approach to the generalized word problem in graphs of groups*, *Proc. Amer. Math. Soc.* **138** (2010), 445–453.
- (8) M. Lohrey and B. Steinberg, *Submonoids and rational subsets of groups with infinitely many ends*, *J. Algebra* **324** (2010), 970–983.
- (9) B. Steinberg, *Cerny’s conjecture and group representation theory*, *J. Algebr. Comb.* **31** (2010), 83–109.
- (10) B. Steinberg, *Maximal subgroups of the minimal ideal of a free profinite monoid are free*, *Israel J. Math.* **176** (2010), 139–155.

- (11) J. Almeida, S. W. Margolis, B. Steinberg and M. V. Volkov, *Characterization of group radicals with an application to Mal'cev products*, Illinois J. Math. **54** (2010), 199–221.
- (12) B. Steinberg, *A theory of transformation monoids: combinatorics and representation theory*, Electron. J. Comb. **17** (2010), Research Paper R164, 56 p., electronic only.
- (13) B. Steinberg, *A combinatorial property of ideals in free profinite monoids*, J. Pure Appl. Algebra **214** (2010), 1693–1695.
- (14) K. Henckell, J. Rhodes and B. Steinberg, *Aperiodic pointlikes and beyond*, Internat. J. Algebra Comput. **20** (2010), 287–305.
- (15) K. Henckell, J. Rhodes and B. Steinberg, *A profinite approach to stable pairs*, Internat. J. Algebra Comput. **20** (2010), 269–285.
- (16) B. Steinberg, *A structural approach to locality of pseudovarieties of the form $\mathbf{LH}^{(m)}\mathbf{V}$* , Internat. J. Algebra Comput. **20** (2010), 307–318.
- (17) L. Ribes and B. Steinberg, *A wreath product approach to classical subgroup theorems*, Enseign. Math. (2) **56** (2010), 49–72.
- (18) B. Steinberg, *Semigroup actions, covering spaces and Schützenberger groups*, Semigroup Forum **81** (2010), no. 1, 217–227.
- (19) J. Funk and B. Steinberg, *The universal covering of an inverse semigroup*, Appl. Categ. Structures **18** (2010), 135–163.
- (20) J. Almeida, S. W. Margolis, B. Steinberg and M. V. Volkov, *Representation theory of finite semigroups, semigroup radicals and formal language theory*, Trans. Amer. Math. Soc. **361** (2009), 1429–1461.
- (21) J. Almeida and B. Steinberg, *Rational codes and free profinite monoids*, J. London Math. Soc. **79** (2009), 465–477.
- (22) O. Ganyushkin, V. Mazorchuk and B. Steinberg, *On the irreducible representations of a finite semigroup*, Proc. Amer. Math. Soc., **137** (2009), 3585–3592.
- (23) B. Steinberg, *Möbius functions and semigroup representation theory II: Character formulas and multiplicities*, Adv. in Math. **217** (2008), 1521–1557.
- (24) J. Rhodes and B. Steinberg, *Closed subgroups of free profinite monoids are projective profinite groups*, Bull. Lond. Math. Soc. **40** (2008), 375–383.
- (25) M. Lohrey and B. Steinberg, *The submonoid and rational subset membership problems for graph groups*, J. Algebra **320** (2008), 728–755.
- (26) B. Steinberg, *A note on the power semigroup of a completely simple semigroup*, Semigroup Forum **76** (2008), 584–586.
- (27) M. Kambites, P. V. Silva and B. Steinberg, *On the rational subset problem for groups*, J. Algebra **309** (2007), 622–639.
- (28) K. Auinger and B. Steinberg, *Varieties of finite supersolvable groups with the M. Hall property*, Math. Ann. **335** (2006), 853–877.
- (29) M. Kambites, P. V. Silva and B. Steinberg, *The spectra of lamplighter groups and Cayley machines*, Geom. Dedicata **120** (2006), 193–227.
- (30) B. Steinberg, *Möbius functions and semigroup representation theory*, J. Combin. Theor. Ser. A. **113** (2006), 866–881.
- (31) F. Arnold and B. Steinberg, *Synchronizing groups and automata*, Theoret. Comput. Sci. **359** (2006), 101–110.
- (32) J. Rhodes and B. Steinberg, *Complexity pseudovarieties are not local; Type II subsemigroups can fall arbitrarily in complexity*, Internat. J. Algebra Comput. **16** (2006), 739–748.
- (33) M. V. Lawson, S. W. Margolis and B. Steinberg, *Expansions of inverse semigroups*, J. Aus. Math. Soc. **80** (2006), 205–228.
- (34) K. Auinger and B. Steinberg, *A constructive proof of the Ribes-Zaleskiĭ product theorem*, Math. Z. **250** (2005), 287–297.

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- (35) K. Auinger and B. Steinberg, *On power groups and embedding theorems for relatively free profinite monoids*, Math. Proc. Cambridge Philos. Soc. **138** (2005), 211–232.
- (36) P. V. Silva and B. Steinberg, *On a class of automata groups generalizing lamplighter groups*, Internat. J. Algebra Comput. **15** (2005), 1213–1235.
- (37) K. Auinger and B. Steinberg, *Constructing divisions into power groups*, Theoret. Comput. Sci. **341** (2005), 1–21.
- (38) J. Rhodes and B. Steinberg, *Krohn-Rhodes complexity pseudovarieties are not finitely based*, Theor. Inform. Appl. **39** (2005), 279–296.
- (39) B. Steinberg, *On aperiodic relational morphisms*, Semigroup Forum **70** (2005), 1–43.
- (40) K. Auinger and B. Steinberg, *The geometry of profinite graphs with applications to free groups and finite monoids*, Trans. Amer. Math. Soc. **356** (2004), 805–851.
- (41) P. V. Silva and B. Steinberg, *A geometric characterization of automatic monoids*, Q. J. Math. **55** (2004), 333–356.
- (42) B. Steinberg, *On an assertion of John Rhodes and the finite basis and finite vertex rank problems for pseudovarieties*, J. Pure Appl. Algebra **186** (2004), 91–107.
- (43) M. V. Lawson and B. Steinberg, *Étendues and ordered groupoids*, Cah. Topol. Géom. Différ. Catég. **45** (2004), 82–108.
- (44) M. Delgado, V. H. Fernandes, S. W. Margolis and B. Steinberg, *On semigroups whose idempotents generate an aperiodic subsemigroup*, Internat. J. Algebra Comput. **14** (2004), 655–665.
- (45) K. Auinger, G. M. S. Gomes, V. Gould and B. Steinberg, *An application of a theorem of Ash to finite covers*, Studia Logica **78** (2004), 45–57.
- (46) K. Auinger and B. Steinberg, *On the extension problem for partial permutations*, Proc. Amer. Math. Soc. **131** (2003), 2693–2703.
- (47) B. Steinberg, *A topological approach to inverse and regular semigroups*, Pacific J. Math. **208** (2003), 367–396.
- (48) B. Steinberg, *The uniform word problem for groups and finite Rees quotients of E -unitary inverse semigroups*, J. Algebra **266** (2003), 1–13.
- (49) R. Gitik, S. W. Margolis and B. Steinberg, *On the Kurosh theorem and separability properties*, J. Pure Appl. Algebra **179** (2003), 87–97.
- (50) B. Steinberg, *The lifting and classification problems for subspaces of covering spaces*, Topology Appl. **133** (2003), 15–35.
- (51) B. Steinberg and B. Tilson, *Categories as algebra 2*, Internat. J. Algebra Comput. **13** (2003), 627–703.
- (52) B. Steinberg, *McAlister’s P -theorem via Schützenberger graphs*, Comm. Algebra **31** (2003), 4387–4392.
- (53) B. Steinberg, *Partial actions of groups on cell complexes*, Monatsh. Math. **138** (2003), 159–170.
- (54) P. V. Silva and B. Steinberg, *Extensions and subsemigroups of automatic monoids*, Theoret. Comput. Sci. **289** (2002), 727–754.
- (55) M. Delgado, S. W. Margolis and B. Steinberg, *Combinatorial group theory, inverse monoids, automata, and global semigroup theory*, Internat. J. Algebra Comput. **12** (2002), 179–211.
- (56) J. Rhodes and B. Steinberg, *Profinite semigroups, varieties, expansions, and the structure of relatively free profinite semigroups*, Internat. J. Algebra Comput. **11** (2002), 627–672.
- (57) B. Steinberg, *Finite state automata: A geometric approach*, Trans. Amer. Math. Soc. **353** (2001), 3409–3464.
- (58) B. Steinberg, *Factorization theorems for morphisms of ordered groupoids and inverse semigroups*, Proc. Edinb. Math. Soc. **44** (2001), 549–569.

- (59) B. Steinberg, *Inevitable graphs and profinite topologies: Some solutions to algorithmic problems in monoid and automata theory, stemming from group theory*, Internat. J. Algebra Comput. **11** (2001), 25–71.
- (60) B. Steinberg, *Inverse automata and profinite topologies on a free group*, J. Pure Appl. Algebra **167** (2001), 341–359.
- (61) B. Steinberg, *A note on amalgams of inverse semigroups*, J. Aus. Math. Soc. **70** (2001), 71–75.
- (62) B. Steinberg, *Inverse semigroup homomorphisms via partial group actions*, Bull. Austral. Math. Soc. **64** (2001), 157–168.
- (63) B. Steinberg, *Algorithmic problems for joins of pseudovarieties*, Semigroup Forum **62** (2001), 1–40.
- (64) B. Steinberg, *A note on the equation $\mathbf{PH} = \mathbf{J} * \mathbf{H}$* , Semigroup Forum **63** (2001), 469–474.
- (65) B. Steinberg, *A delay theorem for pointlikes*, Semigroup Forum **63** (2001), 281–304.
- (66) J. Almeida and B. Steinberg, *On the decidability of iterated semidirect products with applications to complexity*, Proc. Lond. Math. Soc. **80** (2000), 50–74.
- (67) B. Steinberg, *Polynomial closure and topology*, Internat. J. Algebra Comput. **10** (2000), 603–624.
- (68) B. Steinberg, *Fundamental groups, inverse Schützenberger automata, and monoid presentations*, Comm. Algebra **28** (2000), 5235–5253.
- (69) J. Rhodes and B. Steinberg, *Pointlike sets, hyperdecidability, and the identity problem for finite semigroups*, Internat. J. Algebra Comput. **9** (1999), 475–481.
- (70) B. Steinberg, *Semidirect products of categories with applications*, J. Pure Appl. Algebra **142** (1999), 153–182.
- (71) B. Steinberg, *Monoid kernels and profinite topologies on the free Abelian group*, Bull. Austral. Math. Soc. **60** (1999), 391–402.
- (72) B. Steinberg, *On pointlike sets and joins of pseudovarieties*, Internat. J. Algebra Comput. **8** (1998), 203–231.

Papers in Refereed Conference Proceedings

- (1) B. Steinberg, *The averaging trick and the Černý conjecture*, in “Developments in Language Theory” edited by Y. Gao, H. Lu, S. Seki and S. Yu, Springer Lecture Notes in Computer Science **6224** (2010), 423–431.
- (2) J. Almeida and B. Steinberg, *Matrix mortality and the Černý-Pin conjecture*, in “Developments in Language Theory” edited by V. Diekert and D. Nowotka, Springer Lecture Notes in Computer Science **5583** (2009), 67–80.
- (3) B. Steinberg, *Subsequence counting, matrix representations and a theorem of Eilenberg*, in “Language and Automata Theory and Applications,” edited by Carlos Martín-Vide, Friedrich Otto and Henning Fernau, Springer Lecture Notes in Computer Science **5196** (2008), 6–10.
- (4) M. Kambites and B. Steinberg, *Wreath product decompositions for triangular matrix semigroups*, in Proceedings of the International Conference Semigroups and Formal Languages, eds. J. André, V. H. Fernandes, M. J. J. Branco, GMS Gomes, J. Fountain, and J. C. Meakin, World Scientific, 2007, 129–144.
- (5) M. Delgado, A. Masuda and B. Steinberg, *Solving systems of equations modulo pseudovarieties of abelian groups and hyperdecidability*, in Proceedings of the International Conference Semigroups and Formal Languages, eds. J. André, V. H. Fernandes, M. J. J. Branco, GMS Gomes, J. Fountain, and J. C. Meakin, World Scientific, 2007, 57–65.
- (6) J. Almeida, S. W. Margolis, B. Steinberg and M. V. Volkov, *Modular and threshold subword counting and matrix representations of finite monoids*, in “Words 2005, 5th International Conference on Words, 13-17 September 2005, Acts,” edited by S. Brlek and

- C. Reutenauer, Publications du Laboratoire de Combinatoire et d' Informatique Mathématique, UQAM **36** (2005), 65–78.
- (7) J. Rhodes and B. Steinberg, *Join irreducible pseudovarieties, group mapping and Kovács-Newman semigroups*, in “LATIN 2004: Theoretical Informatics, Buenos Aires, Argentina April 2004,” edited by M. Farach-Colton, Springer Lecture Notes in Computer Science **2976** (2004), 279–291.
 - (8) B. Steinberg, *A modern approach to some results of Stiffler*, in: “Proceedings of the Workshop Semigroups and Languages,” edited by I. Araújo, M. Branco, V. Fernandes and G. Gomes, World Sci. Publishing, Singapore 2004, 240–249.
 - (9) S. W. Margolis and B. Steinberg, *Power semigroups and polynomial closure*, in “Words, Languages & Combinatorics, III (Kyoto, 2000),” edited by M. Ito, World Sci. Publishing, River Edge, NJ, 2003, 311–322.
 - (10) B. Steinberg, *A sampler of a topological approach to inverse semigroups*, in “Semigroups, Algorithms, Automata and Languages,” edited by G. M. S. Gomes, J.-E. Pin, and P. Silva, World Scientific, Singapore, 2002, 437–461.
 - (11) J. Almeida and B. Steinberg, *Syntactic and global semigroup theory, a synthesis approach* in “Algorithmic Problems in Groups and Semigroups,” edited by J. -C. Birget, S. Margolis, J. Meakin, and M. Sapir, Birkhauser, 2000, 1–23.
 - (12) B. Steinberg, **PG = BG: Redux** in “Proceedings of the International Conference on Semigroups,” edited by P. Smith, E. Giraldez, and P. Martins, World Scientific, Singapore, 2000, 181–190.
 - (13) B. Steinberg, *Parallel computation: The join of pseudovarieties*, in “Algebraic Engineering,” edited by C. Nehaniv and M. Ito, World Scientific, Singapore, 1999, 302–315.

Preprints

- (1) D. Milan and B. Steinberg, *On inverse semigroup C^* -algebras and crossed products.*, arXiv:1104.2304, 2011.
- (2) J. McCammond, J. Rhodes and B. Steinberg, *Geometric semigroup theory*, arXiv:1104.2301, 2011.
- (3) S. W. Margolis and B. Steinberg, *Quivers of monoids with basic algebras*, arXiv:1101.0416, 2011.
- (4) B. Steinberg, *A simple proof of Brown’s diagonalizability theorem*, arXiv:1010.0716, 2010.
- (5) B. Steinberg, *An elementary proof that subgroups of free groups are free*, arXiv:1006.3833, 2010.
- (6) B. Steinberg, *The Cerny conjecture for one-cluster automata with prime length cycle*, arXiv:1005.1835, 2010.
- (7) M. Delgado and B. Steinberg, *On solvability of semigroups with respect to a pseudovariety of groups*, 2008, submitted.
- (8) B. Steinberg, *Testing spherical transitivity in iterated wreath products of cyclic groups*, math.GR/0607563, 2006.

Work in progress

- (1) J. Araújo, P. Cameron, P. Neumann, C. Praegar, J. Saxl, C. Schneider, P. Spiga and B. Steinberg, *Permutation groups and synchronizing automata*, in progress.
- (2) P. Diaconis and B. Steinberg, *Colored shuffles and random walks on semigroups*.
- (3) S. W. Margolis, F. Saliola and B. Steinberg, *A topological approach to the global dimension of left regular band algebras*.
- (4) J. Almeida and B. Steinberg, *Matrix mortality and the Cerny-Pin conjecture*, in progress.

Dissertation

- “Decidability and Hyperdecidability of Joins of Pseudovarieties,” University of California at Berkeley, 1998.
- Supervised by Professor John Rhodes.

Presented Papers – 50+ minutes

- “A survey of the representation theory of finite semigroups”
 - Invited Speaker
 - Groups, Rings and Group-Rings, Edmonton, July 2011.
- “Etale groupoids and inverse semigroups”
 - Invited Speaker
 - Fields Sponsored Extended Workshop on Groups and Group Actions in Operator Algebra Theory, Ottawa, July 2010.
- “Semigroup representation theory and the Černý conjecture”
 - Invited Speaker
 - International Conference on Semigroups and Related Topics, Porto, Portugal, July 2009.
- “Matrix mortality and the Cerny-Pin conjecture”
 - Invited Speaker
 - 13th International Conference on Developments in Language Theory, Stuttgart, Germany June 2009.
- “Symbolic dynamics, profinite groups and profinite monoids”
 - Invited Speaker
 - International Conference on Geometric and Combinatorial Methods in Group Theory and Semigroup Theory, Lincoln, Nebraska, May 2009.
- “On the irreducible representations of inverse semigroups”
 - Invited Speaker
 - Workshop on Groups, Semigroups and Applications, Lisbon, Portugal, April 2009.
- “Recent progress on the structure of free profinite monoids”
 - Invited Speaker
 - Equational Theory of Regular Languages, Brno, Czech Republic, on March 2009.
- “Cerny’s conjecture and group representation theory”
 - Invited Speaker
 - School on Algebraic Theory of Automata, Lisbon, Portugal, September 2008.
- “Marked products of languages and matrix representations”
 - Invited Speaker
 - 2nd International Conference on Language and Automata Theory and Applications, Tarragona, Spain, March 2008.
- “Möbius functions and semigroup representation theory”
 - Invited Speaker
 - Conference on Representations of Algebras, Groups and Semigroups, Tel Aviv, Israel, January 2008.
- “Submonoids and rational subsets of right-angled Artin groups”
 - Fields Workshop in Asymptotic Group Theory and Cryptography, Ottawa, December 2007.
- “Möbius functions and semigroup representation theory”
 - Workshop on Group Embeddings, Banff, September 2007.
- “The submonoid and rational subset membership problems for graph groups”
 - AMS Special Session on Languages and Groups Stevens Institute, Hoboken, NJ, April 2007.
- “Rational codes and free clopen submonoids of free profinite monoids”

- CRM Workshop: Recent Progress in Combinatorics on Words, Montreal, March 2007.
- “Ordered 2-complexes and inverse semigroups”
 - Invited Speaker
 - Category Theory Octoberfest 2006, October 2006, Ottawa.
- “The representation theory of inverse semigroups – revisited.”
 - Semigroups, categories and automata, October 2006, York, UK.
- “Finite categories and the decomposition theory of finite monoids”
 - Invited Speaker
 - Categories and Semigroups Workshop, June 2006, Calgary.
- “Profinite groups in automata and semigroup theory”
 - Fields Workshop on Profinite Groups and Applications, August 2005.
- “Random walks on groups generated by automata”
 - Invited Speaker
 - International Conference on Semigroups and Languages in Honour of the 65th Birthday of Donald B. McAlister, Lisbon, Portugal, July 2005.
- “The spectra of lamplighters and related groups via automata”
 - Geometric and Asymptotic Methods in Group Theory, Banff, Canada, June 2005.
- “The Krohn-Rhodes theorem on decomposition of finite automata (I) and (II)”
 - “A class of automata groups generalizing lamplighter groups”
 - “Spectral theory”
 - Advanced Course on Automata Groups, Barcelona, Spain July 2004.
- “The q -theory of finite semigroups”
 - Invited speaker
 - International Meeting on Semigroup Theory and Related Topics, Braga, Portugal, June 2003.
- “A constructive proof of $\mathbf{PG} = \mathbf{BG}$ ”
 - Invited speaker
 - Workshop on Semigroups and Automata, Montreal, Canada, March 2003.
- “The q -theory of finite semigroups”
 - International Workshop on Semigroups, Automata, and Formal Languages, Crema, Italy, June 2002.
- “A topological approach to inverse semigroups”
 - Invited speaker
 - Thematic Term on Semigroups, Algorithms, Automata and Languages, Coimbra, Portugal, July 2001.
- “Categories as Algebra II”
 - Invited speaker
 - Colloquium on Semigroups, University of Szeged, Szeged, Hungary, July 2000.
- “Free products of LERF groups: Revisited”
 - Invited speaker
 - Conference on Geometric and Combinatorial Methods in Group Theory and Semigroup Theory, University of Nebraska, Lincoln, May 2000.
- “On the equation $\mathbf{J} * \mathbf{H} = \mathbf{J} \circledast \mathbf{H}$ for pseudovarieties of groups \mathbf{H} ”
 - The Second Semigroup Conference of St. Petersburg, Russian State Hydrometeorological University, St. Petersburg, Russia, June 1999.
- “On iterated semidirect products of pseudovarieties of semigroups with applications to complexity”
 - Invited speaker
 - Conference on Algorithmic Problems in Groups and Semigroups, University of Nebraska, Lincoln, May 1998.

Presented Papers – Shorter talks

- “Problems in permutation groups coming from automata theory”
 - Permutation Groups, Banff, July 2009.
- “On transitivity of sequential transducers”
 - Workshop on Automata and Algorithmic Logic, Stuttgart, June 2009.
- “Profinite groups, symbolic dynamics and profinite monoids”
 - Joint Meeting of the American Mathematical Society and the Brazilian Mathematical Society, Rio de Janeiro, Brazil, June 2008.
- “On semigroups with basic complex algebra”
 - Winter Meeting of the Canadian Mathematical Society, London, Canada, December 2007.
- “Möbius inversion, groupoids and inverse semigroup algebras”
 - Summer Meeting of the Canadian Mathematical Society, Calgary, Canada, June 2006.
- “Algebraic combinatorics, semigroup representations and random walks on hyperplane chambers after Ken Brown”
 - Combinatorial and geometric group theory. Vanderbilt University, May 5-10, 2006.
- “Profinite groups, profinite trees, Stallings foldings and finite monoids”
 - Special Session on Geometric Methods in Group Theory and Semigroup Theory, AMS Fall meeting, Lincoln, Nebraska, October 2005.
- “Modular and threshold subword counting and matrix representations of finite monoids”
 - Words 2005, 5th International Conference on Words, 13-17 September 2005, Montreal.
 - Workshop on Semigroups and Automata, a satellite workshop to ICALP 2005, Lisbon, Portugal July 2005.
- “On the spectra of lamplighter groups and Cayley machines”
 - Winter Meeting of the Canadian Mathematical Society, Montreal, Canada, December 2004.
- “On the profinite monoid of closed subsets of a profinite group”
 - Summer Meeting of the Canadian Mathematical Society, Halifax, Canada, June 2004.
- “Join irreducible pseudovarieties, group mapping and Kovács-Newman semigroups”
 - LATIN 2004: Theoretical Informatics, Buenos Aires, Argentina April 2004.
- “The automata group of the Cayley machine of a group”
 - International Conference on Group Theory: combinatorial, geometric, and dynamical aspects of infinite groups, Gaeta, Italy, June 2003.
- “The q -theory of finite semigroups”
 - Joint meeting of the AMS-UMI, Pisa, Italy, June 2002.
- “Undecidability in extending partial permutations”
 - International Conference on Modern Algebra, Vanderbilt University, Nashville, USA, June 2002.
- “The delay theorem for pointlikes”
 - Workshop on Combinatorics, Semigroups and Words, Kyoto-Sangyo University, Kyoto, Japan, March 2000.
- “Polynomial closure and topology”
 - Third International Colloquium on Words, Languages and Combinatorics, Kyoto-Sangyo University, Kyoto, Japan, March 2000.
- “Geometric automata theory and pseudovariety equations”
 - International Conference on Semigroups, Braga, Portugal, June 1999.
- “Hyperdecidability: examples and counterexamples”
 - First Meeting of the Project Algebra, Geometry, and Combinatorics, Braga, Portugal, June 1997.

- “Parallel computation: The join of pseudovarieties”
 - First International Conference on Semigroups and Algebraic Engineering, Aizu-Wakematsu, Japan, March 1997.

Mini-courses

- “Membership problems in groups,” Workshop on Topics in Algorithmic and Geometric Group and Semigroup Theory, part of the Thematic Semester “Geometric, Combinatorial and Computational Group Theory” of the CRM, August 2010.
- “Groups generated by automata,” Masaryk University, Brno, Czech Republic, May 4–6, 2009.

Participation in Workshops

- Permutation Groups, Banff, Canada, July 2009.
- Self-similarity and Branching in Group Theory, Banff, Canada, October 2008.
- Group Embeddings: Geometry and Representations, Banff, Canada, September 2007.
- Selfsimilar Groups and Conformal Dynamics, American Institute of Mathematics, Palo Alto, US, June 2006.
- Geometric and Asymptotic Methods in Group Theory, Banff, Canada, June 2005.
- Automata Groups, Barcelona, Spain, July 2004.
- Automata and Language Theoretic Methods in Combinatorial and Geometric Group Theory, Bar-Ilan University, Ramat Gan, Israel, December 1999.
- Workshop on Inverse Semigroups and Quasicrystals, University of Essex, Colechester, England, July/August 1999.

Talks for Students and General Audiences

- “Groucho Marx, Bertrand Russell, Kurt Godel and Alan Turing: from self-referential paradoxes to undecidability,” Carleton Math Undergrad Colloquium, November 2009.
- “When is a number a sum of two squares,” Carleton Math Undergrad Colloquium, November 2007.
- “The Platonic Solids,” Carleton Math Undergrad Colloquium, March 2007.
- “Self-similarity and art,” Boston Museum of Fine Arts, Boston, USA, November 2002.
- “Computability,” New Talents in Mathematics Meeting, Portugal, September 2001.
- “The theory of partial symmetry,” Forum of Portuguese Researchers, Faro, Portugal, April 2001.
- “Tricks with numbers,” University of Porto, Portugal, April 2000.

Seminars

A non-exhaustive list of places where I have given seminars includes: University of California at Berkeley, Paris VI, Paris VII, the University of Porto, Simon Fraser, Texas A&M, Carleton University, McGill, University of Ottawa, Ben Gurion University, Bar-Ilan University, University of York (England), University of Newcastle, University of Bangor, University of Lisbon, Instituto Superior Técnico of Lisbon, Centre de Recerca Matemática at Barcelona, University of Brasília, Vanderbilt, University of Texas at El Paso, University of Leipzig, University of Coimbra, University of Stuttgart, University of Tübingen, Université de Québec a Montréal.

GRANTS

- Automata in semigroup theory, group theory and analysis
 - Principal Investigator: Benjamin Steinberg (Carleton University)
 - Granting Agency: NSERC
 - Purpose: Operating Grant
 - Dates: 2007–2012

- Amount per year: \$17,000
- Algorithmic problems in semigroup and automata theory
 - Principal Investigator: Benjamin Steinberg (Carleton University)
 - Granting Agency: NSERC
 - Purpose: Operating Grant
 - Dates: 2003–2007
 - Amount per year: \$13,500
- Network efficiency, reliability and security
 - Principal Investigator: Irwin S. Pressman (Carleton University)
 - My role: Co-investigator
 - Granting Agency: NSERC
 - Purpose: Equipment Grant
 - Dates: 2003
 - Amount: \$65,000
- Carleton startup grant
 - Principal Investigator: Benjamin Steinberg (Carleton University)
 - Granting Agency: Carleton University
 - Dates: 2002–2008
 - Amount: \$20,000
- Combinatorics and geometry in semigroup theory
 - Principal Investigator: Pedro V. Silva (University of Porto)
 - My role: Co-investigator
 - Granting Agency: Foundation of Science and Technology of Portugal
 - Purpose: Research Grant
 - Dates: 2001–2004
 - Amount per year: €10,000
- Algorithmic problems in finite semigroup theory
 - Principal Investigator: Jorge Almeida (University of Porto)
 - My role: Co-investigator
 - Granting Agency: Foundation of Science and Technology of Portugal
 - Purpose: Research Grant
 - Dates: 2000–2002
 - Amount per year: €10,808
- Combinatorial and geometric theory of groups and semigroups and its applications to computer science
 - Principal Investigator: Stuart Margolis (Bar-Ilan University)
 - My role: Co-investigator
 - Granting Agency: INTAS
 - Purpose: Research Grant
 - Dates: 1999–2002

Amount per year: €3,000 for our group in Portugal

EDITORIAL WORK

- Communicating Editor for International Journal of Algebra and Computation, 2011–present.
- Communicating Editor for Semigroup Forum, 2003–present.
- Reviewer for Math Reviews 2003–present.
- Reviewed grant proposals for NSA and NSERC.
- Referee for: Trans. Amer. Math. Soc., Bull. Lond. Math. Soc., Proc. Lond. Math. Soc., Discrete Math., Geom. Dedicata, J. Algebraic Combinatorics, Theory of Computing

Systems, J. Algebra, Internat. J. Algebra Comput., J. Pure Appl. Algebra, Comm. Algebra, Theoret. Comput. Sci., L'Enseignement Mathématique, Monatsh. Math., Semigroup Forum, Indian J. Math., Studia Sci. Math. Hungar., J. Inst. Math. Jussieu, Annales des sciences mathématiques du Québec, Glasgow Mathematical Journal, Canadian Math. Bull., as well as for many conference proceedings in both Mathematics and Computer Science.

- Member of the Mathematics evaluation committee for the *Fonds québécois de la recherche sur la nature et les technologies* for research in teams, 2010.

CONFERENCE AND SEMINAR ORGANIZATION

- Co-organizer of “Topics in Algorithmic and Geometric Group and Semigroup Theory,” a workshop in the CRM thematic semester “Geometric, Combinatorial and Computational Group Theory”, August 2010.
- Co-organizer with P. Hofstra and J. Funk of the Fields Institute workshop on “Semigroups and Categories”, May 2010.
- Co-organizer with M. Neufang of the Canadian Mathematical Society Winter Meeting 2008, in Ottawa.
- Co-organizer with R. Grigorchuk and Z. Sunik of “Self-Similarity and Branching in Group Theory” Banff, October 2008.
- Co-organizer with E. Neher and V. Dlab of the Fields Institute sponsored “Algebra Week,” September 2008.
- Co-organizer with L. Renner of a Special Session on “Algebraic Combinatorics, Representations and Geometry” of the Canadian Mathematical Society Winter meeting in 2007.
- Member of the Programme Committee for Conference AutoMathA 2007 “Automata: from Mathematics to Applications,” Palermo, Italy, June 2007.
- Co-organizer with I. Bumagin of the Fields Institute sponsored “Workshop on Geometric Methods in Group Theory,” August 2006.
- Organizer of the first Fields-Carleton Lecture series given by D. Saari, April 2006.
- Co-organizer with L. Ribes of the Fields Institute sponsored “Workshop on Profinite Groups with Applications,” August 2005.
- Co-organizer of the Joint Carleton-Ottawa University Colloquium, 2005–2006.
- Organizer of the Joint Carleton-Ottawa University Colloquium, 2004–2005.
- Organizer of the Joint Carleton-Ottawa University Algebra Seminar, 2003–2005, 2009–2010.
- Co-organizer of the 53rd, 55th, 57th, 59th, 61st, 63rd and 65th Joint Ottawa-Carleton Algebra Days 2003–2009.
- Co-organizer of the International Conference on Semigroups and Groups in Honor of the 65th Birthday of John Rhodes, Porto, Portugal, June 2002.
- Organizer of the Semigroup Seminar at the University of Porto, 1999–2001 and of the General Seminar, 2001–2002.

POSTDOCS SUPERVISED

- Mark Kambites, Leverhulme Postdoctoral Fellow, 2003–2005. Currently an RCUK Academic Fellow in Complexity at the University of Manchester.

STUDENTS SUPERVISED

- Lynne Wolfson, M.Sc., Winter 2006. Thesis: *Isometries of $Cat(0)$ metric spaces.*

- David Gains, M.Sc., Summer 2005 (co-supervised with John Poland). Thesis: *Monoid pictures and finite derivation type*.
- Fredrick Arnold, M.Sc., Winter 2005. Thesis: *A linear algebraic approach to synchronizing automata*.
- Christina Kevins, Honour's project, Summer 2010.
- Andrew Elkington, Honour's project, Fall 2005.
- James Overton, Honour's project, Summer 2005.
- Zeyu Deng, Honour's project, Winter 2005.
- Chen Lu, Honour's project, Winter 2005.
- Alastair Brockwell, Honour's project (won a prize for his project), Summer 2004.
- External examiner for the Ph.D. theses of: Juan Ignacio García García (University of Granada, Spain 2001); Pascal Tesson (McGill University, Canada 2003); Porfírio Azevedo (University of Brasília, Brazil 2008).
- External examiner for the Master's theses of: Arkadev Chattopadhyay (McGill University, Canada 2004).
- Mentor to Andre Souto for the New Talents in Mathematics program of the Gulbenkian Foundation, Portugal 2001–2002.

CURRENT STUDENTS AND POSTDOCS

- Bridget Brimacombe, Ph.D. Topic: Quivers of incidence algebras of inverse semigroups.
- Wadii Hajji, Ph.D. (co-supervised with David Handelman). Topic: Representation theory of compact inverse semigroups.
- Robin Scott, Ph.D.
- David Gains, Ph.D.

ADMINISTRATIVE EXPERIENCE

- Chair of the Carleton School of Maths and Stats Math Program Committee 2009–2010.
- Vice-chair of Carleton School of Maths and Stats Math Retention Committee 2009–2010.
- Graduate Director of the Carleton School of Maths and Stats 2007–2008.
- Member of the Corporation, The Fields Institute 2004–2007.
- Search Committee for the Director of the School of Maths and Stats 2007.
- Chair of the Carleton School of Maths and Stats Planning Committee 2006–2007.
- Chair of the Carleton School of Maths and Stats Research Committee 2004–2006.
- Carleton University Representative to the Fields Institute 2004–2006.
- Member of Carleton School of Maths and Stats Hiring Committee 2003–2004.
- Member of Steering Committee of the *Centro de Matemática da Universidade do Porto*, a research center at the University of Porto, Portugal 2001–2002.

COURSES TAUGHT

- Associate Professor, Carleton University (Fall 2004–present):
 - Algebraic Topology, Winter 2011.
 - Linear Algebra for Engineers, Winter 2011.
 - Group Theory, Fall 2011.
 - 2nd-year Abstract Algebra, Fall 2011.
 - 2nd-year Abstract Algebra, Winter 2010.
 - 3rd-year Abstract Algebra for Computer Scientists, Winter 2010.
 - Theory of Automata, Fall 2009.
 - Graduate Algebra I, Fall 2009.

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- Algebraic Theory of Automata, Winter 2009, taught at the Computer Science Department of the University of Leipzig as a Mercator Visiting Professor.
 - Group Representation Theory, Winter 2008.
 - Group Theory, Fall 2008.
 - Algebraic Topology, Winter 2007.
 - Theory of Automata, Winter 2007.
 - Linear Algebra I (two sections), Fall 2006.
 - 2nd-year Abstract Algebra, Winter 2006.
 - 1st-year Honours Algebra, Winter 2006.
 - 1st-year Honours Algebra, Fall 2005.
 - Graduate Algebra I, Fall 2005.
 - Ring Theory, Winter 2005.
 - Discrete Mathematics and Algorithms for Computational Sciences, Winter 2005.
 - Theory of Automata, Fall 2004.
 - Algebraic Theory of Automata and Semigroups, Fall 2004.
 - Visiting Professor, University of Leipzig (Fall 2008–Spring 2009):
 - The Algebraic Theory of Automata, Spring 2009.
 - Assistant Professor, Carleton University (Fall 2002–Winter 2004):
 - 2nd-year Abstract Algebra, Winter 2004.
 - Linear Algebra for Engineers, Winter 2004.
 - Theory of Automata, Fall 2003.
 - Graduate Level Group Theory, Fall 2003.
 - Ring Theory, Winter 2003.
 - Linear Algebra for Engineers, Winter 2003.
 - Theory of Automata, Fall 2002.
 - Auxiliary Professor, University of Porto (Spring 2001–Spring 2002):
 - 4th-year Algebra: Combinatorial Group Theory, Spring 2002.
 - Calculus I (two sections), Fall 2001.
 - Algebra I, Fall 2001.
 - Complex Analysis, Fall 2001.
 - 4th-year Algebra: Combinatorial Group Theory, Spring 2001.
 - Linear Algebra II, Spring 2001.
 - Lecturer, University of California at Berkeley (Summer 1998):
 - Introduction to Abstract Algebra, Summer 1998.
 - Graduate Student Instructor, University of California at Berkeley (Fall 1994–Spring 1998):
 - Linear Algebra and Differential Equations, Fall 1997/Spring 1995.
 - Theory of Computation, Spring 1997.
 - Discrete Mathematics, Fall 1996.
 - One Variable Calculus, Fall 1995.
 - One Variable Calculus, Fall 1994.
 - Summer School Teacher, Lowell High School, San Francisco (Summer 1996):
 - Geometry 1, Summer 1996.
 - Geometry 2, Summer 1996.