

Kim B. Bruce  
Department of Computer Science  
Pomona College  
185 E. Sixth St.  
Claremont, CA 91711

Home Phone: (909) 624-9740  
Office Phone: (909) 607-1866  
[kim@cs.pomona.edu](mailto:kim@cs.pomona.edu)

### Research Interests:

Computer Science: Semantics and design of programming languages: types, polymorphism, object-oriented and functional programming languages; computer science education; theory of computation; mathematical logic.

Linguistics: Pragmatics and Semantics of natural languages: modeling multi-participant discourse.

Mathematical Logic: Model theory: Models of languages with generalized quantifiers.

### Professional and Teaching Experience:

#### Regular positions

Pomona College, Claremont, CA., 7/2005 - present, Reuben C. and Eleanor Winslow Professor of Computer Science and Chair, Department of Computer Science.

*Teaching and research in computer science and linguistics.*

Williams College, Williamstown, MA., 9/77 - present, Frederick Latimer Wells Professor of Computer Science, Chairman (1987-1990, 1992-1993, 1996-1998), Department of Computer Science.

*Teaching and research in computer science and (until 1982) mathematics. Initiated and led the design and implementation of major and new department in Computer Science. Chaired department for first three years of its existence.*

Princeton University, Princeton, N. J., 9/75 - 6/77, Instructor in Department of Mathematics.

#### Visiting & temporary positions

University of California at Santa Cruz, 2004-2005, Visiting Professor of Computer Science.

*Research in Computer Science and study of Linguistics.*

EcoNovo, NJ, 2001-2002, part-time Consultant.

*Advised on design of object-oriented database language.*

Princeton University, Princeton, NJ, 9/98-1/99, Visiting Professor of Computer Science.

*Teaching and research in programming languages.*

NEC Research Institute, Princeton, NJ, 9/98 - 1/99, Consultant, *Involved in designing a typed intermediate language for a Java compiler.*

Newton Institute for Mathematical Sciences, Cambridge, UK, 8-10/95, Visiting Scientist.

Wheaton College, Wheaton, MA, 6/92, Principal Instructor for 3 week NSF-sponsored Undergraduate Faculty Enhancement course in Programming Language Paradigms.

Ecole Normale Supérieure, Paris, France, 11/91, Visiting Professor of Computer Science. *Research in programming languages.*

Stanford University, Palo Alto, CA, 1/91 - 5/91, Visiting Professor of Computer Science. *Research in programming languages.*

Digital Equipment Corporation, System Research Center, Palo Alto, CA, 4/91 - 5/91, Consultant.  
*Research in programming languages.*

University of Pisa, Pisa, Italy, 5-6/85, Visiting Professor of Computer Science. *Research.*

M.I.T. Laboratory for Computer Science, 6/80 - 8/81, Visiting Scientist. *Research.*

Prime Computer Corporation, Framingham, MA., 10/80 - 12/80, Part-time consultant on cryptography and computer security.

Stanford University, 6/77 - 8/77, Visiting Scholar, Department of Mathematics.

University of Wisconsin, Madison, summers of 1975, '78, '79, Lecturer in Mathematics for Minority Engineering Program.

University of Wisconsin, Madison, 9/70 - 5/75, N.S.F. Fellow, Teaching Assistant, and Project Assistant.

Naval Plant Representative, Pomona, CA, 6/68 - 9/70, Part-time Mathematician.

#### **Education:**

Pomona College, Claremont, CA; B.A. 1970 in mathematics, magna cum laude with distinction in mathematics.

University of Wisconsin, Madison, WI; M.A. 1972, Ph.D. 1975 in mathematics.

Major area: Mathematical logic - model theory

Minor area: Computer Science

Thesis advisor: H. J. Keisler

#### **Honors and Awards:**

ACM SIGCSE 2005 award for outstanding contributions to Computer Science education.

ACM Recognition of Service Awards for serving as general chair of FOOL 4, 1997, FOOL 6, 1999, and FOOL 7, 2000.

Williamstown Public Schools Service Award for help in setting up a computer lab, 1997.

IEEE Computer Society - named "Golden Core Member", 1996.

IEEE Computer Society Meritorious Service Award for work on Curricula '91, 1992.

Sigma Xi, 1986.

Outstanding Teaching Award, University of Wisconsin, 1975.

Phi Beta Kappa, 1970.

#### **Grants and Fellowships:**

Mellon Foundation funded fellowship to study Linguistics at UC-Santa Cruz, 2004-2005.

NSF research grant #CCR-0306486, "RUI: Modules and Parallel Specialization of Object Types."  
Principal investigator, \$206,901 for 2003-2006.

NSF CCLI course development grant # DUE-0088895, "Making Interaction Fundamental in Object-oriented CS1: Programming Tools and Curricular Materials to Support Concurrency and Event-driven Programming." Co-principal investigator, \$287,892 for 2001-2003.

NSF research grant #CCR-9121778, "RUI: Semantics of Object-Oriented Languages." Principal investigator, \$138,682 for 1992-1995. Renewed as CCR-9424123 for \$144,000 for 1995-1998, CCR-9870253 for \$104,000 for 1998-2000, and CCR-9988210 for \$188,913 for 2000-2003.

NSF grant #CCR-9302344, "Foundations of Object-Oriented Languages Workshop." Principal investigator, \$9,083. Funding for the U.S. half of a joint NSF-ESPRIT sponsored workshop on theoretical foundations of object-oriented languages. This grant provided start-up funds for the series of International Workshops on the Foundations of Object-Oriented Languages (FOOL).

NSF SGER grant #CCR-9105316, "Type Structures in Programming Languages." Principal investigator, \$20,618 for 1991-92.

NSF research grant #MCS-8202851, "Models of Typed and Untyped Lambda Calculus." Principal investigator, \$30,621 for 1982 - 1984. New award #MCS-8402700 "Models of Typed and Untyped Lambda Calculus." \$47,522 for 1984-86. New award #DCR-8603890 "The semantics of Types and Polymorphism in Programming." \$53,290 for 1986-88.

NATO Grant for International Collaboration in Research, "The mathematical semantics of types in programming," Co-principal investigator with G. Longo of U. of Pisa and A. Meyer of M.I.T., 277,000 Belgian Francs (approx. \$6000) for 1986-88.

NSF grant #Int-8200674 under auspices of the U.S.- Italy Cooperative Science Program to support scientific visit to Pisa, Italy, in June, 1982. The grant supported joint research with Professor G. Longo at the University of Pisa in the field of denotational semantics and models of lambda calculus. Co-principal investigator (with A. Meyer of M.I.T.), \$4,500. New award #INT-8300436 in 1983 to support visits during summers of 1983, 1984, and 1985, \$7,400.

Research seminar award by Williams College for Spring, 1987. One semester of released time to do research and conduct seminar in denotational semantics for students and faculty.

N.S.F Science Faculty Development Fellowship: 1980-81.

Williams College Class of 1941 Fellowship for Assistant Professor leave: 9/80 - 12/80.

Williams College Division III & Psychology Research grants, various small grants to support research in mathematics and computer science, 1977-1989.

N.S.F. Graduate Fellowship: 9/70 - 8/73.

Sloan grant funding (from grant received by Williams College) to redesign introductory CS courses and create new Discrete Math course, summers of 1983, 1984.

Sloan grant funded workshop for designing new curriculum for CS in liberal arts colleges, participant.

Ford grant funding (from grant received by Williams College) to introduce a new section of introductory CS course presenting a functional language and experimental highly-parallel architectures.

## **Publications:**

### **Computer Science**

#### Books

(with A. Danyluk and T. Murtagh ) *Java: An Eventful Approach*, Prentice-Hall, 2005.

*Foundations of Object-Oriented Languages: Types and Semantics*, MIT Press, 2002.

#### Journal articles and book chapters:

Controversy on how to teach CS 1: A discussion on the SIGCSE members mailing list, *Inroads – The SIGCSE Bulletin*, 37(2), pp. 111-117, 2005.

(with Scot Drysdale, Charles Kelemen, and Allen Tucker) Why Math?, *Communications of ACM*, 46(9), pp. 40-44, 2003.

(with A. Fiech, A. Schuett '94, R. van Gent '93 ) PolyTOIL: A type-safe polymorphic object-oriented language, *TOPLAS*, 25(2), pp. 225-290, 2003.

Edited and wrote editorial for a special issue with papers from the Sixth Workshop on Foundations of Object-Oriented Languages (FOOL 6), *Information and Computation*, 175, pp. 1-2 (2002).

(with Didier Remy ) co-edited and wrote editorial for a special issue with papers from the Fifth Workshop on Foundations of Object-Oriented Languages (FOOL 5), *Information and Computation*, 172, pp. 1-1 (2002).

(with Luca Cardelli and Benjamin C. Pierce ) Comparing Object Encodings, *Information and Computation* 155, pp. 108-133 (1999). A preliminary version appeared in *Proceedings of TACS '97 (Theoretical Aspects of Computer Science)*, LNCS 1281, pp. 415-438.

(with Benjamin Pierce) co-edited and wrote editorial for a special issue with papers from the Third Workshop on Foundations of Object-Oriented Languages (FOOL3), *Theory and Practice of Object-oriented Systems*, 4(1998), pg. 1.

(with Michael Jipping ) Imperative Programming Languages, in *Handbook of Computer Science and Engineering*, (1996), pp. 1983-2005.

Thoughts on Computer Science Education, *ACM Computing Surveys*, 28, No 4es (December 1996), pp. 93-es.

Progress in Programming Languages, *ACM Computing Surveys*, 28(1996), pp. 245-247.

(with Luca Cardelli, Giuseppe Castagna, The Hopkins Objects Group, Gary T. Leavens, and Benjamin Pierce ) On binary methods, *Theory and Practice of Object-oriented Systems*, 1(1995), pp. 221-242.

A paradigmatic object-oriented programming language: Design, static typing and semantics, *Journal of Functional Programming* 4(1994), pp. 127-206.

(with R. Di Cosmo and G. Longo ) Provable isomorphisms of types, *Mathematical Structures in Computer Science* 2 (1992), pp. 231-247.

Creating a new model curriculum: A rationale for Computing Curricula' 91, *Education and Computing* 7(1991), pp. 23-42.

(with G. Longo ) A modest model of records, inheritance, and bounded quantification, *Information and Computation* 87 (1990), pp. 196-240. A preliminary version appeared under the same name in *Proceedings of Third Symposium on Logic in Computer Science*, Computer Society Press, 1988, pp. 38-50. Reprinted in *Theoretical Aspects of Object-Oriented Programming*, ed. by Carl Gunter and John C. Mitchell, MIT Press, 1994, pp. 151 - 195.

(with A. Meyer and J. Mitchell ) The semantics of second order lambda calculus, *Information and Computation* 85 (1990), pp. 76-134. Reprinted in *Logical Foundations of Functional Programming*, ed. by G. Huet, Addison-Wesley, 1990, pp. 213-272.

(with P. Wegner ) An algebraic model of subtype and inheritance, *Advances in Data Base Programming Languages*, ed. by F. Bancilhon and P. Buneman, ACM Press - Addison-Wesley, 1990, pp. 75-96.

(with G. Longo ) On combinatory algebras and their expansions, *Theoretical Computer Science* 31 (1984), pp. 31-40 (reviewed in *Math. Reviews*, M.R. 86a: 03013).

#### Conference Proceedings and Technical Reports:

(with Andrea Danyluk and Thomas Murtagh) Why structural recursion should be taught before arrays in CS 1, *Proceedings of the 2005 ACM Symposium on Computer Science Education*, pp. 246-250, 2005.

Controversy on How to Teach CS 1: A discussion on the SIGCSE-members mailing list, invited paper in ACM SIGCSE Bulletin (Inroads), pp. 29-34, December, 2004, corrected reprint in June, 2005, pp. 111-117.

(with Isabel Michiel, Jürgen Börstler, and Alejandro Fernández) Tools and Environments for Learning Object-Oriented Concepts, in Frank Buschmann, Alejandro P. Buchmann, and Mariano A. Cilia (Eds.): *Object-Oriented Technology, ECOOP 2003 Workshops*, Darmstadt, Germany, July 21-25, 2003, *Proceedings, Lecture Notes in Computer Science* 3013, Springer-Verlag, 2004, pp. 119-129.

(with Andrea Danyluk and Thomas Murtagh) Event-driven programming facilitates learning standard programming concepts, *Proceedings of the 2004 OOPSLA Educator's Symposium*, to appear, 2005, 5 pp.

(with J. Nathan Foster ) LOOJ: Weaving LOOM into Java, ECOOP 2004 conference proceedings, LNCS 3086, Springer-Verlag, pp. 390-414, 2004.

Some challenging typing issues in object-oriented languages, Invited paper to WOOD Workshop 2003, *Electronic Notes in Theoretical Computer Science*, 82(8), 29 pages, 2003..

Bending without Breaking: Making software more flexible, *Proceedings of 5th International A.P.Ershov Conference, Perspectives of System Informatics*, LNCS 2890, Springer-Verlag, 2003, pp. 46-49.

(with Isabel Michiel and Jürgen Börstler) Tools and Environments for Learning Object-Oriented Concepts, in Juan Hernández Núñez, Ana M. D. Moreira (Eds.): *Object-Oriented Technology, ECOOP 2002 Workshops and Posters*, Málaga, Spain, June 10-14, 2002, *Proceedings, Lecture Notes in Computer Science* 2548, Springer-Verlag, 2002, pp. 30-43.

- (with Andrea Danyluk and Thomas Murtaghr) Event-driven programming can be simple enough for CS 1, *ITiCSE Proceedings*, 2001, pp. 1-4.
- (with Andrea Danyluk and Thomas Murtaghr) A library to support a graphics based object-first approach to CS 1, *SIGCSE Proceedings*, pp. 6-10, 2001.
- (with Charles Keleman and Allen Tucker) Our curriculum has become math-phobic!, *SIGCSE Proceedings*, pp. 243-247, 2001.
- (with Owen Astrachan, Peter Henderson, Charles Keleman, and Allen Tucker) Has our curriculum become math-phobic (an American Perspective)?, *ITiCSE Proceedings*, pp. 132-135, 2000.
- (with Cristian Ungureanu and Suresh Jagannathan) An Object-Based Typed Intermediate Language for Java, NEC Technical Report, 1999.
- (with Joseph Vanderwaart '99) Semantics-Driven Language Design: Statically Type-Safe Virtual Types in Object-Oriented Languages *Electronic Proceedings of the 1999 Symposium on Mathematical Foundations of Programming Semantics, Electronic Notes in Theoretical Computer Science, Volume 20*, 1999.
- Formal Semantics and Interpreters in a Principles of Programming Languages Course, *Proceedings of the 1999 ACM SIGCSE Conference*, pp. 331-335.
- (with Martin Odersky and Philip Wadler) A statically safe alternative to virtual types, *ECOOP '98 Proceedings*. LNCS 1445, Springer-Verlag, pp. 523--549. Available through SpringerLink at <http://dx.doi.org/10.1007/BFb0054106>. An earlier version appeared in the *electronic proceedings of the FOOL 5 Workshop*.
- (with Leaf Petersen '96 and Joseph Vanderwaart '99) Modules in LOOM: Classes are not enough, *Williams College Technical Report*, 1998.
- Increasing Java's expressiveness with ThisType and match-bounded polymorphism, *Williams College Technical Report*, 1997.
- (with Adrian Fiech and Leaf Petersen '96) Subtyping is not a good match for object-oriented languages, *ECOOP '97 Proceedings*, LNCS 1241, Springer-Verlag, pp. 104-127. An earlier version appeared in the *electronic proceedings of the FOOL 4 Workshop*.
- (with A. Schuett '94, R. van Gent '93) PolyTOIL: A type-safe polymorphic object-oriented language, *ECOOP '95 Proceedings*, LNCS 952, Springer-Verlag, pp. 27-51.
- Typing in object-oriented languages: Achieving expressiveness and safety, *Williams College Technical Report*.
- Attracting (& Keeping) the Best and the Brightest: An entry-level course for experienced introductory students, *Proceedings of the 1994 ACM SIGCSE Conference*, pp. 243-247.
- (with R. van Gent '93) TOIL: A new Type-safe Object-oriented Imperative Language, *Williams College Technical Report*.
- (with J. Crabtree '93, A. Dimock, R. Muller, T. Murtagh, and R. van Gent '93), Type checking in TOOPLE is decidable, *Proceedings of OOPSLA 1993*, pp. 29-46.
- (with J. Crabtree '93 and G. Kanapathy '93) An operational semantics for TOOPLE: A statically-typed object-oriented programming language, *Proceedings of the 1993 Symposium on Mathematical*

*Foundations of Programming Semantics*, Lecture Notes in Computer Science 802, Springer-Verlag, 1994, pp. 603-626.

Safe type checking in a statically-typed object-oriented programming language, *Proceedings of 20th ACM Symposium on Principles of Programming Languages*, 1993, pp. 285-298.

The equivalence of two semantic definitions for inheritance in object-oriented languages, *Proceedings of the 1991 Symposium on Mathematical Foundations of Programming Semantics*, Lecture Notes in Computer Science 598, Springer-Verlag, 1992, pp. 102-124.

(with John Mitchell ) PER models of subtyping, recursive types and higher-order polymorphism, *Proceedings of 19th ACM Symposium on Principles of Programming Languages*, 1992, pp. 316-327.

(with J. Riecke ) The semantics of Miranda's algebraic types, *Proceedings of Third Workshop on the Mathematical Foundations of Programming Language Semantics*, Lecture Notes in Computer Science 298, Springer-Verlag, 1988, pp. 455-473.

(with G. Longo ) Domain equations and valid isomorphisms in all models of (higher-order) languages. A short discussion, *Proceedings of the Conferences on Mathematical Logic*, Vol. 3, ed. by R. Ferro and A. Zanado, Università di Siena, Dipartimento di Matematica, Scuola di Specializzazione in Logica Matematica, Siena, 1987, pp. 47-52.

(with P. Wegner ) An algebraic model of subtypes in object-oriented languages (draft), *Proceedings of Object-Oriented Programming Workshop, Sigplan Notices*, vol. 21, October, 1986, pp. 163-172.

(with R. Amadio and G. Longo ) The finitary projection model for second order lambda calculus and solutions to higher order domain equations, *Proceedings of Symposium on Logic in Computer Science*, Computer Society Press, 1986, pp. 122-130.

(with G. Longo ) Provable isomorphisms and domain equations in models of typed languages, *Proceedings of the 17th Annual ACM Symposium on Theory of Computing*, Providence, R.I., 1985, pp. 263-272.

(with A. Meyer ) The semantics of second order polymorphic lambda calculus, *Semantics of Data Types* (ed. G. Kahn, D. B. MacQueen, and G. Plotkin), LNCS 173, Springer-Verlag, 1984, pp.131-144.

## Mathematics

Model Constructions in Stationary Logic, Part II: Definable Ultrapowers, *Notre Dame Journal of Formal Logic* 27 (1986), pp. 257-262 (reviewed in *Math. Reviews*, M.R. 87m: 03045).

Model Constructions in Stationary Logic, Part I: Forcing, *Journal of Symbolic Logic* 45 (1980), pp. 439-454 (reviewed in *M.R.* 82f: 03032).

(with H. J. Keisler )  $L_A(F)$ , *Journal of Symbolic Logic* 44 (1979), pp. 15 - 28 (reviewed in *M.R.* 80f: 03037).

Ideal models and some not so ideal problems in the model theory of  $L(Q)$ , *Journal of Symbolic Logic* 43 (1978), pp. 304-321 (reviewed in *M.R.* 80a: 03048).

Model-theoretic forcing in logic with a generalized quantifier, *Annals of Mathematical Logic* 13 (1978), pp. 225-265 (reviewed in *Math. Reviews*, M.R. 80c: 03033).

*Model-Theoretic Forcing with a Generalized Quantifier*, Doctoral Thesis, University of Wisconsin, Madison, 1975.

### **Published Reviews:**

Review of Johan van Benthem and Kees Doets, "Higher-order logic," from *Handbook of Philosophical Logic*, ed. by D. Gabbay and F. Guenther, Synthese library, vol. 164, D. Reidel Publishing Company, 1983. Review appeared in *Journal of Symbolic Logic* 54 (1989), pp. 1090-1092.

Review of M. Magidor and J. Malitz, "Compact extensions of L(Q) (part 1a)," from *Annals of Mathematical Logic*, 11(1977), pp. 217-261, and M. Kaufmann, "A new omitting types theorem for L(Q)," *Journal of Symbolic Logic*, 44(1979), pp. 507-521. Review appeared in *Journal of Symbolic Logic* 50 (1985), pp. 1076-1078.

### **Contributor to:**

A 2007 Model Curriculum for a Liberal Arts Degree in Computer Science, Liberal Arts Computer Science Consortium, **Journal on Educational Resources in Computing (JERIC)**, Volume 7 , Issue 2 (June 2007), Article No. 2, 2007.

The ACM Java Task Force Project Rationale: Final Report, Eric Roberts, editor, <http://jtf.acm.org/rationale/rationale.pdf>, 2006. See also: The ACM Java Task Force Tutorial, 2006, and abstract of Special Session: The ACM Java Task Force: Final Report, SIGCSE 2006 proceedings, 38(1), pp. 131-132, 2006, and The ACM Java Task Force: Status Report, SIGCSE 2005 proceedings, 37(1), pp. 46-47, 2005.

Computer Science, Charles Kelemen, report editor, a chapter in *The Curriculum Foundations Project: Voices of Partner Disciplines*, edited by Susan Ganter and William Barker, Math Association of America, pp. 37-50, 2004.

A revised model curriculum for a liberal arts degree in computer science, ed. by Henry M. Walker and G. Michael Schneider, December, 1996, *Communications of ACM* 39(1996). pp. 85-95.

Computing Curricula '91, report of the ACM/IEEE Computer Society Joint Curriculum Task Force, a summary of which was published in *Communications of ACM* 34 (1991), pp. 68-84.

Teaching computer Science within mathematics departments, ed. by B. Haytock, Z. Karian, and S. Seltzer, *Computer Science Education* 1 (1990), pp. 181-203.

A model curriculum for a liberal arts degree in computer science, ed. by N. Gibbs and A. Tucker, *Communications of ACM* 29 (1986), pp. 202-210.

### **Technical opinion:**

"Concerns about the Programming Languages Subject Area in the Curriculum 2001 Draft Report", SIGPLAN Notices, April, 2000.

Letter protesting change of AP exam to C++, by Hal Abelson, Kim Bruce, Andy van Dam, Brian Harvey, Allen Tucker, and Peter Wegner, *Communications of ACM* 38 (June, 1995), pp. 116-117.



## **Lectures delivered (w/out proceedings):**

### **Research Talks**

1. "Contexts for Dialogs", Linguistics Seminar, Pomona College, 12/2005.
2. "Sneaking Existentials into Java 5", NEPLS, Williams College, 6/2005, and Southern California Workshop on Programming Languages and Systems, CalTech, 11/2005.
3. FOOL 12, Long Beach, CA, "Object-oriented languages, fixed points, and systems of classes", invited lecture, 1/05.
4. Formal Methods for Components and Objects, Leiden, the Netherlands, "Fixing the meaning of object-oriented languages", keynote lecture, 11/04. Also presented as a software engineering seminar at UC – Santa Cruz, 10/04.
5. Boston University, "LOOJ: Weaving LOOM into Java", 4/04.
6. NEPLS, Northeastern University, "Thoughts about Subtyping versus Inheritance", 2/04.
7. International LISP conference, NYC, "What semantics can teach functional programmers about object-oriented languages", invited speaker, 10/03.
8. "Some challenging typing issues in object-oriented languages," programming languages colloquium, University of Genoa, Genoa, Italy, 7/03.
9. NEPLS, Yale University, "Statically type-safe virtual types in object-oriented languages", 8/02.
10. Yale University, "LOOM: An advanced type system for object-oriented programming languages", 11/98. Lectures with similar titles given at Boston University, 2/99 and Cornell University, 3/99.
11. Swarthmore College, "Designing expressive, yet safe, object-oriented languages", 11/98.
12. University of Pennsylvania, "Modules in object-oriented languages", 10/98.
13. New Jersey Programming Languages Seminar, NEC Research Institute, Princeton, NJ, "Semantics-driven language design: Statically type-safe virtual types in object-oriented languages", 9/98. A similar talk was given at Bell Labs, Mountain View, NJ, in June, 1999.
14. The Semantic Challenge of Object-Oriented Programming, Schloss Dagstuhl, Wadern Germany, "Grouping Constructs & Semantics in Object-Oriented Languages", 7/98.
15. Fifth international workshop on foundations of object-oriented languages (FOOL 5), San Diego, "A statically safe alternative to virtual types", 1/98.
16. Princeton University, "Modules in object-oriented languages", 10/97.
17. Fourth international workshop on foundations of object-oriented languages (FOOL 4), Paris, "Subtyping is not a good "match" for object-oriented languages," 1/97.
18. University of Massachusetts at Amherst, "Designing provably safe and flexible object-oriented languages," 12/96.

19. Newton Institute of Mathematical Sciences, Cambridge, UK, "The search for a 'good' type discipline for object-oriented languages", 9/95. Also presented at Ecole Normale Supérieure in Paris, Sheffield University (UK), M.I.T., Brown University, Colby College, and Wesleyan University, 10-12/95.
20. Workshop on Advances in Type Systems for Computing, Cambridge, UK, "Subtyping is not a good match for OOL's", invited lecture, 8/95.
21. ECOOP '95, Aarhus, Denmark, "PolyTOIL: A type-safe polymorphic object-oriented language", 8/95.
22. Second international workshop on foundations of object-oriented languages (FOOL 2), Paris, "The Design of PolyTOIL: Matching is better than Subtyping for Bounded Polymorphism in OOL's", 7/94.
23. ACM OOPSLA '93 Symposium, Washington, D.C., "Type checking in TOOPLE is decidable," 9/93.
24. Mathematical Foundations of Programming Semantics Symposium, New Orleans, LA, "An operational semantics for TOOPLE: A statically-typed object-oriented programming language," 4/93.
25. Twentieth Annual Symposium on Principles of Programming Languages, Charleston, South Carolina, January, 1993, "Safe type checking in a statically-typed object-oriented programming language", 1/93.
26. NYU Programming Languages Colloquium, "Designing a type-safe object-oriented programming language", 12/92.
27. Harvard University Programming Languages Colloquium, "Designing a statically typed object-oriented programming language", 4/92.
28. Nineteenth Annual Symposium on Principles of Programming Languages, Albuquerque, New Mexico, "PER models of subtyping, recursive types and higher-order polymorphism," 1/92. A similar talk was given at DEC's Paris Research Lab, 11/91.
29. Département de Mathématiques et d'Informatique, Ecole Normale Supérieure, Paris, "Mathematical Models of Subtyping and Inheritance in Object-Oriented Languages", 11/91.
30. 2nd annual North American Jumelage, "Designing a type-safe object-oriented language," 10/91. A similar talk was given at a colloquium at the Université de Nancy, 11/91.
31. Stanford University Logic Colloquium, two lectures on "The Semantics of Subtyping and Inheritance in object-oriented languages", Spring 1991. Also several presentations in C.S. Department subtyping seminar.
32. Mathematical Foundations of Programming Semantics Symposium, "The Equivalence of Two Semantic Definitions of Typed Inheritance," Carnegie-Mellon University, March, 1991. The same or similar talk was also given at the Stanford Lambda Group Meeting (North American Jumelage), Stanford University, November, 1990, and at SRI, International in March, 1991.
33. Hewlett-Packard Laboratories, "A semantic approach to polymorphic and object-oriented programming languages," June, 1989.

34. University of Pennsylvania, "A semantics of subtypes and inheritance: Why object-oriented programming is not exactly FUN," November, 1988. A similar talk was given at SUNY, Albany, in November, 1988.
35. Third Annual Symposium on Logic in Computer Science, Edinburgh, Scotland, July, 1988, "A modest model of records, inheritance, and bounded quantification."
36. Carnegie-Mellon Workshop on Denotational Semantics and Category Theory. 4/88, "A modest model of records, inheritance, and bounded quantification."
37. Workshop on Database and Programming Languages, Roscoff, France, September, 1987, "An Algebraic Model of Subtype and Inheritance."
38. A. T. & T. Bell Laboratories, March, 1987, "An Algebraic Model of Subtype and Inheritance."
39. University of Pisa, Italy, January, 1987, "Types, Subtypes, and Inheritance in Object-Oriented Languages."
40. Brown University, December, 1986, "Types, Subtypes, and Inheritance in Object-Oriented Languages."
41. Boston College, November, 1986, "Types, Subtypes, and Inheritance in Object-Oriented Languages."
42. Wesleyan University Computer Science Colloquium, November, 1986, "Are Denotational Semantics Meaningful?"
43. Object-Oriented Programming Workshop, I.B.M., Yorktown Heights, June, 1986, "An Algebraic Model of Subtypes in Object-Oriented Languages."
44. 1st Symposium on Logic in Computer Science, June, 1986, "The finitary projection model for second order lambda calculus and solutions to higher order domain equations."
45. Brown U. Computer Science Colloquium, February, 1986, "Models of types in programming languages."
46. STOC (17th ACM Symposium on Theory of Computing), May, 1985, "Provable isomorphisms and domain equations in models of typed languages."
47. MIT Computer Science Colloquium, August, 1984, "The semantics of polymorphism."
48. International Symposium on the Semantics of Data Types, Sophia-Antipolis, France, June, 1984, "The semantics of second-order polymorphic lambda calculus."
49. ASL annual meeting, December, 1983, "The semantics of the polymorphic lambda calculus."
50. MIT Denotational Semantics Seminar, several talks during 1980-81.
51. Yale Logic Seminar, March, 1979, "Stationary logic."
52. Boston College, March, 1979, "Model theory and logics with generalized quantifiers."
53. University of Wisconsin Logic Seminar, July, 1978, "Definable ultrapowers and stationary logic."
54. Union College Mini-Logic Conference, May, 1978, "Model constructions in stationary logic."

55. Stanford Logic Seminar, July, 1977, "Stationary logic."
56. Princeton Logic Seminar, several talks during 1975-77.
57. Philadelphia Logic Colloquium, Nov., 1976, "Forcing and generalized quantifiers."
58. AMS annual meeting, Jan., 1976, "A strong notion of model-completeness in  $L(Q)$ ."
59. ASL annual meeting, Jan., 1975, "Model-Theoretic Forcing in  $L(Q)$ ."

### **Expository & CS Education Talks**

1. Using graphics and animation to make AP CS more exciting (and eventful!), Southern California Java Educators Group meeting at Chapman College, 12/2005.
2. "Using abstractions to make concepts concrete", SIGCSE 2005, invited keynote lecture, 2/2005.
3. "Why Structural Recursion Should be Taught Before Arrays in CS1", at the Eighth Workshop on Pedagogies and Tools for the Teaching and Learning of Object-Oriented Concepts, at ECOOP '04 in June, 2004.
4. "Event-Driven Programming Facilitates Learning Standard Programming Concepts", at the OOPSLA 2001 Fifth Workshop on Pedagogies and Tools for Assimilating Object-Oriented Concepts, in October, 2001
5. "Distance education and liberal arts colleges", talks to Williams College alumni and to VP's for Advancement at New England liberal arts colleges, 6/2001.
6. ECOOP 2000 Workshop on Tools and Environments for Understanding Object-Oriented Concepts, "A Library to Support a Graphics-Based Object-First Approach to CS1", 6/2000.
7. "CS 2: How did we get here? Where should we be going?", invited keynote talk at OOPSLA Workshop on Object-Oriented Curricula: the Future of CS 2, Vancouver, Canada, 10/98.
8. "Programming Paradigms & Data Structures: Experience report," LACS summer workshop at Swarthmore College, 6/94, and invited lecture NECUSE CS Curriculum workshop, Harvard University, 1/95.
9. SIGCSE '94, "Attracting (& Keeping) the Best and the Brightest: An entry-level course for experienced introductory students," Phoenix, 3/94
10. Harvard University, "Thoughts on a new introductory curriculum at Williams College," invited lecture at NECUSE Workshop on the introductory Computer Science curriculum, 1/93.
11. Département de Mathématiques et d'Informatique, Ecole Normale Supérieure, Paris, "Using mathematical models in programming language design," 11/91.
12. Washington and Lee University, "The foundations of object-oriented programming languages", February, 1991. A similar talk was given at Pomona College in April, 1991.
13. New England Consortium on Undergraduate Science Education, Workshop on the Introductory Course Sequence in Computer Science, 1/91, "An Innovative introductory computer science course involving experimental parallel architectures."

14. New England Consortium on Undergraduate Science Education, Workshop on Parallelism, 1/90, "A unit on parallel architectures for an enriched introductory course."
15. New England Consortium on Undergraduate Science Education, Workshop on Programming Language Paradigms, 10/88, "Curriculum '8x and Programming Languages."
16. Great Lakes College Association meeting on Computer Science, 3/88. Keynote speaker on "The Computer Science Curriculum: The search for a core in a DARC discipline."
17. Williams College, March, 1986, " 'Star Wars' software is beyond our reach," as part of a panel on the Strategic Defense Initiative.
18. Williams College Faculty Lecture, February, 1984, Pomona College, April, 1985, "Problems with paradoxes."
19. Williams College Sigma Xi Lectures, November, 1981, "Can one reason about programs: The logic and semantics of programs."
20. Wellesley College, April, 1981, "Public-key cryptography."
21. Wesleyan University, Beloit College, April, 1979, "Proving programs correct."
22. Williams College, Oct., 1977, "Infinite games, topology, and the continuum hypothesis."
23. Carleton College, Williams College, Amherst College, Princeton University, Hamilton College, Union College, 1975-77, "Non-standard analysis."

**Panels:**

1. CRA Conference at Snowbird, "Rethinking CS101: Engaging students from the arts and sciences in Computer Science", Snowbird, Utah, June, 2006.
2. SIGCSE '05, "Objects-Early Tools - A Demonstration", St. Louis, MO, February, 2005.
3. SIGCSE '05, Debate: "Resolved: Objects Early Has Failed", St. Louis, MO, February, 2005.
4. SIGCSE '04, "The 2004 Liberal Arts CS Curriculum", Norfolk, VA, March, 2004.
5. SIGCSE '98, "Logic in the Computer Science Curriculum", Atlanta, GA, February, 1998.
6. New Facilities Strategies for Colleges, Universities and Medical Schools, "Computer-aided instructional spaces: Here, there, and everywhere", Hilton Head, SC, November, 1997.
7. Workshop on teaching logic and reasoning in an illogical world, "Teaching Logic in Computer Science", New Brunswick, NJ, July, 1996.
8. SIGCSE '94, "Describing the CS forest to undergraduates," Phoenix, AZ, March, 1994.
9. ACM POPL '94, Chaired panel following tutorials on object-oriented programming languages and systems, Portland, Oregon, January 1994.
10. IEEE CompCon 1991, "Final report of the ACM/IEEE Joint Curriculum Task Force", San Francisco, February, 1991.

11. "Informatics Curricula for the 1990s," an international workshop sponsored by IFIP Working Group 3.2 on Informatics (Computer Science) Education at the University Level, 4/90. Chaired panel on the "ACM / IEEE Computer Society Modular Curriculum."
12. SIGCSE Technical Symposium on Computer Science Education, 2/89, "ACM/IEEE-CS Curriculum Task Force."
13. SIGCSE Technical Symposium on Computer Science Education, 2/89, "Report of the ACM/MAA/IEEE-CS Task Force on the Teaching of Computer Science in Mathematics Departments," Chair.
14. Great Lakes College Association meeting on Computer Science, 3/88, "Teaching Computer Science within Mathematics Departments."
15. Eastern Small College Computing Conference, October, 1987, "Recruiting and Retaining College Faculty in Computer Science."
16. SIGCSE Technical Symposium on Computer Science Education, February, 1986, "Teaching Computer Science within Mathematics Departments."
17. NERCOMP Conference on Computer Science Education and Curriculum, November, 1985, Amherst, "Model curriculum for a liberal arts degree in computer science."
18. ACM '85, Denver, Colorado, October, 1985, "Model curriculum for a liberal arts degree in computer science."
19. SIGCSE Technical Symposium on Computer Science Education, March, 1985, New Orleans, "A draft curriculum for high-quality BA programs in CS."

#### **Tutorials and Workshops:**

1. ECOOP '96, "Static Typing in Object-Oriented Languages: Achieving expressiveness and safety," Linz, Austria, 7/96. Repeated at OOPSLA '96, San Jose, CA, 10/96, and U. of Massachusetts, Amherst, 12/96. Revised version presented at ECOOP '98 in Brussels, Belgium, 7/98, and OOPSLA '98 in Vancouver, Canada, 10/98. A much revised version, "Foundations of Object-Oriented Languages: Types and Language Design" was presented at ECOOP '02 in Malaga, Spain, 6/2002, at OOPSLA '03 in Anaheim, CA. 10/2003, ECOOP '04 in Oslo, Norway, 6/2004, and OOPSLA 2005 in San Diego, CA.
2. (with Andrea Danyluk and Thomas Murtagh) NECCSC, "Events and objects first: An innovative approach to teaching Java in CS 1", Middlebury College, 4/2001. Similar 3 hour workshops were presented at SIGCSE '02, SIGCSE '04, SIGCSE '06, NECCSC '04. and OOPSLA '04. Two to four day workshops were also presented at Williams College during the summers of 2001 and 2002. A tutorial on the same topic was presented at OOPSLA 2004 in Vancouver, Canada, OOPSLA 2005 in San Diego, CA. A two day workshop for high school teachers on the same topics was given at Pomona College during the summer of 2006.

#### **Senior Theses Directed**

##### **Williams College**

1. Robert Gonzalez, "LOOJVM : Type Checking Java Language Extensions In The Virtual Machine", 2003.

2. John N. Foster, "Rupiah: Towards an Expressive Static Type System for Java", 2001. (Currently a graduate student at U. of Pennsylvania, awarded an NSF graduate fellowship, formerly at Cambridge University on a Hutchison Fellowship.)
3. Joseph Vanderwaart, "Typed Intermediate Representations for Compiling Object-Oriented Languages", 1999. (Finishing Ph.D. in CS at CMU, awarded NSF graduate fellowship. Currently instructor at CalTech.)
4. Jon Burstein, "Rupiah: An extension to Java supporting match-bounded parametric polymorphism, ThisType, and exact typing", 1998. (Currently working at Microsoft.)
5. Hilary Browne, "Adding Concurrency to LOOM", 1997. (Completed Ph.D. at University of Maryland, where she was awarded an NSF graduate fellowship. Now working at Google.)
6. Leaf Petersen, "A module system for LOOM," 1996. (Completed Ph.D. in CS at C.M.U., honorable mention in NSF Graduate Fellowship. Currently working at Intel.)
7. Adam Seligman, "FACTS: A formal analysis of C++: Type rules and semantics," 1995. (Completed an MS in CS at University of Texas, Austin, currently working at Motorola.)
8. Angela Schuett, "Parametric Polymorphism in a type-safe, object-oriented programming language," 1994. (Ph.D., 2000, in CS at UC-Berkeley, awarded National Physical Science Consortium Fellowship. Currently working at NSA.)
9. Robert van Gent, "TOIL: An imperative type-safe object-oriented language," 1993. (Attended graduate school in CS at Stanford University.)
10. Gerald Kanapathy, "Modular specification and verification of object-oriented programs with inheritance," 1993 (attended grad school at Rice University.)
11. Robert Allen, "ADT/s: An object-oriented programming language with data abstraction and subtyping," 1990. (Ph.D. 1998 in CS at C.M.U.)
12. Wendy Roy, "MODULA -2OOP: The Best of Both Paradigms, The Addition of Inheritance to a Procedure-Oriented Language," 1988.
13. Dean Pomerleau, "The Meta-Generalized Delta Rule: A New Algorithm for Learning in Connectionist Networks," 1987. (Ph.D. 1992 in CS at C.M.U.)
14. Jon Riecke, "A Denotational Approach to the Semantics of Polymorphic Programming Languages," 1986. (Ph.D., 1991, in CS at M.I.T., awarded 3 year NSF Graduate Fellowship.)
15. David Chelmow, "Numerical methods for fitting statistical models used for analyzing clinical trial experiments," 1984. (Graduate of Yale Medical School.)
16. Charles Stewart, "NP-completeness and approximate solutions to the two-dimensional knapsack packing problem," 1982. (Ph.D., 1988 in CS at U.W-Madison. Currently Prof. of CS at R.P.I.)
17. Benjamin Goldberg, "Theory and implementation of an automatic program verifier," 1982. (Ph.D., 1987 in CS at Yale University. Currently Professor of CS at Courant Institute, NYU.)
18. David Maltzan, "Two routes to the same result: Craig's interpolation theorem," 1979.

**Princeton University**

1. Valerie King, "Recursively saturated models," 1977.
2. Jeff Rottman, "Model-theoretic forcing in  $L(F)$ ", 1976.

#### **Selected Other Professional Activities:**

Co-organizer and Steering Committee chair (1993-2001) for series of International Workshops on Foundations of Object-Oriented Languages (FOOL) originally sponsored by grants from NSF & ESPRIT. Workshops held in Palo Alto, CA, 10/93, Paris, 7/94. New Brunswick, NJ, 7/96 (in conjunction with LICS), Paris, 1/97, San Diego, 1/98, San Antonio, Texas, 1/99, Boston, 1/00, and London, 1/01 (with all since 1996 in conjunction with POPL). Also program chair for first and third workshops. Member of program committee for FOOL 11 (2004).

Member, steering committee for International Conferences in Functional Programming, 1999-2002.

Member – Program committee for POPL '03, program committee for FOOL '04, program Committee for ICALP '01, program committee for OOPSLA (Object-Oriented Programming Systems, Languages, and Applications) Conferences '94 & '95, program committee for SIPL (State in Programming Languages) '95 Workshop, program committee for ASIAN '96. Chaired sessions in OOPSLA '94, SIPL, POPL, and FOOL.

Member, Editorial Board of Theory and Practice of Object Systems (TAPOS), 1994-1999.

Member, Advisory Board, and Programming Languages Section Advisor for CRC Handbook of Computer Science and Engineering, 1993-1996.

Member - ACM / IEEE Computer Society Joint Curriculum Task Force (which produced Computer Curricula 1991), 1988-1991. Chair, Programming Languages Knowledge Area Focus Group, Curricula '2001. Member, Pedagogy Focus Group on Supporting Topics and Courses.

Member Executive Committee - MAA, ACM, IEEE-Computer Science Task Force on Teaching Computer Science in Mathematics Departments, 1986-88.

Member - Computing Research Association ad hoc committee on admission of undergraduate and master's degree granting institutions, 1990.

Invited Participant, NSF Workshop in Computer Science Education, Washington, D.C., 3/88, and Workshop on Strategic Directions in Computer Science (Programming languages and Education subgroups), MIT, 6/96.

Co-chair of the steering committee for Computer Science, NECUSE grant from the Pew Foundation, 1988-91. Organizer and in charge of local arrangements for Pew-sponsored Workshop on Programming Languages held at Williams, 10/88. Program chair for Workshop on the Introductory Course Sequence in Computer Science held at Trinity College, 1/91. Chaired session, organized working groups, and presented report on "Beyond CS1" at NECUSE Workshop on Computer Science Curricula held at Harvard University, 1/95.

Member of Survey Committee, CBMS survey of mathematical and computer science departments, 1985-1993.

Member, ACM Task Force on Java Resources for Introductory Computer Science Education, 2004-present.



Member of Liberal Arts Computer Science Consortium - Sloan Foundation supported group designing model computer science curriculum for liberal arts colleges, 1984-present. In charge of local arrangements for 4th annual meeting at Williams College, summer, 1987; Convener in 1988. In charge of local arrangement for 2001 annual meeting at Williams College, summer, 2001; convener in 2002.

Chair and/or member of Visiting Committees in Computer Science at Amherst College, Harvey Mudd College, Middlebury College, Oberlin College, Vassar College, Mount Holyoke College, Gettysburg College, Depauw University, University of Richmond, Colby College, Macalester College, Simmons College, Transylvania University, Pomona College, Skidmore College, and Gustavus Adolphus College.

Served on tenure committee in Computer Science at Washington and Lee University. Served on Ph.D. committees at Yale University, RPI, and U. Mass. at Amherst, and as external reader for Ph.D.'s at Free University of Brussels, U. of Pisa, Italy (Giorgio Ghelli), and Ecole Normale Supérieure, Paris (Giuseppe Castagna). Also served as external referee for tenure and promotion decisions at many colleges and universities.

Member of NSF Graduate Fellowship Evaluation Panel - Computer Science, 1992. Reviewer for NSF research proposals, member of NSF panels reviewing research proposals in Programming Languages.

Referee for Information and Computation, TOPLAS, Mathematical Structures in Computer Science, Journal of Functional Programming, Theoretical Computer Science, SIAM Journal of Computing, Communications of ACM, Computer, Journal of Symbolic Logic, American Math Monthly, Addison-Wesley, John Wiley & Sons, MIT Press, National Science Foundation, ACM thesis award competition, Acta Informatica, LOPLAS, LISP & Symbolic Computation, Computing Surveys, Theoretical Computer Science, and too many conferences to count.

Reviewer for Math Reviews, Journal of Symbolic Logic.

Williams College Committee service: Faculty Steering Committee (chair, 2002-2003), Committee on Appointments and Promotions (2000-2002, 2003-2004), Coordinating Committee for Strategic Planning (2000-2001), Ad hoc Technology Committee (co-chair, 1999-2000), Faculty steering and compensation committee (chair, 1979-80), Faculty Compensation Committee (chair, 1994-95), Committee on Educational Policy (two terms, most recently 1999-2000), Committee on Priorities and Resources, Committee on Academic Computing (chairman, 1985-87), Computer Control and Planning Committee, Computing Review Committee, Search committee for Computer Center Director and Director of Academic Computing, Division III & P Research Funding Committee, Science Executive Committee, AAUP Board of Directors, Williams College Sloan Grant Advisory Committee, Science Facilities Planning Committee (1993-present). Member of organizing committee for retreat on improving teaching at Williams, 1985. Member of tenure committee for linguistics, 2003-??.

Secretary/Treasurer of Williams College Phi Beta Kappa chapter, 1999-2000 academic year.

Freshman advisor at Williams College.

Member - ACM, IEEE CS, SIGACT, SIGPLAN, SIGCSE, CPSR, Sigma Xi.

Regular contributor to high school AP CS course mailing list.

#### **Selected Community Activities:**

Secretary, Williamstown Education Foundation, 1992-1997.

Volunteer in Williamstown Elementary School Computer lab. Taught course on HyperCard to Elementary teachers (1994). Volunteer for NetDay '96.

Member, Mount Greylock H.S. Technology Advisory Council 1995-1997.

Member, Williamstown Elementary School Technology Advisory Council (1995-96).

Member, search committee for computer teacher, Williamstown Elementary School (1995).

Assistant coach, youth soccer and baseball, occasionally in 1990's.