

# Thomas A. Standish

*Résumé Prepared May 2016*

Donald Bren School of  
Information and Computer Sciences  
University of California, Irvine  
Irvine, California 92697-3425

## **Education**

B. S. (Mathematics, magna cum laude), Yale University, 1962.  
Ph. D. (Computer Science), Carnegie Institute of Technology, 1967.

## **Experience**

### **Academic**

Professor Emeritus of Information and Computer Science,  
University of California, Irvine, July 1998 – present.

Professor of Information and Computer Science,  
University of California, Irvine, July 1981-June 1998.

Chair, Dept. of Information and Computer Science, University of California,  
Irvine, October 1977–June 1980, January 1993 – June 1995

Associate Professor of Information and Computer Science,  
University of California, Irvine, October 1974-June 1981.

Lecturer on Computer Science, Harvard University, February 1974–October 1974.

Associate Director, Center for Research in Computing Technology,  
Harvard University, January 1972–June 1972.

Associate Professor of Computer Science, Harvard University,  
July 1971–June 1972.

Assistant Professor of Computer Science, Harvard University,  
September 1969–June 1971.

Assistant Professor of Computer Science, Carnegie-Mellon University,  
September 1967–June 1969.

## **Non-Academic**

Mathematician, Westinghouse Research Laboratories, Mathematics Department,  
June 1961-September 1961.

Consultant in Air Traffic Control, Bolt Beranek and Newman, Cambridge, MA,  
September 1969-September 1972.

Senior Scientist, Computer Science Division, Bolt Beranek and Newman,  
Cambridge, MA, September 1972-September 1974.

FAA Certified Instrument Flight Instructor (*CFII*), July 2001 - *present*.

## **Professional Activities**

### **Memberships (Present and Past)**

Apple Programmers and Developers Association

MacApp Developers Association

Honorary Lifetime Member

Association for Computing Machinery (joined in 1964)

AAAS

Federation of American Scientists

Phi Beta Kappa

Professional Air Traffic Controllers Organization

Sigma Xi

IEEE Computer Society

ACM SIGPLAN (Special Interest Group on Programming Languages)

ACM SIGAda (Formerly AdaTEC, Special Interest group on Ada)

ACM SIGSOFT (Special Interest Group on Software)

ACM SIGACT (Special Interest Group on Algorithms and Computation Theory)

National Association of Flight Instructors

### **Consulting Activities**

Institute for Defense Analyses

Stanford Research Institute

National Bureau of Standards

Harvard University (Summer 1979 and Spring 1981)

Office of the Under Secretary of Defense for Research and Engineering

The Aerospace Corporation

Ada Joint Program Office

TRW

General Dynamics

KAPSE Interface Team — Industry/Academia

### **Professional Society Service**

Vice-Chairman SIGPLAN (the Special Interest Group on Programming Languages of the ACM), June 1969-July 1971.

Editor, Programming Languages Department, *Communications of the ACM*, May 1973-June 1975.

Guest Editor together with Michael Harrison and James Morris for special Issue of *Communications of the ACM* devoted to Best papers from Fourth POPL Symposium (issue appeared Dec. 1976).

Award Subcommittee for ACM — Languages and Systems Paper Award (1978-1980).

Editor-in-Chief, *ACM Monograph Series*, June 1978-June 1981.

Member *IEEE Technical Committee on Software Engineering*, May 1983-May 1985.

Conference Program Committees:

8th International Conference on Software Engineering  
1985 International Ada Conference, Paris, France  
IEEE Ada Applications and Environments Conference  
ACM AdaTEC - Future Ada Environment Workshop

Editor, *Proceedings of ACM AdaTEC Future Ada Environment Workshop*  
(Proceedings published in *Software Engineering Notes*, 10, 2 and *Ada Letters*, IV, 5)

## **Non-Academic Organizations**

Chairman of the Board, Irvine Compiler Corporation  
{Formerly Irvine Computer Sciences Corporation}, (June 1981 – May 2016).  
Board of Directors, Laguna Beach Chamber Music Society (1976-1979)  
Congressional District Coordinator, Bread for the World (1976-1983).  
Elected Constable, Borough of Edgeworth, Allegheny County, Pennsylvania,  
general elections, November 1967.  
Yale Alumni Board  
First Lieutenant, Mission Pilot, and Air Operations Officer,  
Group V, Massachusetts Wing, Civil Air Patrol.

## **Contracts & Grants**

NSF C.E.R. Grant to ICS Department, UCI, (co-principal with R. Taylor, P. Freeman, N. Leveson, R. Razouk), 7/86 - 6/89, \$3,130,100; (NSF Grant DCR-8521398).

Advanced Software Production Environments, Defense Advanced Research Projects Agency, Information Processing Techniques Office, 10/81-12/87, \$225,851;  
Renewal: 6/28/83 to 6/27/85, \$582,756, (Contract: N0009-83-0567).

Science Career Options for Handicapped College Students, (NSF Grant Project SPI79-08735), took over as Project Director from Daniel L. Wulff for remainder of FY1979.

Irvine Workshop on Alternatives for the Environment, Certification, and Control of the DOD Common High Order Language, Dept. of the Army Contract DAAG29-78-M-0219, June-December 1978, Army Research Office.

Interactive Program Manipulation (NSF-DCR75-13875, \$60,000);  
Two year renewal (MCS75-13875, \$82,100, 7-1-77 to 6-30-79).

Extensible Language Studies (co-Principal with Ugo Gagliardi)  
USAF-F19628-68-C0101, Electronic Systems Division, USAF.

Operating System Principles (co-Principal with Ugo Gagliardi)  
USAF-F19628-70-C-0217, Electronics Systems Division, USAF.

Graphics and Transportation Systems (co-Principal with D. Cohen)  
DOT-TSC-196, Transportation Systems Center, Department of Transportation.

### **Dissertations Supervised (eleven Ph.D.s , eight Masters)**

David Allen Fisher, *Control Structures for Programming Languages*,  
Ph.D. Thesis, Carnegie-Mellon University (1970), Thesis Committee  
Co-Chaired with Alan J. Perlis.

Robert Melancton Metcalfe, *Packet Communication*,  
Ph.D. Thesis, Harvard University, (Dec. 1973).

Arthur Gibson Duncan, *Studies in Program Correctness*,  
Ph.D. Thesis, UC Irvine, (July 1976).

Patrick James Hanratty, *A Second Order System which Couples Mathematical Models  
and Picture Behavior in an Interactive Graphical Environment*,  
Ph.D. Thesis, UC Irvine, (1977).

Kamal Attia Mansour, *Computer Handling of Arabic Text*,  
M.S. Thesis, UC Irvine, (1977).

John Francis Hueras, *A Formalization of Syntax Diagrams as k-Deterministic Language  
Recognizers*, M.S. Thesis, UC Irvine, (1979).

Mark Jeffrey Tadman, *Fast-Fit, A New Dynamic Storage Allocation Technique*,  
M.S. Thesis, UC Irvine, (1979).

Dennis Francis Kibler, *Power, Efficiency, and Correctness of Transformation Systems*, Ph.D. Thesis, UC Irvine, (Feb. 1979).

David Feign, *Programming Tricks of Last Resort for Desperados: An Investigation into the Advantages of Assembly Language Coding*, Ph.D. Thesis, UC Irvine, (June 1980).

Sherry Lee Brownback, *Computer Aided Preparation, Retrieval, and Analysis of Detailed Design Specifications for Ada Program Units*, M.S. Thesis, UC Irvine, (November 1980).

Liang-Te Hu, *The Comment Management System*, M.S. Thesis, UC Irvine, (1981)

Ashok Viswanathan Iyer, *Performance Analysis of Two Syntax Analyzers, SLR(1) and Almost Optimal Floyd-Evans Production Systems*, M.S. Thesis, UC Irvine, (1981).

David Andrew Smith, *Rapid Software Prototyping*, Ph.D. Thesis, UC Irvine, (April 1982).

Paul Vincent Mockapetris, *Communication Environments for Local Networks*, Ph.D. Thesis, UC Irvine, (May 1982).

Stephen Thomas McHenry, *Debugging Capabilities in High-Level Language Environments*, M.S. Thesis, UC Irvine, (September 1983).

William Henry Kleppinger, *Engineering a Data Model for the Programming Environment Database*, M.S. Thesis, UC Irvine, (May 1984).

Gene Lee Fisher, *Program Explanation Techniques*, Ph.D. Thesis, UC Irvine, (June 1985).

Stephen Blaine Whitehill, *An Ada Virtual Operating System*, Ph.D. Thesis, UC Irvine, (June 1985).

Rika Yoshii, *JETR: A Robust Machine Translation System*, Ph.D. Thesis, UC Irvine, (August 1986).

## **Courses Taught at Harvard, CMU, and UC Irvine (by descriptive title)**

### **Undergraduate**

*Applied Discrete Mathematics*: [mathematical logic through resolution theory, theory of automata and formal languages, combinatorics, graph theory, analysis of algorithms]

*Programming Languages:* [analysis and comparison of a variety of programming languages, compilers, interpreters, compiler-compilers, assemblers, loaders, data structures]

*Compiler Construction:* [techniques for constructing language processors for programming languages using interactive, visual educational technology.]

*Analysis of Algorithms:* [mathematical and empirical techniques for determining quantitative performance measures of algorithms; algorithms in areas such as pattern matching, sorting, searching, syntax analysis of context free languages, and so forth]

*Data Structures:* [basic concepts of data; linear lists, strings, arrays and orthogonal lists; representation of trees and graphs; storage structures, storage allocation and collection; multilinked structures; symbol tables and searching techniques; sorting techniques; formal specification of structures, data structures in programming languages, and generalized data management systems]

*Introduction to Artificial Intelligence:* [heuristic methods for problem-solving; comparison of formal and heuristic models and methods of particular problems relative to effectiveness, efficiency of solutions, knowledge representations, game playing, theorem proving, algebraic manipulation, natural language processing]

*Educational Technology:*[interactive, graphical, multimedia, hypermedia, and object-oriented approaches to developing software learning modules for teaching and learning computer science; emphasis on visualization, simulation, and exploratory environments.]

*Mathematical Logic:* [propositional calculus: axiomatization, consistency, completeness; quantification theory: first-order predicate calculus with equality, interpretations, models, validity, incompleteness theorems; resolution theory]

*Technical Writing:* [Senior-level writing course for computer science majors on aspects of effective technical and scientific writing.]

## **Graduate**

*Extensible Programming Languages:* [survey and comparison, extension techniques and theory, implementation techniques]

*Computer Graphics:* [hardware, algorithms and techniques: clipping, windowing, hidden line elimination, perspective transformations, half-tones, pen-tracking, homogeneous coordinates, animation, real-time simulation techniques, etc.]

*Theory and Construction of Compilers:* [compiler writing: lexical analysis, syntactic analysis, code generation, optimization, compile-time data structures, symbol tables, hash codes, etc.]

*Software Laboratory:* [hands on laboratory experience with complex systems software: language processors, text editors, debuggers, operating systems, measurement and analysis]

*Automatic Programming:* [seminar on research topics and current problems; automatic program synthesis, verification, transformation, high-level optimization, etc.]

*Data Structures:* [description, representation and associated operations; topics covered are basic data types (numeric, boolean, character) various aggregate composite data structures (lists, files, strings, arrays, sets, trees, graphs), and techniques for storage management and searching (including symbol tables, hashing, storage allocation, garbage collection, etc.)]

*Personal Computing:* [a working group on the design and implementation of personal computing services]

*Programming Environments:* [seminar on research topics and current problems; software lifecycle, maintenance, documentation, consistent interface conventions, integrated tool sets, good environment design principles, etc.]

*Programming Epistemology:* [seminar on research topics and current problems; software understanding, knowledge representation, the structure of knowledge about software, application to debugging and documentation, program explanations, etc.]

## **Departmental and University Service**

Departmental Library Committee  
Departmental Space Planning Committee  
Departmental Curriculum Committee  
Ad Hoc Committee on Computer Pricing Policy  
Departmental Ph.D. Admissions Committee  
Departmental Executive Committee  
Departmental Colloquium Committee  
Representative to UCI Industrial Associates  
Departmental Recruiting Screening Committee  
Departmental Research Travel Committee  
Committee on Planning and Budget, (Chair 1983-84)  
Academic Planning Council, (1983-84, 1989-91)  
Chancellor's Administrative Round Table  
Executive Committee, Irvine Division, Academic Senate  
Advisory Board, Irvine Division, Academic Senate  
ICS Academic Senate Faculty Chair, (1982-84)  
Chair, Search Committee for ICS Chair (1983-84)  
ICS Associate Chair for Undergraduate Studies (Fall 1984)  
ICS elected representative, Academic Senate Representative Assembly (1984-1986)  
Marshal, Doctoral candidates, 1984 Commencement  
University-Wide Task Force on Academic Computing (1984-1987)

Campus Physical and Environmental Committee (1983-1984)  
 Advisory Committee, Center for the Neurobiology of Learning and Memory  
 (1984-1988)  
 Phi Beta Kappa Nominating Committee (1982-86, 1988-91)  
 ICS Undergraduate Disqualification Committee (1985-1986)  
 UC Riverside — Invited Outside Reviewer for Graduate Computer Science Program  
 (1986-1987)  
 ICS Academic Senate Faculty Chair (1988-89)  
 ICS 21-22-23 Committee, Chair (1986 - 1989)  
 ICS Departmental Executive Committee (1988 - 1989)  
 ICS Departmental Planning Committee (1988 - 89, 1990-91)  
 Faculty Retreat Committee, Chair (1987)  
 Academic Senate Executive Committee (1988 - 1989)  
 Committee on Educational Policy (1988 - 1989)  
 CEP - Planning Subcommittee (1988 - 1989)  
 Writing Board (1988 - 1991), Chair (1989-1991)  
 External Writing Review Panel (1988 - 1989)  
 Psychology Committee (created by CEP to clarify campus Psychology curricula) (1989)  
 Search Committee for Dean of Undergraduate Studies, Chair (1989)  
 ICS Departmental Undergraduate Policy Committee, Chair (1990-91)  
 Distinguished Faculty Lectureship Award for Teaching (1990-91)  
 UCI Dana Point Workshop on Writing Excellence, Organizer (3/1/91)  
 Task Force on Writing Excellence, Chair (1991-1992)  
 Search Committee for EdTech Professorship for Dept. of Ed., Chair (1990-1991)  
 Academic Planning Council, (1989-1992)  
 ICS Undergraduate Policy Committee, Chair (1991-1992)  
 ICS Departmental Planning Committee, member (1990-1991)  
 ICS Computing Resources Committee, member (1991-1993)  
 Computer Science External Review Committee, UC Riverside, (1991)  
 Honors Program Council, Elected ICS Representative (1991-1992)  
 Phi Beta Kappa Nominating Committee, (1991-1992)  
 Building Advisory Committee, Computer Science II Addition, (1993)

## **Programming Language and Environment Implementations**

### **1. Formula Algol**

- a. on Bendix G-21 at Carnegie-Tech (1965-1966)
- b. Co-implementers: R. Iturriaga, J. Earley, R. Krutar
- c. Project Director: A. J. Perlis

### **2. Polymorphic Programming Language (PPL)**

- a. on DEC PDP-10 at Harvard (1969-1971)
- b. Co-implementers: E. A. Taft
- c. Distributed to : Brandeis, Cal Tech, Carnegie-Mellon, First Data Corp., Harvard,



Irvine, Johns Hopkins, JPL, NSA, On-Line Systems, Princeton, Santa Barbara, Yale, TSC, and via the standard BBN-Tenex releases to Case, CCA, SRI, USC-ISI, Utah, Xerox PARC.

- d. PPL has been implemented on the PDP-11/45 for use in Harvard's undergraduate education program. It was used from 1971 to 1983 as the principal educational language for undergraduate education at Harvard.

### **3. Arcturus — An Interactive Ada Environment**

- a. on VAX running under Berkeley Unix
- b. Co-implementers: R. Klefstad, C. Snider, F. Tadman, S. Whitehill, S. Willson
- c. Distributed to over 90 outside organizations and used in ICS 145 (a compiler construction class) at UC Irvine.

## **Publications**

### **Periodicals, Books, Computer Software, and Conference Proceedings**

*Data Structures in Java*, Addison-Wesley Publishing Company, Reading, Mass., 555 pages, (1998)

*Data Structures, Algorithms, and Software Principles in C*, Addison-Wesley Publishing Company, Reading, Mass., 748 pages, (1995)

*Data Structures, Algorithms, and Software Principles*, Addison-Wesley Publishing Company, Reading, Mass., 748 pages, (October 1994)

*Revitalizing Education with Computers*, a book on the prospects for use of computers in education, Computer Science Dept., UC Irvine, 220 pages, (August 1988)

*The SmallGol Compiler*, (Animated Educational Software for the Macintosh), Kinko's Academic Courseware Exchange, (April 1986), 32K bytes plus 88-page manual.

*An Essay on Software Reuse*, IEEE Transactions on Software Engineering, Vol. SE-10, No.5, pp. 494-497, (September 1984).

*Software Reuse*, Proc. of the Workshop on Reusability in Software, ITT, Newport, Rhode Island, (September 1983), pp.

*Interactive Ada in the Arcturus Environment*, Ada Letters, Vol. 3, No. 1, ACM AdaTEC, (July-August 1983), pp. 23-35.

*The Importance of Ada Programming Support Environments*, Proc. National Computer Conference 1982, AFIPS Press, Montvale, New Jersey, (June 1982), pp. 333-339.

*Advanced Development Support Systems*, Software Engineering Notes, SIGSOFT, Vol. 6, No. 4, (Aug. 1981), pp. 25-35.

*ARCTURUS, An Advanced Highly-Integrated Programming Environment*, in Software Engineering Environments, (H. Hünke, ed.), North-Holland, Amsterdam, (1981), pp. 49-60.

*Data Structure Techniques*, Addison-Wesley Publishing Co., Reading, Mass., 447 pages, (March 1980).

*Instructor's Manual to Accompany Data Structure Techniques*, Addison-Wesley, Reading, Mass., (1980).

*A Data Definition Facility for Programming Languages*, Garland Publishing Co., New York, 292 pages, (1979), [Note: this is a reprint of my Ph.D. thesis as a book in the Garland Series of *Twenty-eight Outstanding Dissertations* in computer science.]

*The Future of Automatic Programming*, Proc. NCC 1978, Vol. 47, AFIPS Press, Montvale, N.J., pp. 707-709.

*Proceedings of the IRVINE WORKSHOP on Alternatives for the Environment, Certification, and Control of the DOD Common High Order Language*, (T. Standish, ed.), Computer Science Department, UC Irvine, (June 1978).

*Data Structures — An Axiomatic Approach*, (Chapter 3), Current Trends in Programming Methodology, Vol. 4 (Ray Yeh, ed.), Prentice-Hall, Englewood Cliffs, N. J., pp. 30-59, (1978).

*Program Transformations*, Proc. 1977 Conf. on Information Sciences and Systems, Johns Hopkins University, (March 1977), pp. 326-332.

*Extensibility in Programming Language Design*, Proc. NCC, AFIPS Press, Montvale, N. J. (May 1975), pp. 287-290.

*After Extensible Languages - What Next?*, Proceedings Fifth Annual Princeton Conference on Information Sciences and Systems, Princeton University, Princeton, N. J., (March 1971). pp. 189-192.

*Remarks on Interactive Computer Mediated Animation*, Proceedings Ninth Annual Meeting of UAIDE, Miami, Florida, (October 1970), pp. 306-309.

*The Role of Extensible Language in a Network of Computers*, Proceedings of Workshop on Networks of Computers 1969, NSA, Ft. Meade, Maryland, (October 1969), pp. 9-13.

*Some Compiler-Compiler Techniques for Use in Extensible Languages*, Proceedings of the Extensible Language Symposium, SIGPLAN Notices, Vol. 4, (August 1969),

pp. 55-62.

*Some Features of PPL - A Polymorphic Programming Language*, Proceedings of the Extensible Language Symposium, SIGPLAN Notices, Vol. 4, (August 1969), pp. 20-26.

*What is Software and What are its Management Problems*, Navy Management Review, (March 1969), pp. 3-5, 20, also in *Software for Computer Systems*, (E.O. Joslin, Ed.).

### **Technical Reports**

*A Philosophy for a Tool Extension Paradigm*, Tech. Rept., Programming Environment Project, UC Irvine, (August 1982). Presented at Oxnard Meeting on the joint TRW/UCI programming environment.

*New Category — Extensibility*, memorandum to the KITIA, in KIT Public Report, vol. II, pp. 3Y-1 to 3Y-6, NOSC TD 552, Patricia Oberndorf, KIT Chairman.

*Ideas for the Arcturus Personal Workstation*, TR-172, ICS Dept., UC Irvine, (March 1981)

*A Preliminary Philosophy for ARCTURUS, An Advanced Highly-Integrated Programming Environment*, TR-150, ICS Dept., UC Irvine, (April 1980).

*Extensibility in Programming Language Design*, Tech. Rept., UC Irvine, Dept. of Computer Science, 1975.

*An Introduction to PPL Programming*, Center for Research in Computing Technology, Harvard University, (August 1973), 2nd Edition, 303 pages.  
[This is the text book used extensively by Harvard undergraduates who use PPL.]

*Observations and Hypotheses About Program Synthesis Mechanisms*, Automatic Programming Memo. 9, Bolt Beranek and Newman, Cambridge, MA (Dec. 1973), 38 pages

*Representation Cascades, Heterarchy and Knowledge Structures in Automatic Programming*, Automatic Programming Memo. 5, Bolt Beranek and Newman, (October 1973), 20 pages.

*Data Structures — An Axiomatic Approach*, Automatic Programming Memo. 3, Bolt Beranek and Newman, Cambridge, MA. (August 1973), 40 pages.

*An Essay on APL*, Department of Computer Science, Carnegie-Mellon University, Pittsburgh, PA (March 1969), 26 pages.

*A Time-Shared Program to Print Flight Progress Strips for Use in Enroute Air Traffic Control*, Department of Computer Science, Carnegie-Mellon University, Pittsburgh, PA (Feb. 1969), 51 pages.

*Un Metodo para Construir los Programas de Reduccion a Partir de una Gramatica con Frases*

*Estructuradas*, Centro de Calculo Electronico, Universidad Nacional Autonoma de Mexico, Mexico, D. F., Mexico, (July 1968), 10 pages.

*Analisis Sintactico para un Lenguaje de Reducciones*, Centro de Calculo Electronico, Universidad Nacional Autonoma de Mexico, Mexico, D. F., Mexico, (July 1968), 8 pages.

*A Preliminary Sketch of a Polymorphic Programming Language*, Centro de Calculo Electronico, Universidad Nacional Autonoma de Mexico, Mexico, D. F., Mexico, (June 1968), 42 pages.

*On Formula Algol and the Evolution of Programming Languages*, in *Computer Science Research Review*, (A. Newell, ed.), Department of Computer Science, Carnegie-Mellon University (Dec. 1967), pp. 9-17.

*Computer Simulated Models of Nerve Nets*, Scientific Paper 206-4000-P1, Mathematics Dept., Westinghouse Research Laboratories, Pittsburgh, PA (September 1961), 23 pages.

*A Pseudo Computer Designed to Simulate the Behavior of Nerve Nets*, Research Dept. 206-5000-R5, Mathematics Dept., Westinghouse Research Laboratories (August 1961), 29 pages.

*Notes on the Molecular Biology of Neurons and its Role in Brain Function*, Research Memo, 205-5000-M2, Mathematics Dept., Westinghouse Research Laboratories, Pittsburgh, PA (July 1961), 15 pages.

### **Publications with Co-Authors in Periodicals and Conference Proceedings**

*Using  $O(n)$  ProxmapSort and  $O(1)$  ProxmapSearch to Motivate CS2 Students, Part I & Part II*, (with Norman Jacobson), Part I – Inroads – The SIGCSE Bulletin, Vol. 37, Issue 4, (Dec. 2005), pp. 41-44, Part II – Inroads – The SIGCSE Bulletin, Vol. 38, Issue 2, (June 2006), pp. 29-32.

*Report of the NSF Undergraduate Computer Science Workshop*, James Foley (editor) and Thomas A. Standish (Co-Editor), SIGCSE Bulletin, 20, 3, pp. 57-64, (Sept. 1988)

*Using Animation to Teach Compiler Construction*, (with Anil S. Bajaj), *Wheels for the Mind*, Winter 1986, pp. 27-30.

*User Interfaces*, (with Carl Braesicke *et al*), *Proceedings of the ACM AdaTEC Future Ada Environment Workshop*, Santa Barbara, *Software Engineering Notes*, 10, 2, pp. 105-108, (April 1985) and also in *Ada Letters*, IV, 5, pp. 90-96, (March-April 1985).

*Steps to an Advanced Ada Programming Environment*, (with Richard N., Taylor), *IEEE Transactions on Software Engineering*, SE-11, 3, pp. 302-310, (March 1985).

*Arcturus: A Prototype Advanced Ada Programming Environment*, (with Richard N. Taylor), Proc. ACM SIGSOFT/SIGPLAN Software Engineering Symposium on Practical Software Development Environments, Pittsburgh, PA., SIGPLAN Notices, 19, 5 and Software Engineering Notes, 9, 3 (May 1984), pp. 57-64.

*Steps to an Advanced Ada Programming Environment*, (with Richard N. Taylor), Proc. 7th International Conference on Software Engineering, IEEE Computer Society Press, Orlando, Florida, (March 1984), pp. 116-125.

*Software Technology in the 1990s*, (with Barry W. Boehm), IEEE Computer, Vol. 16, No. 11, (November 1983), pp. 30-37.

*Initial Thoughts on Rapid Prototyping Techniques*, (with Tamara Taylor), Software Engineering Notes, 7, 5, ACM SIGSOFT, (December 1982), pp. 160-166. Also in Proc. of ACM SIGSOFT Second Symposium on Software Engineering: Workshop on Rapid Prototyping, Columbia, Maryland, (April 1982).

*Recollections on the History of Ada Environments*, (with John N. Buxton and Larry E. Druffel), Ada Letters, Vol. 1, No. 1., ACM AdaTEC, (July-August 1981), pp. 16-21.

*Program Development Systems — An Overview*, (with T. Cheatham, R. Balzer, J. Esch, Robert Morris, Ann Marmor-Squires, S. Squires, and E. Taft), in Proc. of the Irvine Workshop on Alternatives for the Environment, Certification, and Control of the DOD Common High Order Language, (T. Standish, ed.), June 22, 1978.

*Program Manipulation via an Efficient Production System*, (with Kibler and Neighbors), Proc. Symp. on AI & Programming Languages, ACM SIGPLAN and SIGART, (August 1977), pp. 163-173.

*Improving and Refining Programs by Program Manipulation*, (with Kibler and Neighbors), Proc. ACM Annual Conference 1976, (Oct. 1976), pp. 509-516.

*Optimization Aspects of Compiler-Compilers*, with T. E. Cheatham, Jr., SIGPLAN Notices, Vol. 5 (October 1970), pp. 10-17.

*Techniques and Advantages of Using the Formal Compiler Writing System FSL to Implement a Formula Algol Compiler*, with R. Iturriaga, J. Earley and R. Krutar, Proc. Spring Joint Computer Conference, Spartan Books, (1966), pp. 241-242.

### **Technical Reports with Co-Authors**

*A Dialogue Between Diogenes and Archimedes*, (with Richard Barrutia, *et al*), UCI Faculty Retreat, Rancho Santa Fe, (May 1986), 16 pages.

*Steps to an Advanced Ada Programming Environment*, (with Richard N. Taylor),

ICS Dept, TR-203, UC Irvine, (July 1983), 18 pages.

*Initial Thoughts on Rapid Prototyping Techniques*, (with Tamara Taylor),  
ICS Dept., TR-167, UC Irvine, (February 1981), 26 pages.

*Research on Interactive Program Manipulation — Final Report*, (with D. A. Smith), NSF Final  
Report on Grant MCS75-13875 A01, ICS Dept., TR-146, UC Irvine,  
(December 1979), 60 pages.

*Programming Environment Questionnaire*, (with 22 co-authors, T.A. Standish, ed.), ICS Dept.,  
TR-139, UC Irvine, 75 pages.

*Initial Thoughts on the Pebbleman Process*, (with D.A. Fisher), IDA Paper P-1392, Institute for  
Defense Analyses, Science and Technology Division, Arlington, Virginia,  
(June 1979), 66pp.

*The Irvine Program Transformation Catalogue*, (with D. Harriman, D. Kibler, and J. Neighbors),  
U. C. Irvine, (Jan. 1976) 82 pages.

*Ideas for Managing Automatic Programming Research*, (with C. Hewitt, and G. J. Sussman),  
MIT-AI-Lab, (January 1974), 13 pages.

*A Homily on Prudence for Automatic Programming Research*, (with G. J. Sussman),  
Bolt Beranek and Newman, (Dec. 1973), 12 pages.

*PPL Users Manual*, (with E. A. Taft), Center for Research in Computing Technology,  
Harvard University, Cambridge, MA. 3rd Edition, (September 1973), 151 pages.

*Systems Programming Bibliography*, (with R. W. Floyd), Dept. of Computer Science,  
Carnegie-Mellon University, (July 1967), 9 pages.

*The Implementation of Formula Algol in FSL*, (with R. Iturriaga, J. Earley and R. Krutar),  
Carnegie Institute of Technology (Oct. 1966), 124 pages.

*A Definition of Formula Algol*, (with A. J. Perlis and R. Iturriaga), Carnegie Institute of  
Technology, (April 1966), 52 pages.

*A Preliminary Sketch of Formula Algol*, (with A. J. Perlis and R. Iturriaga),  
Carnegie Institute of Technology, (April 1965), 52 pages.

## **Presentations**

### **Presentations in 1991-96**

*O(n) Sorting, O(1) Searching, and O(1) Dynamic Memory Allocation*, Computer Science

Theory Group Talk, Dept. of Information and Computer Science, UC Irvine, June 7, 1996.

*The Role of Scientific Visualization in the Education of Students of Computer Science*,  
Panel at IFIP Working Group 3.2 Conference on Visualization in Scientific Computing:  
Uses in University Education, UC Irvine, July 30, 1993.

*Informality and the Epistemology of Computer Programming*, Workshop on Informal  
Computing, Sponsored by DARPA ISTO, Scotts Valley, California, May 30, 1991.

### **Presentations in 1990**

*Technology and Teaching — Context and Issues*, Invited Keynote Address, 1990 Instructional  
Improvement/ Educational Technology Conference, organized by the University of  
California Office of the President, UC Davis, May 2.

*Using Simulation, Animation, and Exploratory Environments to Help Teach Computer Science  
Fundamentals*, Harvey Mudd College, Claremont, California,  
(Live Macintosh Demonstration), March 29.

*Using Simulation, Animation, and Exploratory Environments to Help Teach Computer Science  
Fundamentals*, Software Engineering Institute, Carnegie-Mellon University, Pittsburgh,  
Pennsylvania, (Live Macintosh Demonstration), February 21.

### **Presentations in 1986**

*Can Computers Help Revitalize Education?*, Invited Faculty Address, UCI Honors  
Convocation, June 13.

*How Will We Utilize New Technology in Providing Education in the Future?*,  
Invited Presentation, UCI Faculty Retreat, Rancho Santa Fe,  
(live Macintosh demonstration), May 31.

*Can Computers Help Revitalize Education?*, Invited Address to Honors Students,  
Computer Science Night, UC Davis, (Live Macintosh Demonstration), May 22.

*Can Computers Help Revitalize Computer Science Education?*, Brown Bag Lunch,  
UCI, ICS Department, (live Macintosh demonstration), May 14.

### **Presentations in 1985**

*Computers in the School of the Future*, California Principal's Conference for Academic  
Excellence in Effective Schools, Anaheim, Ca, (live Macintosh demonstration),  
Nov. 22.

*Macintosh — Future Directions*, ACM Meeting, UC Irvine,  
(live Macintosh demonstration), February 8.

### **Presentations in 1984**

*Arcturus and Advanced Programming Environments of the Future*, UC Computer Center  
Consultant's Conference, UC Irvine, December 13.

*Microcomputer Laboratories*, Panel at the Conference on Microcomputers in Higher Education,  
de Anza College, Cupertino, California, October 20.

*Visions of Future Environments*, (with Larry Druffel, Warren Teitelman, and Cordell Green),  
Panel at 1984 ACM Annual Conference, San Francisco, October 9.

*User Interfaces — Report of Working Group 6*, ACM AdaTEC Future Ada Environment  
Workshop, Santa Barbara, California, September 20.

*Beyond Stoneman*, Invited Presentation, ACM AdaTEC Future Ada Environment Workshop,  
Santa Barbara, California, September 18.

*Interactive Ada in the Arcturus Environment*, Microelectronics Research and Development  
Center, Rockwell International, Anaheim, California, May 11.

*Interactive Ada in the Arcturus Environment*, Computer Science Colloquium, Harvard University,  
Cambridge, Massachusetts, February 17.

*The Epistemology of Computer Programming*, Computer Science Colloquium, Yale University,  
New Haven, Connecticut, February 15.

*The Epistemology of Computer Programming*, National AdaTEC Meeting, San Diego,  
California, February 9.

*Teaching Ada using the Arcturus Interactive Ada System*, Ada Education Subcommittee,  
National AdaTEC Meeting, San Diego, California, February 7.

*Rapid Prototyping in Arcturus*, Ada Professional Development Seminar,  
AdaTEC - Los Angeles Chapter, El Segundo, California, January 28.

*Arcturus - How it Works, and Rapid Prototyping in Arcturus*, two talks at the  
IBM Federal Systems Division, Bethesda, Maryland, January 9.

### **Presentations in 1983**

*Software Reuse*, Workshop on Reusability in Programming, ITT,  
Newport, Rhode Island, September 7.



*Interactive Ada in the Arcturus Environment*, Boston AdaTEC Meeting,  
Cambridge, Massachusetts, July 7.

*Fast Composition and Debugging via an Interactive Ada System*,  
AIAA Conference on Using Ada, Washington, D.C, June 29.

*Interactive Ada Environments of the Future*, National Computer Conference,  
Anaheim, California, May 18.

*New Horizons in Computer Programming*, UCI Honors Day Program, UC Irvine, May 1.

*Live Demonstration of Arcturus*, for Norden Systems and Ford Aerospace,  
Programming Environment Project, UC Irvine, March 21.

*Rapid Prototyping in the Arcturus Environment*,  
ACM National AdaTEC Meeting, San Diego, California, February 24.

*Arcturus — An Advanced Interactive Programming Environment*, Colloquium,  
ICS Department, UC Irvine, February 23.

*The Epistemology of Computer Programming*, Cognitive Sciences Seminar,  
UC Irvine, February 9.

*The Irvine Programming Environment Project — What do We Do?*,  
dinner presentation for parents and spouses, Programming Environment Project,  
UC Irvine, February 3.

*The Irvine Programming Environment Project — What do We Do?*,  
luncheon presentation for ICS Departmental Staff,  
Programming Environment Project, UC Irvine, February 2.

*Programming Environments of the Future*, Japanese Software Industry Association,  
Tokyo, Japan, January 14.

*How Arcturus Works*, Joint System Development Corporation,  
Tokyo, Japan, January 13.

*Rapid Prototyping in Arcturus*, 16th International Hawaii Conf. on System Sciences,  
Honolulu, Hawaii, January 7.

## **Presentations in 1982**

*Programming Environments of the Future*, Science Research Associates Seminar,  
Santa Monica, California, December 9.

*Ada Programming in the Future: The UC Irvine Arcturus Environment*,  
Arrowhead AdaTEC Meeting, Claremont, California, December 1.

*Ada Programming in the Future: The UC Irvine Arcturus Environment*,  
San Diego AdaTEC Meeting, San Diego, California, November 11.

*Interactive Tools for Program Design*, Ada Education and Technology  
Transfer Symposium, Crystal City, Virginia, October 9.

*Ada Programming in the Future: The UC Irvine Arcturus Environment*,  
Los Angeles AdaTEC Meeting, Redondo Beach, California, September 20.

*A Philosophy for a Tool Extension Paradigm*, Oxnard Workshop on  
Ada Programming Environments of the Future, Oxnard, California, August 12.

*New Category — Extensibility*, KITIA Meeting, Waltham, Mass, June 18.

*The Importance of Ada Programming Support Environments*,  
National Computer Conference, Houston, Texas, June 9.

*Initial Thoughts on Rapid Prototyping Techniques*, ACM SIGSOFT Second Software  
Engineering Symposium: Workshop on Rapid Prototyping, Columbia,  
Maryland, April 20.

### **Presentations in 1981**

*Ada Programming Environment Research*, Rockwell International,  
Newport Beach, California, December 17.

*Program Understanding Techniques*, DARPA Conference on Program Visualization,  
Key West, Florida, December 15.

*Programming Environments of the Future*, Xerox Council of Research Fellows,  
XEROX PARC, Palo Alto, Calif, November 17.

*The Arcturus Personal Workstation*, panel on Mini/Micro-Based Software Engineering  
Environments, 5th International Conference on Software Engineering,  
San Diego, California, March 11.

*Programming Environments of the Future*, TRW Software Systems Operations Seminar,  
TRW, Redondo Beach, California, February 18.

*Programming Environments of the Future*, Computer Science Colloquium,  
ICS Dept., UC Irvine, February 4.

*Programming Environments of the Future*, Aerospace Computer Resources Forum,  
The Aerospace Corporation, El Segundo, California, January 16.

### **Presentations in 1980**

*Problems and Research Directions in Programming Environments*,  
4th International Computer Software and Applications Conference,  
IEEE, Chicago, October 29.

*Arcturus: An Advanced, Highly-Integrated Programming Environment*,  
Symposium on Software Engineering Environments, Lahnstein, Germany, June 17.

*What is Computer Science?*, Santa Ana College, Santa Ana, California, April 26.

*Programming Environments*, Computer Science Colloquium, University of San Francisco,  
April 10.

*The Impact of Ada on the Software Metrics Problem*, Software Metrics Workshop,  
Las Vegas, Nevada, January 31.

### **Presentations in 1979**

*Transformation Techniques: Constructive or Destructive?*, Panel Discussion with  
E.W. Dijkstra, D. Gries, R.M. Burstall, B. Randell, and P. Pepper,  
4th International Conf. on Software Engineering, Munich, Germany, September 18.

### **Presentations in 1978**

*Fast-Fit: A New Dynamic Memory Allocation Technique*, Computer Science Seminar,  
Univ. of Southern California, Los Angeles, California, November 1.

*The Future of Automatic Programming*, presentation during Panel Discussion on  
Whither Automatic Programming, with C.C. Green, E. Kant, M. Hammer, R. Balzer,  
NCC 1978, Anaheim, California, June 7.

*Program Transformations*, Computer Science Colloquium, Jorgensen Lab.,  
California Institute of Technology, Pasadena, California, May 14.

### **Presentations in 1977**

*Arcturus*, Information Sciences Institute, University of Southern California,  
Marina del Rey, CA, July 15.

## **Presentations in 1976**

*What is Computer Science?*, Information and Computer Science Department  
Annual Lecture, University of California, Irvine, September 25.

*Refining and Improving Programs with Source-to-Source Transformations*,  
Computer Science Colloquium, Dept. of Applied Mathematics, Harvard University,  
Cambridge, MA, June 22.

*Improving and Refining Programs by Program Manipulations*, Colloquium,  
Computer Science Department, University of Utah, Salt Lake City, Utah, May 18.

*Semi-Automatic Programming Using Source-to-Source Transformations*,  
ACM Computer Science Conference, Anaheim, CA., February 11.

## **Presentations in 1975**

*What Do Computer Scientists Do?*, Mathematics Colloquium,  
Department of Mathematics, U. C. Riverside, Riverside, CA, December 3.

*Semi-Automatic Programming Using Mechanized Refinement Transformations*,  
SIGPLAN, L. A. Chapter, Santa Monica, CA.

*Extensibility in Programming Language Design*, National Computer Conference,  
AFIPS, Anaheim, CA, May 20.

*Programming Languages for Intelligent Terminals*, Conference on Computer Graphics,  
Pattern Recognition and Data Structure, Beverly Hills, CA, May 14.

## **Presentations in 1974**

*Extensible Languages - An Anatomy of a Failure*, ACM National Meeting,  
SIGPLAN Lecturer, San Diego, CA, November 11.

*Data Structures - An Axiomatic Approach*, University of California, Irvine, April 8.

*Extensible Languages - An Anatomy of a Failure*, University of California, Irvine, April 5.

*Observations and Hypotheses About Program Synthesis Mechanisms*,  
Computer Science Seminar, Softech Inc., Waltham, MA, January 3.

### **Presentations in 1973**

*Representation Cascades, Heterarchy and Knowledge Structures in Automatic Programming*, Yale University, October 29.

*APL Implementation Techniques*, Harvard University, October 23.

*Representation Cascades, Heterarchy and Knowledge Structures in Automatic Programming*, Brandeis University, October 16.

*Data Structures — An Axiomatic Approach*, Brown University, October 9.

*New Trends in Programming Languages*, Computer Science Seminar, Bolt Beranek and Newman, July 12.

*Automatic Program Synthesis Techniques*, Brown University, June 27.

### **Presentations in 1972**

*The Air Traffic Control System — Present and Future*, Computer Graphics Seminar, Harvard University, December 13.

*Extensible Languages — An Anatomy of a Failure*, ACM SIGPLAN, Boston Chapter Meeting, Brandeis University, December 7.

*Extensible Languages — An Anatomy of a Failure*, Queen's University, Kingston, Ontario, Canada, October 19.

*On the Limitations of Our Current Stock of Ideas About Extensible Languages*, Courant Institute of Mathematical Sciences, New York University, May 5.

*A Comparison of PPL and APL*, Computer Science Colloquium, Yale University, April 11.

### **Presentations in 1971**

*After Extensible Languages, What Next?*, Princeton Conference on Information Sciences and Systems, Princeton University, March 25.

*After Extensible Languages, What Next?*, Brown University, March 17.

*A Live Demonstration of PPL*, Johns Hopkins University, March 1.

*Axioms for Data Structures*, SIGPLAN Symposium on Data Structures in Programming Languages, Gainesville, FL, February 26.

*A Live Demonstration of PPL*, Yale University, February 22.

*A Live Demonstration of PPL*, Carnegie-Mellon University, February 4.

### **Presentations in 1970**

*The Enroute Air Traffic Control System — Present and Future*, Air Traffic Control Seminar, Transportation Systems Center, Cambridge, MA, December 10.

*Control Structures for Programming Languages*, The Mitre Corporation, Bedford, MA, October 14.

*The Enroute Air Traffic Control System — Present and Future*, Computer Science Seminar, Bolt Beranek and Newman, February 25.

### **Presentations in 1969**

*The Enroute Air Traffic Control System — Present and Future*, MIT Project MAC - Seminar on Computation Structures, December 11.

*The Role of Extensible Languages in a Network of Computers*, Workshop on Networks of Computers, University of Maryland, College Park, October 21.

*Some Features of PPL, A Polymorphic Programming Language*, SIGPLAN Extensible Languages Symposium, Boston, MA, May 13.

*The Enroute Air Traffic Control System — Present and Future*, University of Utah, February 28.

*A Polymorphic Programming Language*, California Institute of Technology, Information Sciences Seminar, February 26.

### **Presentations in 1968**

*A Polymorphic Programming Language*, MIT Project MAC-Seminar on Computation Structures, December 19.

*A Polymorphic Programming Language*, Working Conference on Extensible Languages, Carnegie-Mellon University, December 3.

*A Polymorphic Programming Language*, University of Waterloo, Waterloo, Ontario, Canada, November 11.

*Data Definition Techniques*, Joint Chiefs of Staff, Pentagon, given with A.J. Perlis, October 14.

*Conferencias Sobre Analisis Sintactico*, (in Spanish), National University of Mexico, Visting Lecturer Series, July 18.

*Polymorphic Programming*, National Security Agency, Ft. Meade, MD, April 22.

### **Presentations in 1967**

*Formula Algol*, Computer Science Colloquium, Cornell University, October 13.

*Data Definition Facility for Programming Languages*, Computer Science Colloquium, Cornell University, October 12.

*A Data Definition Facility for Programming Languages*, IBM Poughkeepsie Laboratories, July 24.

*A Data Definition Facility for Programming Languages*, IBM Watson Research Center, Yorktown Heights, July 24.

*A Data Definition Facility for Programming Languages*, Applied Math. Colloquium, Harvard University, January 21.

### **Presentations in 1966**

*Formula Algol*, Computer Science Colloquium, University of Wisconsin, Madison, December 21.

*A Data Definition Facility for Programming Languages*, Computer Science Colloquium, The Pennsylvania State University, University Park, October 21.

*How it Feels to Compute in Carnegie Tech's Remote Job Entry System*, NATO Conference on Man-Machine Interaction, Edinburgh, Scotland, August 4.

*Programming Language Design Criteria and Trade-Offs*, Computer Science Colloquium, University of Texas, Austin, TX, May 3.

*A Formal Semantic Language of Feldman and Its Use in Compiler Writing*, Computer Science Colloquium, University of Texas, Austin, May 2.

*A Definition of Formula Algol*, Symposium on Symbolic and Algebraic Manipulation, Washington, D. C., given with R. Iturriaga, April 29.

*Techniques and Advantages of Using the Formal Compiler Writing System FSL to Implement a Formula Algol Compiler*, Spring Joint Computer Conference, Boston, given with R. Iturriaga, April 20.

### **Presentations in 1965**

*Formula Algol*, Computer Science Colloquium, Stanford University, September 25.