

VITA

June 1979

J. F. Traub

Ph.D., Columbia University, 1959

EMPLOYMENT:

Edwin Howard Armstrong Professor of Computer Science and Chairman,
Department of Computer Science, Columbia University, 1979 -

Head, Department of Computer Science and Professor of Computer
Science and Mathematics, Carnegie-Mellon University, 1971-1979

Mathematics Research Center, Computer Science Research Center,
Bell Telephone Laboratories, Murray Hill, 1959-1971

HONORS:

Distinguished Lecturer
Massachusetts Institute of Technology, February 1977

Mackay Professor
University of California at Berkeley, 1978-1979

Fellow, American Association for the Advancement of Science

Who's Who in America

American Men and Women of Science

Dictionary of International Biography (Cambridge)

Who's Who in Engineering

Men of Achievement (Cambridge)

GOVERNMENT GRANTS AND CONTRACTS:

National Science Foundation (Principal Investigator)

Office of Naval Research (Principal Investigator)

Advanced Research Projects Agency (Co-Principal Investigator
with A. Newell)

ADVISORY AND VISITING COMMITTEES:

Chairman (74-75), President's Advisory Committee on Computer Science,
Stanford University

Argonne National Laboratory Applied Mathematics Division Review Committee,
Argonne, Illinois

Member, Central Steering Committee, Computing Science and Engineering
Research Study (COSERS), National Science Foundation

Member, Advisory Committee for the Institute of Defense Analysis,
Princeton, New Jersey

Member, University of British Columbia Dean's Review Committee,
Vancouver, Canada

Member, Scientific Council, Laboratoire de Recherche en Informatique et
Automatique (I.R.I.A.), Paris, France

Liaison, Panel on Theoretical Computer Science from Central Steering
Committee of COSERS

Liaison, Panel on Numerical Computation from Central Steering Committee
of COSERS

Member, Carnegie-Mellon Institute of Research Advisory Committee,
Carnegie-Mellon University

Member, Advisory Committee, Computer Science and Mathematics Division,
National Science Foundation

INVITED TALKS TO CONFERENCES SINCE JULY 1971:

Panelist, IFIP Congress, Ljubljana, Yugoslavia; August, 1971.

American Mathematical Society, Dallas, Texas; January, 1973.

Computer Science Conference, Ohio State University, Columbus, Ohio;
February, 1973.

Conference on Software and Algorithms for Numerical Mathematics,
University of Technology, Loughborough, England; April, 1973.

American Mathematical Society - SIAM Meeting, New York City; April, 1973.

Symposium on Complexity of Sequential and Parallel Numerical Algorithms,
Carnegie-Mellon University, Pittsburgh, Pennsylvania; May, 1973.

American Mathematical Society, Conference on the Influence of Computing
on Mathematical Research and Education, Missoula, Montana; August, 1973.

Mathematical Association of America - Allegheny Mountain Section, Meadville,
Pennsylvania; May, 1974.

Mathematical Software II, Purdue University, West Lafayette, Indiana; May,
1974 (with M. A. Jenkins).

Panelist, Panel on the Ph.D. Production Rate, Meeting of Heads of Ph.D.
Computer Science Departments, Snowbird, Utah; July, 1974.

Panelist, Panel on Computer Science as a Discipline, Meeting of Heads of
Ph.D. Computer Science Departments, Snowbird, Utah; July, 1974.

Conference on Numerical Analysis, Royal Irish Academy, Dublin, Ireland;
July, 1974.

Panelist, Panel on impact of Parallel/Vector Computers on Numerical Analysis,
Second Langley Conference on Scientific Computing, Virginia; October, 1974.

Symposium on Algorithmen und Komplexitätstheorie, Oberwolfach, West Germany;
October-November, 1974.

Symposium on Analytic Computational Complexity, Carnegie-Mellon University,
Pittsburgh, Pennsylvania; April, 1975 (with H. Wozniakowski).

Mathematical Models and Numerical Methods Semester, Stefan Banach International
Mathematical Center, Warsaw, Poland; May, 1975.

Panelist, COSERS Panel on Numerical Computation, SIAM-SIGNUM Fall Meeting,
San Francisco, California; December, 1975.

Symposium on New Directions and Recent Results in Algorithms and Complexity,
Carnegie-Mellon University, Pittsburgh, Pennsylvania; April, 1976 (with
H. Woźniakowski).

Symposium on Algorithmen und Komplexitätstheorie, Oberwolfach, West Germany;
October, 1977.

CONTRIBUTED TALKS TO CONFERENCES SINCE JULY 1971:

IFIP Congress, Ljubljana, Yugoslavia; August, 1971.

SIAM-SIGNUM Conference, Austin, Texas; October, 1972.

Symposium on Switching and Automata Theory, College Park, Maryland;
October, 1972.

Mathematical Software II, Purdue University, West Lafayette, Indiana;
May, 1974 (with H. T. Kung).

IFIP Congress, Stockholm, Sweden; August, 1974.

Second Langley Conference on Scientific Computing, Virginia; October,
1974 (with H. T. Kung).

SIAM-SIGNUM Fall Meeting, San Francisco, California; December, 1975
(with A. Feldstein).

Symposium on New Directions and Recent Results in Algorithms and
Complexity, Carnegie-Mellon University, Pittsburgh, Pennsylvania;
April, 1976 (with H. T. Kung).

COLLOQUIA SINCE JULY 1971:

Panelist, University of Pittsburgh, Pittsburgh, Pennsylvania; November,
1971.

University of Toronto, Toronto, Canada; November, 1971.

Lawrence Livermore Laboratory, Livermore, California; December, 1971.

Argonne National Laboratory, Argonne, Illinois; February, 1972.

National Center for Atmospheric Research (three talks), Boulder, Colorado;
July, 1972.

Stanford University, Stanford, California; October, 1972.

Mechanical Engineering Department, Carnegie-Mellon University, Pittsburgh,
Pennsylvania; November, 1972.

Senior Scientist Visit, Jet Propulsion Laboratory (two days), Pasadena,
California; March, 1973.

COLLOQUIA (Continued)

NASA/Ames, Moffett Field, California; August, 1973.

Lawrence Livermore Laboratory, Livermore, California; August, 1973.

Stanford University, Stanford, California; August, 1973.

ICASE, Hampton, Virginia; October, 1973.

College of William and Mary, Williamsburg, Virginia; October, 1973.

California Institute of Technology, Pasadena, California; October, 1973.

Argonne National Laboratory, Argonne, Illinois; February, 1974.

University of Chicago, Chicago, Illinois; February, 1974.

Harvard University, Cambridge, Massachusetts; February, 1974.

Massachusetts Institute of Technology, Cambridge, Massachusetts;
February, 1974.

Bell Telephone Laboratories, Murray Hill, New Jersey; April, 1974.

International Business Machines, Yorktown Heights, New York; April, 1974.

Stanford University, Stanford, California; May, 1974.

University of California, Berkeley, California; May, 1974.

University of Warsaw, Warsaw, Poland; August, 1974.

University of Pittsburgh, Pittsburgh, Pennsylvania; December, 1974.

Lawrence Livermore Laboratory, Livermore, California; January, 1975.

I.R.I.A., Rocquencourt, France; May, 1975.

University of Paris, Paris, France; May, 1975.

University of California, Berkeley, California; June, 1975.

Stanford University, Stanford, California; July, 1975.

Harvard University, Cambridge, Massachusetts; February, 1977.

Institute for Defense Analyses, Princeton, New Jersey; April, 1977.

COLLOQUIA (Continued)

Princeton University, Princeton, New Jersey; April, 1977.

I.R.I.A., Rocquencourt, France; March, 1977.

University of California, San Diego, California; June, 1977.

University of Toronto, Toronto, Canada; October, 1978.

University of Southern California, Los Angeles, California; October, 1978.

Lawrence Livermore Laboratory, Livermore, California; October, 1978.

Stanford University, Stanford, California; October, 1978.

University of California, Berkeley, California; November, 1978.

University of California, Los Angeles, California; November, 1978.

University of California, Santa Barbara, California; November, 1978.

PUBLICATIONS:

Books

Iterative Methods for the Solution of Equations, Prentice-Hall, 1964.

Complexity of Sequential and Parallel Numerical Algorithms, (editor)
Academic Press, 1973.

Analytic Computational Complexity, (editor) Academic Press, 1975.

Algorithms and Complexity: New Directions and Recent Results, (editor)
Academic Press, 1976.

General Theory of Optimal Algorithms
Academic Press, 1980 (with H. Woźniakowski).

Papers

Variational Calculations of the 2^3S State of Helium. Phys. Rev. 111, 1958,
1098-1108.

Variational Calculations of the 2^3P State of Helium. Phys. Rev. 116, 1959,
914-919.

On a Class of Iteration Formulas and Some Historical Notes. Communications
of the ACM 4, 1961, 276-278.

Functional Iteration and the Calculation of Roots. Proceedings of the 1961
National ACM Conference, pp. 5A-1 - 5A-4.

A Macro Compiler that Counts Machine Cycles. Bell Labs Report (with
P. M. Sherman).

The Theory of Multipoint Iteration Functions. Proceedings of the 1962
ACM National Conference, 80-81.

Interpolatively Generated Iteration Functions. Proceedings of the 1963
ACM National Conference.

On Lagrange-Hermite Interpolation. J.Soc.Indust.Appl.Math. 12, 1964, 886-891.

Globally Convergent Iteration Functions. Proceedings IFIP Congress 2, 1965,
483-484.

Generalized Sequences with Applications to the Discrete Calculus. Math.
Comp. 19, 1965, 177-200.

A Proposed System for the Computer-Aided Distribution of Laboratories
Technical Memoranda. Bell Labs Report (with W. S. Brown and J. B. Kruskal).

Construction of Globally Convergent Iteration Functions for the Solution of
Polynomial Equations. Bull.Amer.Math.Soc. 71, 1965, 894-895.

Papers (continued)

- Associated Polynomials and the Solution of Linear Problems. SIAM Review 8, 1966, 277-301.
- A Class of Globally Convergent Iteration Functions for the Solution of Polynomial Equations. Math. Comp. 20, 1966, 113-138.
- The Future of Scientific Journals. Science, 158, 1153-1159. (with W. S. Brown and J. R. Pierce)
- The Calculation of Zeros of Polynomials and Analytic Functions. Proceedings of a Symposium on Mathematical Aspects of Computer Science, American Mathematical Society, 1967, 138-152.
- The Solution of Transcendental Equations. In Mathematical Methods for Digital Computers, edited by Ralston and Wilf, Vol. 2, 1968, 171-184.
- The Bell Laboratories Numerical Mathematics Program Library Project. Proceedings of the 1968 ACM National Conference, 485-489. (with W. M. Gentleman)
- MERCURY - A System for the Computer Aided Distribution of Technical Papers. Journal of the ACM 16, 1969, 13-25. (with W. S. Brown)
- An Algorithm for an Automatic General Polynomial Solver. Constructive Aspects of the Fundamental Theorem of Algebra, edited by Dejon and Henrici, Wiley-Interscience, 1969, 151-180. (with M. A. Jenkins)
- Solving Equations on a Computer. Bell Labs Report, 1969.
- A Three-Stage Variable-Shift Iteration for Polynomial Zeros and Its Relation to Generalized Rayleigh Iteration. Numerische Mathematik 14, 1970, 252-263. (with M. A. Jenkins)
- A Three-Stage Algorithm for Real Polynomials Using Quadratic Iteration. SIAM Journal of Numerical Analysis 7, 1970, 545-566. (with M. A. Jenkins)
- The Shifted QR Algorithm for Hermitian Matrices. Linear Algebra and its Applications 4, 1971, 137-154. (with T. J. Dekker)
- An Analysis of the Shifted LR Algorithm. Numerische Mathematik 17, 1971, 179-188. (with T. J. Dekker)
- Optimal Iterative Processes: Theorems and Conjectures. Proceedings IFIP Congress Booklet TA-1, 1971, 29-32.
- High Quality Portable Numerical Mathematics Software. Mathematical Software, Academic Press, Inc., New York, 1971, 131-139.
- On Euclid's Algorithm and the Theory of Subresultants. Journal of the ACM 18, 1971, 505-514. (with W. S. Brown)

Papers (continued)

- On the Matrix Polynomial, Lambda-Matrix and Block Eigenvalue Problems. CMU Report, 1971. (with J. E. Dennis, Jr. and R. P. Weber)
- Zeros of a Complex Polynomial [C2], Algorithm 419. Communications of the ACM 15, 1972, 97-99. (with M. A. Jenkins)
- Computational Complexity of Iterative Processes. SIAM Journal on Computing 1, 1972, 167-179.
- The Future of Numerical Mathematics. SIGNUM Newsletter 7, April, 1972, 21-45. (with W. Givens and J. H. Wilkinson)
- Numerical Mathematics and Computer Science. 25th Anniversary Issue of Communications ACM 15, 1972, 537-541.
- Iterative Solution of Tridiagonal Systems on Parallel or Vector Computers. Complexity of Sequential and Parallel Numerical Algorithms, edited by J. F. Traub, Academic Press, 1973, 49-82.
- Computational Complexity of One-Point and Multipoint Iteration. Complexity of Computation, edited by R. Karp, SIAM-AMS Proceedings 7, American Mathematical Society, 1974, 149-160. (with H. T. Kung)
- Theory of Optimal Algorithms. Software for Numerical Mathematics, edited by D. J. Evans, Academic Press, 1974, 1-13.
- An Introduction to Some Current Research in Numerical Computational Complexity. Proceedings of the Conference on the Influence of Computing on Mathematical Research and Education, American Mathematical Society, 1974, 47-55.
- On the Number of Multiplications for the Evaluation of a Polynomial and Some of Its Derivatives. Journal of the ACM 21, 1974, 161-167. (with M. Shaw)
- Parallel Algorithms and Parallel Computational Complexity. Proceedings IFIP Congress, 1974, 685-687.
- Principles for Testing Polynomial Zerofinding Programs. ACM Trans. on Mathematical Software 1, 1975, 26-34. (with M. A. Jenkins)
- Accelerated Iterative Methods for the Solution of Tridiagonal Systems on Parallel Computers. Journal of the ACM 23, 1976, 636-654. (with D. E. Heller and D. K. Stevenson)
- Order of Vector Recurrences with Applications to Nonlinear Iteration, Parallel Algorithms, and the Power Method. CMU Report. (with A. Feldstein)
- Analysis of a Family of Algorithms for the Evaluation of a Polynomial and Some of its Derivatives. CMU Report, February 1975. (with M. Shaw)
- Recent Results and Open Problems in Computational Complexity. Theorie des Algorithmes, des Langues et de la Programmation, Seminaires I.R.I.A., October 1974-June 1975.

Papers (continued)

- Strict Lower and Upper Bounds on Iterative Complexity. Analytic Computational Complexity, edited by J. F. Traub, Academic Press, 1975, pp. 15-34. (with H. Woźniakowski).
- Algorithms for Solvents of Matrix Polynomials. CMU Report, October 1975. (with J. E. Dennis and R. P. Weber). To appear in SIAM Journal on Numerical Analysis.
- Optimal Order and Efficiency for Iterations with Two Evaluations. SIAM Journal on Numerical Analysis 13, 1976, 84-89. (with H. T. Kung).
- Numerical Analysis and Computational Complexity (extended abstract). To appear in Proceedings of the Numerical Analysis Seminar, University of Paris, France.
- Optimal Linear Information for the Solution of Non-Linear Operator Equations. Algorithms and Complexity: New Directions and Recent Results, edited by J. F. Traub, Academic Press, 1976, pp. 103-119. (with H. Woźniakowski).
- Some General Observations on Ph.D. Production in Computer Science. SIGCSE Newsletter 8, December 1976, 8-9.
- The Algebraic Theory of Matrix Polynomials. SIAM Journal on Numerical Analysis 13, December 1976, 831-845. (with J. E. Dennis and R. P. Weber).
- Asymptotic Behavior of Vector Recurrences with Applications. Mathematics of Computation 31, January 1977, 180-192. (with A. Feldstein).
- Convergence and Complexity of Newton Iteration for Operator Equations. CMU Report, January 1977. To appear in Journal of the ACM. (with H. Wozniakowski).
- Optimal Radius of Convergence of Interpolatory Iterations for Operator Equations. CMU Report, November 1976. To appear in Equationes Mathematicae, 1978. (with H. Wozniakowski).
- Convergence and Complexity of Interpolatory-Newton Iteration in a Banach Space. CMU Report, June 1977. (with H. Wozniakowski).
- Selection of Good Algorithms from a Family of Algorithms for Polynomial Derivative Evaluation. Information Processing Letters 6, October 1977, 141-145.
- General Theory of Optimal Error Algorithms and Analytic Complexity: Part A. General Information Model. CMU Report, September 1977. (with H. Wozniakowski).
- Recent Results and Open Problems in Analytic Computational Complexity (extended abstract). Proceedings of the Banach Center's Mathematical Models and Numerical Methods Semester, Volume 3, Warsaw, Poland, 1978, 269-272.

All Algebraic Functions Can Be Computed Fast. Journal of the ACM 25, April 1978, 245-260. Also appeared in Analyse et Controle de Systemes, Seminaires IRIA, 1977, 133-152.

On the Complexity of Composition and Generalized Composition of Power Series. CMU Report, May 1978. To appear in SIAM Journal on Computation. (with R. Brent).

General Theory of Optimal Error Algorithms and Analytic Complexity: Part B. Iterative Information Model. In progress. (with H. Wozniakowski).

Computation of Power Series in Non-Commuting Variables. In progress. (with H. T. Kung).

The Influence of Algorithms and Heuristics on Mathematics, Science, and Education. To appear in Proceedings of the Tenth Anniversary Symposium, I.R.I.A., Paris, France, 1978.

Complexity of Composition and Reversion of Formal Power Series. To appear in Research Problems of Theoretical Computer Science, edited by S. R. Kosaraju, A. R. Meyer, and R. L. Rivest.

History and Annotated Bibliography for Analytic Complexity. In progress. (with H. Wozniakowski).

CURRENT AND RECENT PROFESSIONAL ACTIVITIES:

Editor: Journal of Association for Computing Machinery
SIAM Journal of Numerical Analysis
Journal of Computer and System Sciences
International Journal on Computers and Mathematics with Applications
Transactions on Mathematical Software

Reviewer: Mathematical Reviews
Computing Reviews

Organizer, Symposium on Complexity of Sequential and Parallel Numerical Algorithms, Carnegie-Mellon University, 1973.

Organizer, Symposium on Analytic Computational Complexity, Carnegie-Mellon University, 1975.

Organizer, Symposium on New Directions and Recent Results in Algorithms and Complexity, Carnegie-Mellon University, 1976.

Member, Organizing Committee, Mathematical Software II, Purdue, 1974.

Member, Computer Science Conference Board.

Member, Organizing Committee and Panelist, Heads of Ph.D. Computer Science Departments Meeting, Utah, 1974.

Member, New York Academy of Science.

Chairman, ACM Committee on Relations between ACM and Research Computing.

Chairman, ACM Awards Committee.

I've served the following organizations in numerous other capacities;

Association for Computing Machinery
Society for Industrial and Applied Mathematics
American Mathematical Society
Conference Board of the Mathematical Sciences
American Association for the Advancement of Science