David L. Waltz

Work: Center for Computational Learning Systems
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Professional Experience

Columbia University
Director,Center for Computational Learning Systems (CCLS) 2003-present
NEC
CSO, NEC Laboratories America, 2002-03
President, NEC Research Institute, 2000-02
VP, Computer Science Research, NEC Research Institute, 1993-2000.
Thinking Machines Corporation, Cambridge, MA
Director of Advanced Information Systems, 1984-1993.
Brandeis University, Computer Science Department, Waltham, MA
Adjunct Professor, 1993-2002; Professor, 1984-93
University of Illinois, Urbana/Champaign
Professor of Electrical and Computer Engineering; and
Research Professor at the Coordinated Science Laboratory, 1980-1984
Associate Professor, 1978-1980; Assistant Professor, 1973-1978.
Board of Directors, Signafy, Inc., Princeton, NJ, 1997-1999.
Board of Directors, Inquizit Technologies, Santa Monica, CA, 1998-2002
Post-doctoral researcher, AI Laboratory,
Massachusetts Institute of Technology, Cambridge, MA, 1972-1973

Education

Ph.D., Massachusetts Institute of Technology, Electrical Engineering, 1972
S.M. , Massachusetts Institute of Technology, Electrical Engineering, 1968
S.B., Massachusetts Institute of Technology, Electrical Engineering, 1965

Honors

Distinguished Lectureships: Northeastern University; Ohio State University; University of Glasgow (Scotland), University of Colorado; Ecole Polytechnique Federale de Lausanne (Switzerland); UCLA; Carnegie-Mellon University; Syracuse University; Georgia Tech; James Madison University; University of Toronto; Longwood College; New South Wales Institute of Technology (Australia); Cornell University; Carleton University (Canada); Florida Atlantic University; University of Illinois at Urbana-Champaign; Texas A&M University
Fellow, American Association for Artificial Intelligence
Fellow, ACM
Sigma Xi; Tau Beta Pi; Eta Kappa Nu
Keynote and invited lectures: AAAI-98 (15th National Conference on Artificial Intelligence); Computo98 (Mexico); ICNN-97 (1997 International Conf. On Neural Nets); European Case-Based Reasoning Conference (1996); CAIA-93 (Conference on AI for Applications); AAAI-92 (National Conference on Artificial Intelligence); Cognitive Science Conference (1989); many others.
Five times on List of Teachers Judged Excellent by their Students,
University of Illinois

Professional Activities

AAAI (American Association for Artificial Intelligence)
President 1997-1999. (elected)
Fellow, 1990
ACM (Association for Computing Machinery)
Fellow, 1998
ACM-SIGART (Special Interest Group on Artificial Intelligence)
Chairman - 1977-80; Vice Chairman - 1975-77 (elected)
CRA (Computing Research Association)
Board of Directors, 2000-2004 (elected)
CCC (Computing Community Consortium), Council Member, two year term 2007-9
IEEE (Institute for Electrical and Electronics Engineers), Senior Member
Editor or Editorial Boards
Current:
IEEE Intelligent Systems
Past:
JAIR (Journal of AI Research)
Communications of the ACM
JLNE (Journal of Natural Language Engineering)
Cognitive Science
Cognition and Brain Science
Computational Linguistics

Advisory

EPFL (Ecole Polytechnique Federale de Lausanne) Lausanne, Switzerland
External Advisory Board, 1998-present
IHMC (Institute for the Interdisciplinary Study of Human and Machine Cognition),
at the University of West Florida**,** Pensacola
Advisory Board, 1999-present
Army Research Laboratory, Digitization and Communications Science Division
National Academies Technical Assessment Board, 2004-present
4C (Cork Constraint Computation Centre) Cork, Ireland
Technical Advisory Board, 2004-present
Rutgers University, CS Department
External Advisory Committee, December 2006
Carnegie-Mellon University, CS Department
External Advisory Committee, October 2005
Hunter College, CS Department, NYC
External Advisory Committee, May 2003
Indiana University, Bloomington
External Advisory Board, October 2002
University of Illinois at Urbana-Champaign
Beckman Center, Advisory Committee, Human-Computer Intelligent Interaction Program , 1998-1999
Brown University, Providence, RI
Executive Review Group for Brain, Behavioral and Computational Sciences Program, 1999
NASA Ames Research Laboratories, Sunnyvale, CA
OCLC (Online Computing Library Consortium), Columbus, Ohio
Research Advisory Board, 1992-1993
Mississippi State University, Columbus
Computer Science Advisory Board, 1991-3

New Mexico State University, Las Cruces
Computing Research Laboratory, External Advisory Board, 1986-90
National Science Foundation
Computer Science Advisory Committee - Member, 1982-85
Experimental Research Program Site Visitor, 1981-1985
Rutgers University
DIMACS Executive Council, 1996-2000

On committee of four that wrote the proposal for the Volen Center building at Brandeis University, 1982. The building cost ~$25M, and houses Computer Science, Cognitive Science/Linguistics, and Molecular Biology.

On committee of three that wrote the proposal for Beckman Center, University of Illinois, 1982. The building cost ~$45M, and houses NCSA (National Center for Supercomputer Applications) as well as interdisciplinary activities for many departments.

Publications

Patents

- Waltz, D. L. et al, "System and Method for Grading Electricity Distribution Network Feeder Conditions", Applied for, May 2006.

- Waltz, D. L. "Artificial Intuition." Patent applied for, May 2005.

Books and Edited Volumes

- Waltz, D.L. (ed.) **Natural and Artificial Parallel Computation**, Philadelphia: SIAM Press, 1996, 202 pages.

- Waltz, D. L. (ed.) **Semantic Structures: Advances in Natural Language Processing**, Hillsdale, NJ: Lawrence Erlbaum Associates, 1989, 220 pages.

- Waltz, D. L. and J. A. Feldman (eds.) **Connectionist Models and Their Implications**, Norwood, NJ: Ablex, 1988, 300 pages.

- Waltz, D. L. (ed.) **Theoretical issues in natural language processing - 2.** New York: ACM, 1978.

Refereed publications

- Ansaf Salleb-Aouissi, Bert C. Huang and David L. Waltz
Vers des Machines a Vecteurs de Support "Actionables": Une Approche Fondee sur le Classement
To appear in **Knowledge extraction and management (Extraction et Gestion des Connaissances, EGC'2008)**, Sophia Antipolis, France.

- Gross, P., A. Boulanger, M. Arias, D. Waltz, P. Long, C. Lawson, R. Anderson, M. Koenig, M. Mastrocinque, W. Fairechio, J. Johnson, S. Lee, F. Doherty and A. Kressner. "Predicting Electricity Distribution Feeder Failures using Machine Learning Susceptibility Analysis." **Proceedings of IAAI-06 (Innovative Applications of Artificial Intelligence),** Boston, MA, July 2006, 1705-1711.

- Anderson, R., A. Boulanger, P. Gross, P. Long and D. Waltz. “Boosting, Support Vector Machines and Reinforcement Learning in Lean Energy Management.” **Oil and Gas Journal 103**, 18, May 2005, 41-48.

- Kasif, S., S. Salzberg, D. Waltz, J. Rachlin, D. Aha. “A Probabilistic Framework for Memory-Based Reasoning.” **Artificial Intelligence,** 104, 1-2, 1998**,** 287-311.

- Fulton, T., S. Kasif, S. Salzberg & D, Waltz. "Local Induction of Decision Trees: Towards Interactive Data Mining." in **KDD-96 (Proceedings, Second International Conference on Knowledge Discovery & Data Mining),** Portland, OR, August 1996, 14-19.

- Waltz, D.L. & S. Kasif. "On Reasoning from Data." **ACM Computing Surveys,** 27, 3, September 1995, 356-9.

- Waltz, D.L. "Massively Parallel AI." **International Journal of High Speed Computing**, 5, 3, 1993, 491-501.

- Waltz, D. L. "Toward a Fuller and More Useful Account of Mental Imagery." **Computational Intelligence**, 9, 4, November 1993, 402-5.

- Zhang, X., J. Fetrow, W.A. Rennie, D.L. Waltz, & G. Berg. "Automatic Derivation of Substructures Yields Novel Structural Building Blocks in Globular Proteins," in L. Hunter, D. Searls, & J. Shavlik (eds.) **Proceedings of the First International Conference on Intelligent Systems for Molecular Biology**, 1993, 438-446.

- Zhang, X., J. Mesirov, and D.L. Waltz. "Hybrid System for Protein Structure Prediction," **Journal of Molecular Biology**, 225, 1992, 1049-1063.

- Creecy, R., B. Masand, S. Smith, and D. L. Waltz. "Trading MIPS and Memory for Knowledge Engineering" **Communications of the ACM**. 35, 8, 1992, 48-64.

- Masand, B., G. Linoff, and D.L. Waltz. "Classifying News Stories using Memory Based Reasoning," **Proceedings of ACM SIGIR Conference,** Copenhagen, 1992, 59-65.

- Zhang, X., M. McKenna, J. Mesirov, and D. L. Waltz. "The Backpropagation Algorithm on Grid and Hypercube Architectures." **Parallel Computing 14** , 1990, 317-327.

- Waltz, D. L. "Eight Principles for an Intelligent Robot." in S. Wilson and J. Meyer (eds.), **SAB-90: Simulations of Animal Behavior**, MIT Press, 462-464.

- Waltz, D. L. "Massively Parallel AI." **Proceedings Eighth National Conference on Artificial Intelligence (AAAI-90)**, Boston, Aug. 1990, 1117-1122.

- Zhang, X., M. McKenna, J.P. Mesirov, and D. L. Waltz. "A Fast Implementation of Backpropagation on the Connection Machine CM-2." **Proceedings of NIPS-89**, Boulder, CO, Dec. 1989,

- Sun, R. and D. L. Waltz. "Review of 'Neural and Brain Modeling' by Ronald McGregor," **Journal of Mathematical Psychology**, December 1990, 483-488.

- Zhang, X., J.P. Mesirov, M. McKenna, and D. L. Waltz. "Protein structure prediction by a data-level parallel algorithm." **Proceedings of Supercomputing 89**, Reno, NV, November 1989, 215-223.

- Stanfill, C., R. Thau, and D. L. Waltz. "A parallel indexed algorithm for information retrieval." **Proceedings of the 12th Annual Intl. ACM/SIGIR Conf.**, Cambridge, MA, June 1989, 88-97.

- Waltz, D. L. "The Prospects for Truly Intelligent Machines." **Daedalus 117**, 1, Winter 1988, 191-212. Also reprinted in S. Graubard (ed.) **The Artificial Intelligence Debate: False Starts, Real Foundations**, Cambridge, MA: MIT Press, 1988.

- Waltz, D. L. "Applications of the Connection Machine." **IEEE Computer 20** (1), January 1987, 85-97.

- Stanfill, C., and Waltz, D. L. "Toward Memory-Based Reasoning." **Communications of the ACM 29** (12), December 1986, 1213-1228.

- Waltz, D. L. and J. B. Pollack. "Massively parallel parsing: A strongly interactive model of natural language interpretation." **Cognitive Science 9** (1), 57-84, January - March, 1985.

- Conrad, M., E. Harth, J. Holland, M. Martinez, H. Pattee, R. Rada, D. L. Waltz and B. Zeigler. "Natural and artificial intelligence." **Cognition and Brain Theory 7** (1), Winter 1984, 89-104.

- DeJong, G. F. and D. L. Waltz. "Understanding novel language." **International Journal of Computers and Mathematics with Applications 9** (1), 1983, 131-147.

- Waltz, D. L. "Helping computers understand natural language." **IEEE Spectrum 20** (11), November 1983, 81-84.

- Waltz, D.L. and Lois C. Boggess. 1979. "Visual Analog Representations for Natural Language Understanding," In Proceedings of the 6th International Joint Conference on Artificial Intelligence, pages 926--934, Tokyo..

- Waltz, D. L. (1982) "Event Shape Diagrams," Proceedings of the National Conference on Artificial Intelligence, Pittsburgh, PA, 84-87.

- Waltz, D. L. "On the interdependence of language and perception." **American Journal of Computational Linguistics** 3, Microfiche 79; also appears in Theoretical Issues in Natural Language Processing - 2, D. L. Waltz (ed.), ACM, New York, 1978, 149-156.

- Waltz, D. L. "An English language question answering system for a large relational database." **Communications of the ACM 21** (7), July 1978, 526-539.

Other publications in periodicals

- Waltz, D. L. “Evolution, Sociobiology, and the Future of Artificial Intelligence,” **IEEE Intelligent Systems 21,** 3, May/June 2006, 66-69.

- Waltz, D. L. “AI’s 10 to Watch,” **IEEE Intelligent Systems 21,** 3, May/June 2006, 5.

- Waltz, D.L. “An Opinionated History of AAAI”, **AI Magazine 26,** 4, Winter 2005, 45-47.

- Waltz, D.L. “Results of CRA Industrial Lab Survey of CS Research Labs”, **Computing Research News** 14, 5, November 2002, 3-ff.

- Waltz, D. “Survey Shows Significant Increases in CS Research Lab Salaries”, **Computing Research News** 13, 5, November 2002, 3.

- Waltz, D.L. & S.J. Hong. “Guest Editors’ Introduction: Data Mining: A Long Term Dream”, **IEEE Intelligent Systems 14** (6), November/December 1999, 30-1.

- Waltz, D. L. “The Importance of Importance: AAAI Presidential Address”, **AI Magazine,** Summer 1999.

- Waltz, D. L. "Artificial Intelligence." In E. Lazowska (ed.) **The Case for Computing,** CRA (Computing Research Association), to appear 1997. Available on CRA Web Page. Also reprinted in **AI Magazine 18** (3), Fall 1997, 49-52.

- Waltz, D.L. "Massively Parallel AI." **International Journal of High Speed Computing**, 5, 3, 1993, 491-501.

- Waltz, D.L. "CAIA '92: Silver Linings," **IEEE Expert**, 7, 3, 1992, 64-65.

- Waltz, D. L. and J. Pustujovsky. "Penrose's Grand Unified Mystery." **The Behavioral and Brain Sciences**, 13, 4, 1990, 688-690.

- Pollack, J., and Waltz, D. L. "Interpretation of Natural Language." **Byte 11**, 2, February 1986, 189-198.

- Waltz, D. L. "A Proposed Taxonomy of AI." **AI Magazine 6** (1), 58-63, Spring, 1985.

- Waltz, D. L. "Artificial Intelligence: Obstacles and Opportunities." **Brandeis Review 4**, (2), Spring 1985.

- Waltz, D., M. Genesreth, P. Hart, G. Hendrix, A. Joshi, J. McDermott, T. Mitchell, N. Nilsson, R. Wilensky and W. Woods. "Artificial intelligence: An assessment of the state-of-the-art and recommendation for future directions." **AI Magazine 4** (3), Fall 1983, 55-67.
- Waltz, D. L. "Artificial intelligence." **Scientific American 247** (4), October 1982, 118-33.

- Waltz, D. L. and M. H. Dorfman. "The holes in points." **The Behavioral and Brain Sciences 6** (4), December 1983, 612-613.

- Waltz, D. L. "On the function of mental imagery." **The Behavioral and Brain Sciences 2,** 1979, 569-570.

Book Chapters

- Waltz, D. L. "Memory-Based Reasoning." in M. A. Arbib (ed.) **The Handbook of Brain Theory and Neural Networks,** Cambridge, MA: MIT Press, 1995, 568-570; revised entry in new edition, 2002.

- Waltz, D.L. “AI Applications of Massive Parallelism: An Experience Report.” in J. Geller, H. Kitano & C. Suttner (eds.) **Parallel Processing for Artificial Intelligence 3,** Amsterdam: Elsevier, 1997, 327-339.

- Waltz, D.L. "Cognitive and Computational Models." in J. Glasgow & H. Narayanan (eds.) **Diagrammatic Reasoning**, Menlo Park, CA: The AAAI Press, 1995, 397-401.

- Waltz, D.L. "Foreword." in H. Kitano & J. Hendler (eds.) **Massively Parallel Artificial Intelligence,** Cambridge, MA: MIT Press, 1994, ix-x.

- Waltz, D.L. "Massively Parallel Symbolic Computing." in R. H. Halstead & T. Ito (eds.) **Parallel Symbolic Computing: Languages, Systems, and Applications**, Berlin: Springer-Verlag, 1993, 352-8.

- Stanfill, C. and D.L. Waltz. "Statistical Methods, Artificial Intelligence, and Information Retrieval." in Paul S. Jacobs (ed.) **Text-Based Intelligent Systems: Current Research and Practice in Information Extraction and Retrieval**, Lawrence Erlbaum Associates, Hillsdale, NJ, 1992, 215-225.

- Sun, R. and D.L. Waltz. "A Neurally Inspired Massively Parallel Model of Rule-Based Reasoning," in Branko, S. (ed.) **Neural and Intelligent Systems Integration**, John Wiley & Sons, New York, 1992, 341-381.

- Zhang, X. and D.L. Waltz. "Developing Hierarchical Representations for Protein Structures: An Incremental Approach," in Hunter, L. **Artificial Intelligence and Molecular Biology**, John Wiley & Sons, New York, 1992.

- Feldman, J., L. Cooper, C. Koch, R. Lippman, D. Rummelhart, D. Sabbah, and D.L. Waltz. "Connectionist Systems." **Annual Review of Computer Science 1990, 4**, 1990, 369-381.

- Waltz, D.L., and C. Stanfill. "Applications of the Connection Machine.", in J. Kowalik (ed.), **Supercomputing,** NATO ASI Series, Springer-Verlag, Berlin, 1990, 325-40.

- Waltz, D. L. "Memory-based Reasoning." in M. Arbib and J.A. Robinson (eds.), **Natural and Artificial Parallel Computation**, MIT Press, 1990, 251-276.

- Waltz, D. L. "Applications of the Connection Machine." in B. Wah and C. V. Ramamoorthy (eds.), **Computers for Artificial Intelligence**, New York: Wiley, 1990, 324-351.

- Waltz, D. L. "Connectionist Networks: Not a Panacea, Not Just a Notational Variant." in Y. Wilks (ed.), **Theoretical Issues in Natural Language Processing**, Hillsdale, NJ: Lawrence Erlbaum Associates, 1989, 56-63.

- Waltz, D. L. "Forward" to J. Barnden and J. Pollack, **Advances in Connectionist and Neural Computation Theory**, Norwood, NJ: Ablex Publishing, 1990.

- Waltz, D. L. "The state-of-the-art in natural language understanding." In M. Ringle and W. Lehnert (eds.), **Strategies for Natural Language Processing**. Hillsdale, NJ, Erlbaum Associates, 1982, 3-36.

- Waltz, D. L. "Generating and understanding scene descriptions." In Joshi, Sag, and Webber (eds.), **Elements of Discourse Understanding**, Cambridge University Press, 1981, pp. 266-282.

- Waltz, D. L. "Review of natural language processing." In P. Wegner (ed.), **Research Directions in Software Technology**. Cambridge, MA: MIT Press, 1979, 837-842.

- Waltz, D. L. "A parallel model for low-level vision." In Hanson and Riseman (eds.), **Computer Vision Systems**. New York: Academic Press, 1978, 175-186.

- Waltz, D. L. "Automata theoretic approach to visual processing." In Yeh (ed.), **Applied Computation Theory.** Englewood Cliffs, NJ: Prentice-Hall, 1976, 468-529.

- Waltz, D. L. "Understanding scenes with shadows." In Winston (ed.), **The Psychology of Computer Vision**. New York: McGraw-Hill, 1975, 19-91.

Other writings

- Waltz, D. L. “Generating Semantic Descriptions from Drawings of Scenes with Shadows”, Ph.D. dissertation, MIT AI Lab, AI TR-271, Novermber 1972.

- Waltz, D.L. "Intelligent Database of Massively Parallel Supercomputers in the 1990's.", **Proceedings of Supercomputing Japan '91**, Tokyo, April 1991, 13-24.

- Waltz, D. L. "Is Indexing Used for Retrieval?." **Proceedings: DARPA Case-Based Reasoning Workshop**, Pensacola Beach, FL, May 1989, 41-44.

- Waltz, D. L. and C. Stanfill. "AI-Related Research on the Connection Machine." **Proceedings of the International Conference on Fifth Generation Computer Systems**, Tokyo, Dec. 1988.

- Waltz, D. L. , C. Stanfill, S, Smith, & R. Thau. "Very large database applications of the Connection Machine." **Proceedings of the National Computer Conference 1987,** 161-165.

Ph.D. Students Supervised

Timothy Finin, University of Maryland, Baltimore County

Bradley Goodman, Lead Scientist, Artificial Intelligence Center, Mitre Corp., Bedford, MA

Douglas Dankel II, University of Florida

Harry Tennant, Harry Tennant & Associates, Richardson, TX

Lois Boggess, Mississippi State University

Jordan Pollack, Brandeis University

Paul Rutter, Philips Research

George Hadden, Senior Research Fellow**,** Honeywell Laboratories

Stephen Cross, Director and CEO, Software Engineering Institute (SEI), Carnegie Mellon University

Roy Rada, University of Maryland, Baltimore County

Anthony Maddox, Program Director, NSF

Hon Wai (Andy) Chun, City University of Hong Kong

Xiru Zhang, PHZ Partners, Cambridge, MA

Ron Sun, RPI

Marc Goodman, Consultant

Pulavarthi Satyananarayana, current location unknown

Tze-Wah Wong, current location unknown

Research and Equipment Grants

Co-PI on three NSF grants, four Con Edison grants, and one NIH Center grant.
Grants as PI:

"Machine Learning Algorithms and Applications to the Electric Power Grid," NYSTAR/CAT grants, 7/1/05-6/30/06 ($100,000), 7/1/06-6/30/07 ($100,000) and 7/1/07-6/30/08 ($100,000).

"Grounded Concept Learning," (PI) DARPA, $450,000, 6/18/05-12-31-06.

"Columbia Learning System for the MECC," (R. Anderson & D. Waltz, PIs), Consolidated Edison, $499,998, 1/1/05-12/31/05.

"Columbia Learning System for the Cable Center," (R. Anderson & D. Waltz, PIs), Consolidated Edison, $319,993, 1/1/05-12/31/05.

"Wellness Program," (R. Anderson & D. Waltz, PIs), Consolidated Edison, $149,462, 5/1/05-8/31/05.

"Concept Learning," (PI) NSF SGER Grant, $100,000, 8/15/04-7/31/05.

"National Center for Complex Systems," (Co-PI), DoD Grant for building costs, Brandeis University, $2,000,000, 1993.

Tipster Extraction, DARPA, $368,000, (Co-PI with James Pustejovsky) 1/1/91-12/31/92.

"Adaptive Planning and Associative Memory." DARPA Contract, administered by U.S. Air Force Office of Scientific Research, 1988-91, $466,765, (with R. Alterman).

"Equipment for Computer Science Research." National Science Foundation Grant, 1987, $120,000, (Co-PI with J. Cohen, T. Hickey, and J. Miller).

"Equipment for Computer Science Research." National Science Foundation Grant 1985, $75,000, (Co-PI with J. Cohen).

"Equipment for Computer Science Research." National Science Foundation Grant 1984 $110,000, (Co-PI with J. Cohen).

"Understanding and Representing Natural Language Meaning." Office of Naval Research Contract, 8/1/77 - 6/30/84, $685,870.

"An Expert Distributed Robotics System with Comprehension and Learning Abilities in the Aircraft Flight Domain." Air Force Office of Scientific Research, 1/1/82 - 9/30/85, $587,207.

"Understanding Natural Language Scene and Event Descriptions: Cognitive Universals and Computer Programs Based on Combined AI and Linguistics Methodologies." National Science Foundation, 11/1/81 - 4/30/85, $267,407.

"Equipment for AI Research." (Co_PI with T. Huang), National Science Foundation, 9/1/82 - 2/28/84, $141,581.

DoD Instrumentation Grant, 7/1/83 - 6/30/84, $198,000

"TINLAP – Conference on Theoretical Issues in Natural Language Processing", National Science Foundation, 1978, $14,000.

Consulting

Honeywell Corp. Albuquerque, NM
RAE (Research Assessment Exercise), UK
Vulcan, Seattle, WA
NEC Laboratories America, Princeton, NJ
U. S. Army Construction Engineering Research Lab, Champaign, IL
Comtex Scientific Corp., New York, NY
Ohio Development Authority, Columbus, OH
Bolt, Beranek and Newman, Inc., Cambridge, MA

Machine Intelligence Corp., Sunnyvale, CA
Symantec, Sunnyvale, CA
Hughes Aircraft Company, Culver City, CA
(and others)

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