STUART C. SHAPIRO

Curriculum Vitae
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EDUCATION

PhD	1971	University of Wisconsin (Computer Sciences)
MS	1968	University of Wisconsin (Computer Sciences)
SB	1966	Massachusetts Institute of Technology (Mathematics)

EXPERIENCE

1998–present Department of Computer Science and Engineering, University at Buffalo, The State University of New York: Professor, 1998–2012; Professor Emeritus, 2012–present; Founding Chair, 1998–1999.

2004–2008 Director, Center for Cognitive Science, University at Buffalo, The State University of New York

1977–1998 Department of Computer Science, State University of New York at Buffalo:
Assistant Professor, 1977–78; Associate Professor, 1978–83; Professor, 1983–1998;
Acting Chair, 1978–79; Chair, 1984–90, 1996–1998.

1971–1978 Computer Science Department, Indiana University, Bloomington, IN: Visiting Assistant Professor, 1971–72; Assistant Professor, 1972–77; Associate Professor (with tenure, on leave), 1977–78.

1971 Computer Sciences Department, University of Wisconsin, Madison, WI: Lecturer.

Visiting, Consulting, and Research Positions

1968–1971 Linguistics Group, The Rand Corporation, Santa Monica, CA: Consultant.

Summer, 1974 Computer Science Department, University of Illinois at Urbana-Champaign: Visiting Research Assistant Professor.

1983–1985 Smart Systems Technology, McLean, VA: Principal Lecturer and Consultant.

1983–1987 Analysis and Simulation, Inc., Buffalo, NY (previously XMCO Inc.; previously Falcon Research & Development Co.): Consultant.

1987–1989 University of Southern California/Information Sciences Institute, Marina del Rey, CA: Consultant.

1987–1992 Calspan-UB Research Center (CUBRC), Buffalo, NY: Consultant.

1989–2012 National Center for Geographic Information and Analysis, Buffalo Site: Research Scientist.

January–September, 1993 New Jersey Institute of Technology, Newark, NJ: Consultant on an N.S.F. research grant, J. Geller, P.I.

August–December, 1997 Apple Aid, Inc., Amherst, NY: Consultant.

August–December, 1998 Multisource, Inc., Williamsville, NY: Consultant.

July, 2013 – April, 2014 Enhance Enterprises LLC, Mahomet, IL: Consultant.

Affiliated Positions

ca. 1983–present Affiliated Professor of Linguistics

ca. 2005–present Affiliated Professor of Philosophy

RESEARCH INTERESTS

Artificial Intelligence, Cognitive Science, Computational Linguistics, Knowledge Representation, Reasoning, Cognitive Robotics, Agent Architectures, Natural Language Understanding and Generation, Information Fusion.

PROFESSIONAL ASSOCIATIONS

Association for the Advancement of Artificial Intelligence (Fellow); Association for Computing Machinery (Distinguished Scientist) and its Special Interest Group on Artificial Intelligence (Chair, 1991–95); Association for Computational Linguistics and its Special Interest Group on Computational Semantics; Cognitive Science Society; IEEE (Life Senior Member) and its Computer Society.

HONORS

- External Fellow, Cognitive Science Program, U. of Rochester, Rochester, NY, 1982–83.
- Awards to *The Encyclopedia of Artificial Intelligence,* Stuart C. Shapiro, Editor-in-Chief, John Wiley & Sons, Publishers: named Best New Book in Technology and Engineering for 1987 by the Association of American Publishers Professional and Scholarly Publishing Division; named Outstanding Reference Source of 1989 by the American Library Association-Reference Book Bulletin.
- 1992 Best Paper Award given by the Calspan Chapter of Sigma Xi to J. G. Neal and S. C. Shapiro for "Intelligent Multi-Media Interface Technology," In J. W. Sullivan & S. W. Tyler, Eds. *Intelligent User Interfaces.*
- Elected a Senior Member of the IEEE, 1994.
- Elected a Fellow of the Association for the Advancement of Artificial Intelligence, 1994. "For contributions to theory and practice of knowledge representation and reasoning, and service to the AI community."
- ACM Recognition of Service Award "In Appreciation for Contributions to The Association for Computing" as SIGART Chair, 1991-1995.
- ACM Recognition of Service Award "In Appreciation for Contributions to The Association for Computing" on SIGBoard, 1995-1996.
- Space Act Award from the NASA Inventions and Contributions Board "for inventions and other scientific and technical contributions that have helped NASA to achieve its aeronautical and space goals" for *Foveal Machine Vision for Robots Using Agent Based Gaze Control*, July 30, 1999.
- Office of the UB Senior Vice Provost for Educational Technology Excellence Award "in recognition of outstanding contributions to the Access99 initiative," December 9, 1999.
- Japan Society for the Promotion of Science (JSPS) Invitation Fellowship for Research in Japan (Short-term), 2001.
- University at Buffalo Sustained Achievement Award "In recognition of your outstanding achievements in scholarly activity," May 2, 2002 (first time awarded).
- Named ACM Distinguished Scientist, October, 2006 (in inaugural class of 49 Distinguished Scientists, Engineers, and Members).

- Town of Amherst Town Board proclamation of honor and commendation for being named an ACM Distinguished Scientist, December 18, 2006.
- Named a Life Senior Member of the IEEE, January 1, 2012.
- Listed in *Marquis Who's Who in the World,* 23rd (2006) and later Edition, *Marquis Who's Who in America,* 45th (1988–89) and later Editions, *Marquis Who's Who in American Education,* 2006–2007 and later Editions, *Marquis Who's Who in the East,* 24th (1993–94) and later Editions, *Marquis Who's Who in Science and Engineering,* 7th (2003–2004) and later Editions, *Marquis Who's Who in the Media and Communications,* 1st (1998–99) Edition, *American Men & Women of Science,* 14th and later Editions, *Contemporary Authors,* Volume 127 (1989), *Directory of American Scholars,* 10th Edition, *Who's Who in Technology,* 5th and later Editions, and *Who's Who in Artificial Intelligence.*

HONORS TO SUPERVISED STUDENTS

William J. Rapaport, Northeastern Association of Graduate Schools Master's Scholar Award, 1987.
Debra T. Burhans, First Place, ACM International Graduate Research Competition, Austin, TX, March 9-10, 2000.
João Pavão Martins, Senior Member of the Association for the Advancement of Artificial Intelligence, 2011.
James Geller, Fellow of The American College of Medical Informatics, 2012

GRANTS AND CONTRACTS RECEIVED

Travel Grants

1971	NSF	International Travel Grant GJ-30282	$350
1975	IU	Learning Resources Special Travel Grant	$181

Education and Training Grants

1974	IU	Course Development Grant	$1,600
1974	IU	PLATO Development Grant	$1,200
1998–2003	NSF	*IGERT: Integrated Graduate Education and Research Training in Geographical Information Science* (One of 18 "faculty participants"; D. M. Mark, P.I.)	$2,215,436
2003–2011	NSF	*IGERT: Integrative Geographic Information Science Traineeship Project* (One of 15 "faculty participants"; D. M. Mark, P.I.; 4 Co-PIs)	$3,778,676

Equipment Grants

1976	NSF	Instructional Scientific Equipment Grant	$20,000
1982	NSF	Computer Science and Computer Engineering Research Equipment (Co-PI on departmental grant)	$34,480
1983	NSF	Computer Science and Computer Engineering Research Equipment (Co-PI on departmental grant)	$150,000
1985–86	NSF	Computer Science and Computer Engineering Research Equipment (PI on departmental grant)	$150,000
1986		Tektronix Equipment Donation	$40,450
1989		Texas Instruments Equipment Donation (with S. N. Srihari)	$50,878
1992–93		SUN Academic Equipment Grant *A Grounded Layered Architecture with Integrated Reasoning for Autonomous Intelligent Agents*	$55,105

Internal Research Grants

1978	SUNY	*Deductive Networks for the Representation of Knowledge*	$2,000
1983–84	UB RDF	*Space and Time: an Integrated Cognitive Science Approach* (with J. Duchan, E. Segal, D. Zubin)	$18,400
11/3/03–10/31/04	UB IRCAF	*Virtual Drama with Intelligent Agents* (J. Anstey, PI; S. C. Shapiro & D. Pape, Co-PIs)	$31,000
7/1/06–12/31/07	UB IRDF	*Intermedia Performance Studio* (S. Bay-Cheng, PI; J. Anstey, D. Pape, & S. C. Shapiro, Co-PIs)	$38,500
7/1/07–6/30/08	Robert and Carol Morris Fund for Artistic Expression and Performing Arts	*Virtual Woyzeck & Real Dreams* (S. T. Bay-Cheng, PI; J. R. Anstey, D. E. Pape, & S. C. Shapiro, Co-PIs)	$20,000
7/1/08–6/30/09	Robert and Carol Morris Fund for Artistic Expression and Performing Arts	*Woy/Ubu: A Collaborative Performance of Woyzeck and Ubu Roi in Virtual Reality* (S. T. Bay-Cheng, PI; J. R. Anstey, D. E. Pape, & S. C. Shapiro, Co-PIs)	$40,000
7/30/11–5/5/12	UB Gender Institute	*Improvisation, Intermedia Performance, Video Game* (J. Anstey, PI; S. T. Bay-Cheng, D. Pape, & S. C. Shapiro, Co-PIs)	$3,000

External Research Grants and Contracts

1978–81	NSF	*Studies in Deductive Networks for the Representation of Knowledge*	$45,000
1980–83	NSF	*Studies of Deductive Networks for the Representation of Knowledge*	$102,363
1984	RADC	*A Graphics Interface to a Rule-Based System* (with S. N. Srihari)	$52,363
1984	Council on Library Resources	*Computer Assisted Documents Reference* (with K. F. Smith)	$3,000
1984–85	RADC	*A Graphics Interface to a Rule-Based System* (with S. N. Srihari)	$21,858
1984–89	RADC & AFOSR	*Participation in a Consortium in Artificial Intelligence* (with S. N. Srihari)	$819,000
1987–89	N.S.F	*Cognitive and Computer Systems for Understanding Narrative Text* (with G. A. Bruder, J. F. Duchan, W. J. Rapaport, E. M. Segal, and D. A. Zubin)	$374,352
1987–89	RADC	*Discussing and Using Plans*	$171,914
1987–89	DARPA	*Intelligent Multi-Media Interfaces* (with J. G. Neal)	$553,328
1990	ESRI	*Interfacing an Intelligent, Multi-Media User Interface with ARC/INFO* (with D. M. Mark)	$3,600
1991–92	Unisys←DARPA	*Interface Standards for Knowledge Representation Systems*	$64,083
1–5/94	Amherst Systems←NASA	*Development of Foveal Gaze Control in GLAIR*	$12,000
6–12/94	Amherst Systems←NSF	*Development of Foveal Gaze Control in GLAIR*	$15,000
1994–97	Unisys←ARPA	*Intelligent Agent Integration*	$176,730
1/1/95–12/31/96	Amherst Systems←NASA	*Development of Foveal Gaze Control in GLAIR*	$150,000
1996–97	Apple Aid←ONR	*Genetically Programmed Dextrous Manipulator*	$21,000
6/1/98–2/29/00	Apple Aid←ONR	*Genetically Programmed Dextrous Manipulator* (Co-PI: D. Walters)	$120,000
2/99–6/01	CACI Technologies←US Army CECOM	*Truth Maintenance Technology in Data Fusion Systems for Enhanced Situation Assessment* (2–12/99 J. Llinas, PI & SCS Co-PI; 1/00–6/01 SCS PI & JL Co-Pi)	$135,135
4/12/01–8/31/01	CACI Technologies←US Army CECOM	*Truth Maintenance Technology in Data Fusion Systems for Enhanced Situation Assessment*	$14,696
8/3/01–3/31/03	Booz·Allen & Hamilton←US Army CECOM	*Truth Maintenance Technology in Data Fusion Systems for Enhanced Situation Assessment*	$75,000
5/11/05–12/31/05	CUBRC←MIT-Lincoln Labs←Federal Gvt.	*Information Fusion Technology Development in Support of a Sensor Fusion Prototype* (R. Nagi & M. Sudit, PIs; S. C. Shapiro & J. Llinas, Co-PIs)	$89,715
2006–2007	CUBRC←AFRL/IF	*Nat'l Center of Excellence for Multisource Information Fusion (NCMIF)* (M. Sudit, PI; J. Llinas, R. Nagi, & S. C. Shapiro, Co-PIs)	$195,936
8/23/06–3/31/07	SRA, Intl.←US Army CERDEC	*Information Extraction for Soft Target Exploitation and Fusion*	$16,281
12/27/06–12/27/07	US Army CERDEC	*Ontological Reasoning and Assessment* (J. Delvecchio, PI; M. Sudit, R. Nagi, J. Llinas, & S. C. Shapiro, Co-PIs)	$75,000
9/1/07–12/31/09	John R. Oishei Foundation	*UB Task Force for Ontology-Based IT Support for Large-Scale Field Studies in Psychiatry* (W. Ceusters, PI; S. C. Shapiro & B. Smith, Co-PIs)	$148,328
1–12/2008	CUBRC←AFRL/IF	*National Center of Excellencefor Multisource Information Fusion (NCMIF)* (R. Nagi, PI; A. Gosavi, & S. C. Shapiro, Co-PIs)	$104,915
1–12/2008	CUBRC←ONR	*Silver Bullet Context* (J. Llinas, PI; T. Singh, J. Crassidis, & S. C. Shapiro, Co-PIs)	$179,000
2009–2014	ARO	*Unified Research on Network-Based Hard/Soft Information Fusion* (J. Llinas, PI; A. M. Bisantz, R. Nagi, S. C. Shapiro & M. Sudit, Co-PIs)	$6,261,663

PUBLICATIONS

A. AUTHORED BOOKS

(1) S. C. Shapiro. *Techniques of Artificial Intelligence.* D. Van Nostrand, New York, 1979. Japanese edition translated by T. Matsuda, Kyoritsu Pub. Co., Tokyo, 1985.

(2) S. C. Shapiro. *LISP: An Interactive Approach.* Computer Science Press, Rockville, MD, 1986. Japanese edition translated by I. Tahara, Keigaku Publishing Co., Tokyo, 1988.

(3) S. C. Shapiro, *COMMON LISP: An Interactive Approach.* W. H. Freeman, New York, 1992.

B. EDITED BOOKS

(1) G. Epstein, J. M. Dunn, N. Cocchiarella, & S. C. Shapiro, Eds., *Proceedings of the 1975 International Symposium on Multiple-Valued Logic,* IEEE Computer Society, Long Beach CA, 1975.

(2) S. C. Shapiro, Editor-in-Chief. *Encyclopedia of Artificial Intelligence.* John Wiley & Sons, Inc., New York, 1987. Named Best New Book in Technology and Engineering for 1987 by the Association of American Publishers Professional and Scholarly Publishing Division. Named Outstanding Reference Source of 1989 by the American Library Association-Reference Book Bulletin. Boxed, Paperback Edition, 1990. Japanese edition, Maruzen Co., Ltd., 1991. Second Edition, 1992.

(3) Luigia C. Aiello, Jon Doyle, & Stuart C. Shapiro, Eds., *Principles of Knowledge Representation and Reasoning: Proceedings of the Fifth International Conference (KR '96),* Morgan Kaufmann, San Francisco, 1996.

(4) Anthony G. Cohn, Lenhart Schubert, & Stuart C. Shapiro, Eds., *Principles of Knowledge Representation and Reasoning: Proceedings of the Sixth International Conference (KR '98),* Morgan Kaufmann, San Francisco, 1998.

(5) Łucja M. Iwańska & Stuart C. Shapiro, Eds., *Natural Language Processing and Knowledge Representation: Language for Knowledge and Knowledge for Language,* AAAI Press/The MIT Press, Menlo Park, CA, 2000.

C. EDITED JOURNAL ISSUES

(1) S. C. Shapiro, Guest Editor, Special Issue on Knowledge Representation for Natural Language Processing, *Minds and Machines 3,* 4 (November, 1993).

(2) S. S. Ali, Ł. Iwańska, and S. C. Shapiro, Guest Editors, Special Issue on Knowledge Representation and Inference for Natural Language Processing, *International Journal of Expert Systems 9,* 1 (1996).

D. JOURNAL ARTICLES

(1) S. C. Shapiro, The list set generator: a construct for evaluating set expressions. *Communications of the ACM 13,* 12 (1970), 741–744.

(2) S. C. Shapiro and S. C. Kwasny, Interactive consulting via natural language. *Communications of the ACM 18,* 8 (1975), 459–462.

(3) S. C. Shapiro, Generation as parsing from a network into a linear string. *American Journal of Computational Linguistics,* Microfiche 33 (1975), 45–62.

(4) D. S. Wise, D. P. Friedman, S. C. Shapiro, and M. Wand, Boolean-valued loops. *BIT 15,* (1975), 431–451.

(5) B. Shneiderman and S. C. Shapiro, Towards a theory of encoded data structures and data translation. *International Journal of Computer and Information Sciences 5,* 1 (March 1976), 33–43.

(6) S. C. Shapiro, Path-based and node-based inference in semantic networks. *American Journal of Computational Linguistics,* Microfiche 80 (1978), 38–44. Also in D. Waltz, Ed., *TINLAP-2: Theoretical Issues in Natural Language Processing - 2,* ACM, New York, 1978, 219–225.

(7) S. C. Shapiro, Generalized augmented transition network grammars for generation from semantic networks. *American Journal of Computational Linguistics 8,* 1 (January–March 1982), 12–25.

(8) A. S. Maida and S. C. Shapiro, Intensional concepts in propositional semantic networks. *Cognitive Science 6,* 4 (October–December 1982), 291–330. Reprinted in R. J. Brachman & H. J. Levesque, Eds. *Readings in Knowledge Representation.* Morgan Kaufmann, Los Altos, CA, 1985, 170–189.

(9) Stuart. C. Shapiro, Sargur N. Srihari, James Geller, and Ming-Ruey Taie, A fault diagnosis system based on an integrated knowledge base, in D. Sriram and M. D. Rychener, Eds., Knowledge-Based Engineering Systems Research in Progress, *IEEE Software 3,* 2 (1986), 48–49.

(10) Z. Xiang, J. G. Chutkow, S. C. Shapiro, and S. N. Srihari, Computerized neurological diagnosis: a paradigm of modeling and reasoning. *Health Care Instrumentation 1*, 3 (1986), 90–105.

(11) S. C. Shapiro, Symmetric relations, intensional individuals, and variable binding, *Proceedings of the IEEE 74,* 10 (October 1986), 1354–1363.

(12) J. P. Martins and S. C. Shapiro, A model for belief revision. *Artificial Intelligence 35,* 1 (May 1988), 25–79.

(13) S. C. Shapiro and W. J. Rapaport, The SNePS family. *Computers & Mathematics with Applications 23,* 2–5 (January–March, 1992), 243–275. Reprinted in F. Lehmann, Ed. *Semantic Networks in Artificial Intelligence.* Pergamon Press, Oxford, 1992, 243–275.

(14) D. Kumar and S. C. Shapiro, Deductive efficiency, belief revision and acting. *Journal of Experimental and Theoretical Artificial Intelligence 5,* 2&3 (April–September 1993), 167–177.

(15) S. C. Shapiro, Belief spaces as sets of propositions. *Journal of Experimental and Theoretical Artificial Intelligence 5,* 2&3 (April–September 1993), 225–235.

(16) S. C. Shapiro, Preface to Special Issue on Knowledge representation for natural language processing, *Minds and Machines 3,* 4 (November, 1993) 377–380.

(17) S. S. Ali and S. C. Shapiro, Natural language processing using a propositional semantic network with structured variables. *Minds and Machines 3,* 4 (November, 1993), 421–451.

(18) Deepak Kumar and Stuart C. Shapiro, The OK BDI Architecture. *International Journal on Artificial Intelligence Tools 3,* 3 (March, 1994), 349–366.

(19) Stuart C. Shapiro, Computationalism. *Minds and Machines 5,* 4 (November, 1995), 517–524.

(20) Syed S. Ali, Łucja Iwańska, and Stuart C. Shapiro, Knowledge representation and inference for natural language processing (Preface). *International Journal of Expert Systems 9,* 1 (1996) 1–14.

(21) Stuart C. Shapiro, Formalizing English. *International Journal of Expert Systems 9,* 1 (1996) 151–171.

(22) William J. Rapaport, Stuart C. Shapiro, & Janyce M. Wiebe, Quasi-Indexicals and Knowledge Reports. *Cognitive Science 21,* 1 (January–March, 1997), 63–107. Reprinted in Francesco Orilia and William J. Rapaport, Eds. *Thought, Language, and Ontology: Essays in Memory of Hector-Neri Castañeda*, Kluwer Academic Publishers, Dordrecht, 1998, 235–294.

(23) Stuart C. Shapiro, A Procedural Solution to the Unexpected Hanging and Sorites Paradoxes. *Mind 107,* 428 (October, 1998), 751–761.

(24) Stuart C. Shapiro and Haythem O. Ismail, Anchoring in a Grounded Layered Architecture with Integrated Reasoning, *Robotics and Autonomous Systems 43,* 2–3 (May 2003), 97–108.

(25) Stuart C. Shapiro, Natural Language Competent Robots, *IEEE Intelligent Systems 21,* 4 (July/August 2006), 76–77.

(26) Debra T. Burhans and Stuart C. Shapiro, Defining Answer Classes Using Resolution Refutation, *Journal of Applied Logic 5,* 1 (March 2007), 70–91. `http://dx.doi.org/10.1016/j.jal.2005.12.004`

(27) Stuart C. Shapiro, William J. Rapaport, Michael Kandefer, Frances L. Johnson, and Albert Goldfain, Metacognition in SNePS, *AI Magazine 28,* 1 (Spring 2007), 17–31.

(28) Josephine Anstey, Sarah Bay-Cheng, Dave Pape, and Stuart C. Shapiro, Human trials: an experiment in intermedia performance, *ACM Computers in Entertainment 5,* 3, Article 4 (November 2007), 17 pages. DOI = 10.1145/1316511.1316515 `http://doi.acm.org/10.1145/1316511.1316515`

(29) Josephine Anstey, A. Patrice Seyed, Sarah Bay-Cheng, Dave Pape, Stuart C. Shapiro, Jonathan Bona, and Stephen Hibit, The Agent Takes The Stage, *International Journal of Arts and Technology (IJART) 2,* 4 (2009), 277–296. DOI: 10.1504/IJART.2009.029236.

(30) Stuart C. Shapiro and Jonathan P. Bona, The GLAIR Cognitive Architecture, *International Journal of Machine Consciousness 2,* 2 (2010), 307–332. DOI: 10.1142/S1793843010000515

(31) Sam S. Adams, Itamar Arel, Joscha Bach, Robert Coop, Rod Furlan, Ben Goertzel, J. Storrs Hall, Alexei Samsonovich, Matthias Scheutz, Matthew Schlesinger, Stuart C. Shapiro, and John F. Sowa, Mapping the Landscape of Human-Level Artificial General Intelligence, *AI Magazine, 33*, 1 (Spring 2012), 25–41.

E. CHAPTERS IN BOOKS

(1) S. C. Shapiro, The SNePS semantic network processing system. In N. V. Findler, Ed. *Associative Networks: The Representation and Use of Knowledge by Computers,* Academic Press, New York, 1979, 179–203.

(2) S. C. Shapiro, Artificial intelligence. In AFIPS Taxonomy Committee, *Taxonomy of Computer Science & Engineering,* AFIPS Press, Arlington, VA, 1980, 57–60, 261–267.

(3) S. C. Shapiro, Natural language processing. In A. Ralston, Ed. *Encyclopedia of Computer Science 2nd Edition,* Van Nostrand Reinhold, New York, 1983, 1011–1016.

(4) S. C. Shapiro, SCRABBLE crossword game playing programs. In M. A. Bramer, Ed. *Computer Game-Playing: Theory and Practice,* Ellis Horwood, Ltd., Chichester, England, 1983, 221–228.

(5) A. S. Maida and S. C. Shapiro, Intensional concepts in propositional semantic networks. In R. J. Brachman & H. J. Levesque, Eds. *Readings in Knowledge Representation.* Morgan Kaufmann, Los Altos, CA, 1985, 170–189. Reprinted from *Cognitive Science 6,* 4 (October–December 1982), 291–330.

(6) J. G. Neal and S. C. Shapiro, Knowledge Representation for Reasoning about Language. In J. C. Boudreaux, B. W. Hamill, & R. Jernigan, Eds. *The Role of Language in Problem Solving 2.* Elsevier Science Publishers, 1987, 27–46.

(7) S. C. Shapiro, Processing, bottom-up and top-down. In S. C. Shapiro, Ed. *Encyclopedia of Artificial Intelligence.* John Wiley & Sons, Inc., New York, 1987, 779–785. Also in S. C. Shapiro, Ed. *Encyclopedia of Artificial Intelligence, Second Edition.* John Wiley & Sons, Inc., New York, 1992, 1229–1234.

(8) S. C. Shapiro and W. J. Rapaport, SNePS considered as a fully intensional propositional semantic network. In N. Cercone & G. McCalla, Eds. *The Knowledge Frontier: Essays in the Representation of Knowledge.* Springer-Verlag, New York, 1987, 262–315.

(9) J. Geller, M. R. Taie, S. C. Shapiro, and S. N. Srihari, Device representation and graphics interfaces of VMES. In D. Sriram & R. A. Adey, Eds. *Knowledge Based Expert Systems for Engineering: Classification, Education and Control.* Computational Mechanics Publications, Southampton, UK, 1987, 15–28.

(10) J. G. Neal and S. C. Shapiro, Knowledge-based parsing. In L. Bolc, Ed. *Natural Language Parsing Systems.* Springer-Verlag, Berlin, 1987, 49–92.

(11) S. C. Shapiro and J. Geller, Artificial intelligence and automated design. In Y. E. Kalay, Ed. *Computability of Design.* John Wiley & Sons, New York, 1987, 173–187.

(12) Stuart C. Shapiro and Howard R. Smith, A SCRABBLE crossword game-playing program. In D. N. L. Levy, Ed. *Computer Games I.* Springer-Verlag, New York, 1988, 403–419. Reprint of Technical Report 119, Department of Computer Science, SUNY at Buffalo, February, 1977.

(13) S. C. Shapiro, The CASSIE projects: an approach to natural language competence. In J. P. Martins & E. M. Morgado, Eds. *EPIA 89: 4th Portuguese Conference on Artificial Intelligence Proceedings. Lecture Notes in Artificial Intelligence 390.* Springer-Verlag, Berlin, 1989, 362–380.

(14) S. C. Shapiro and J. P. Martins, Recent Advances and Developments: The SNePS 2.1 Report. In D. Kumar, Ed. *Current Trends in SNePS—Semantic Network Processing System. Lecture Notes in Artificial Intelligence 437.* Springer-Verlag, Berlin, 1990, 1–13.

(15) J. G. Neal and S. C. Shapiro, Intelligent Multi-Media Interface Technology. In J. W. Sullivan & S. W. Tyler, Eds. *Intelligent User Interfaces.* Addison-Wesley, Reading, MA, 1991, 11-43.

(16) S. C. Shapiro, Cables, paths and "subconscious" reasoning in propositional semantic networks. In J. Sowa, Ed. *Principles of Semantic Networks: Explorations in the Representation of Knowledge.* Morgan Kaufmann, San Mateo, CA, 1991, 137–156.

(17) S. C. Shapiro and W. J. Rapaport, Models and minds: knowledge representation for natural-language competence. In R. Cummins & J. Pollock, Eds. *Philosophy and AI: Essays at the Interface.* MIT Press, Cambridge, MA, 1991, 215–259.

(18) S. C. Shapiro, Artificial intelligence. In S. C. Shapiro, Ed. *Encyclopedia of Artificial Intelligence, Second Edition.* John Wiley & Sons, Inc., New York, 1992, 54–57.

(19) S. C. Shapiro and W. J. Rapaport, SNePS considered as a fully intensional propositional semantic network. In L. Burkholder, Ed. *Philosophy and the Computer.* Westview Press, Boulder, CO, 1992, 75–91. (Reprinted from *Proc. Fifth National Conference on Artificial Intelligence,* Morgan Kaufmann, Los Altos, CA, 1986, 278–283.)

(20) S. C. Shapiro, Relevance logic in computer science. In A. R. Anderson, N. D. Belnap, Jr., M. Dunn, *et al. Entailment Volume II.* Princeton University Press, Princeton, NJ, 1992, 553–563.

(21) S. C. Shapiro and W. J. Rapaport, The SNePS Family. In F. Lehmann, Ed. *Semantic Networks in Artificial Intelligence.* Pergamon Press, Oxford, 1992, 243–275. Reprinted from *Computers & Mathematics with Applications 23,* 2–5 (January–March, 1992), 243–275.

(22) S. C. Shapiro, Artificial Intelligence. In A. Ralston and E. D. Reilly, Eds. *Encyclopedia of Computer Science, Third Edition,* Van Nostrand Reinhold, New York, 1993, 87–90. Revised version of E18.

(23) H. Hexmoor, J. Lammens, G. Caicedo, and S. Shapiro, Behaviour Based AI, Cognitive Processes, and Emergent Behaviors in Autonomous Agents. In G. Rzevski, J. Pastor, & R. Adey, Eds. *Applications of AI in Engineering VIII, Vol. 2, Applications and Techniques,* Computational Mechanics/Elsevier, 1993, pp. 447–461.

(24) J. G. Neal and S. C. Shapiro, Knowledge-Based Multimedia Systems. In J. F. Koegel Buford, Ed. *Multimedia Systems,* ACM Press, Addison-Wesley, Reading, MA, 1994, 403–438.

(25) D. Kumar and S. C. Shapiro, The OK BDI Architecture. In E. A. Yfantis, Ed. *Intelligent Systems: Third Golden West International Conference: Edited and Selected Papers,* Kluwer Academic Publishers, Dordrecht, 1995, 307–317.

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(22) John F. Santore and Stuart C. Shapiro, Crystal Cassie: Use of a 3-D Gaming Environment for a Cognitive Agent. In R. Sun, Ed., *Papers of the IJCAI 2003 Workshop on Cognitive Modeling of Agents and Multi-Agent Interactions*, IJCAII, Acapulco, Mexico, August 9, 2003, 84–91.

(23) John F. Santore and Stuart C. Shapiro, Identifying Perceptually Indistinguishable Objects. In Silvia Coradeschi & Alessandro Saffiotti, Eds., *Anchoring Symbols to Sensor Data, Papers from the AAAI Workshop,* Technical Report WS-04-03, AAAI Press, Menlo Park, CA, 2004, 1–9.

(24) John F. Santore and Stuart C. Shapiro, A Cognitive Robotics Approach to Identifying Perceptually Indistinguishable Objects. In Alan Schultz, Ed., *The Intersection of Cognitive Science and Robotics: From Interfaces to Intelligence, Papers from the 2004 AAAI Fall Symposium,* Technical Report FS-04-05, AAAI Press, Menlo Park, CA, 2004, 47–54.

(25) Frances L. Johnson and Stuart C. Shapiro, Improving Recovery for Belief Bases. In Leora Morgenstern and Maurice Pagnucco, Eds., *IJCAI-05 Workshop on Nonmonotonic Reasoning, Action, and Change (NRAC'05): Working Notes,* IJCAII, Edinburgh, 2005, 65–70.

(26) Stuart C. Shapiro and Michael Kandefer, A SNePS Approach to The Wumpus World Agent or Cassie Meets the Wumpus. In Leora Morgenstern and Maurice Pagnucco, Eds., *IJCAI-05 Workshop on Nonmonotonic Reasoning, Action, and Change (NRAC'05): Working Notes,* IJCAII, Edinburgh, 2005, 96–103.

(27) Albert Goldfain, Michael W. Kandefer, Stuart C. Shapiro, and Josephine Anstey, Co-Designing Agents. In Michael Beetz, Kanna Rajan, Michael Thielscher, and Radu Bogday Rusu, Eds., *Cognitive Robotics: Papers from the AAAI Workshop (CogRob2006)* Technical Report WS-06-03, AAAI Press, Menlo Park, CA, 2006, 77–82. (Revised version of I51.)

(28) Michael Kandefer and Stuart C. Shapiro, Knowledge Acquisition by an Intelligent Acting Agent. In Eyal Amir, Vladimir Lifschitz, and Rob Miller, Eds., *Logical Formalizations of Commonsense Reasoning: Papers from the AAAI Spring Symposium* Technical Report SS-07-05, AAAI Press, Menlo Park, CA, 2007, 77–82.

(29) Michael Kandefer and Stuart C. Shapiro, A Categorization of Contextual Constraints. In Alexei Samsonovich, Ed., *Biologically Inspired Cognitive Architectures: Papers from the AAAI Fall Symposium,* Technical Report FS-08-04, AAAI Press, Menlo Park, CA, 2008, 88–93.

(30) Michael Kandefer and Stuart C. Shapiro, An F-Measure for Context-Based Information Retrieval. In Gerhard Lakemeyer, Leora Morgenstern, and Mary-Anne Williams, Eds., *Commonsense 2009: Proceedings of the Ninth International Symposium on Logical Formalizations of Commonsense Reasoning*, The Fields Institute, Toronto, CA, 2009, 79–84.

(31) Stuart C. Shapiro and Jonathan P. Bona, The GLAIR Cognitive Architecture. In Alexei Samsonovich, Ed., *Biologically Inspired Cognitive Architectures-II: Papers from the AAAI Fall Symposium,* Technical Report FS-09-01, AAAI Press, Menlo Park, CA, 2009, 141–152.

(32) Stuart C. Shapiro, The Jobs Puzzle: A Challenge for Logical Expressibility and Automated Reasoning. In Ernest Davis, Patrick Doherty, and Esra Erdem, Eds., *Logical Formalizations of Commonsense Reasoning: Papers from the AAAI Spring Symposium,* Technical Report SS-11-06, AAAI Press, Menlo Park, CA, 2011, 96–102.

(33) Daniel R. Schlegel and Stuart C. Shapiro, Visually Interacting with a Knowledge Base Using Frames, Logic, and Propositional Graphs. In M. Croitoru, J. Howse, S. Rudolph, and N. Wilson, Eds., *Second International IJCAI Workshop on Graph Structures for Knowledge Representation and Reasoning (GKR 2011),* Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier, Montpellier, France, 2011, 56–62.

(34) Ari I. Fogel and Stuart C. Shapiro, On the Use of Epistemic Ordering Functions as Decision Criteria for Automated and Assisted Belief Revision in SNePS: (Preliminary Report). In Sebastian Sardina and Stavros Vassos, Eds., *Proceedings of the Ninth International Workshop on Non-Monotonic Reasoning, Action, and Change (NRAC'11),* Technical Report RMIT-TR-11-02, School of Computer Science and Information Technology, RMIT University, Melbourne, Australia, July, 2011, 31–38.

(35) Jonathan P. Bona and Stuart C. Shapiro. Modality in the MGLAIR Architecture. In Antonio Chella, Roberto Pirrone, Rosario Sorbello and Kamilla Rún Jóhannsdóttir, Eds., *Biologically Inspired Cognitive Architectures 2012: Proceedings of the Third Annual Meeting of the BICA Society,* Springer, Berlin, 2013, 75–81.

(36) Jonathan P. Bona and Stuart C. Shapiro, Specifying Modalities in the MGLAIR Architecture. In Ahmed M. H. Abdel-Fattah and Kai-Uwe Kühnberger, Eds., *Proceedings of the Workshop on Formalizing Mechanisms for Artificial General Intelligence and Cognition (Formal MAGIC)*, PICS: Publication Series of the Institute of Cognitive Science (ISSN 1610-5389), Institute of Cognitive Science, University of Osnabrück, Germany, 2013, 7 pages, unpaginated.

(37) Daniel R. Schlegel and Stuart C. Shapiro, Concurrent Reasoning with Inference Graphs. In *Working Notes of the 3rd International Workshop on Graph Structures for Knowledge Representation and Reasoning (GKR@IJCAI 2013)*, 2013, unpaginated, 9 pages.

(38) Daniel R. Schlegel and Stuart C. Shapiro, Inference Graphs: A New Kind of Hybrid Reasoning System. In *Proceedings of the Cognitive Computing for Augmented Human Intelligence Workshop at AAAI-14 (CGAHI@AAAI-14)*, 2014, 38-41.

H. PUBLISHED ARTICLES IN OTHER CONFERENCES

(1) S. C. Shapiro and S. F. Ziegler, Non-standard logics and question answering: preliminary observations. *Proc. First Biennial Conference on Computing in Indiana,* IU ACM Student Chapter, April, 1974, 44–48.

(2) D. P. Witmer and S. C. Shapiro, An interactive visual FORTRAN interpreter. *Proc. First Biennial Conference on Computing in Indiana,* IU ACM Student Chapter, April, 1974, 19–24.

(3) S. C. Shapiro and The SNePS Research Group, Position Paper. In J. G. Schmolze and R. J. Brachman, Eds., *Proceedings of the 1981 KL-ONE Workshop,* Report No. 4842, Bolt Beranek and Newman, Inc., Cambridge, MA, June, 1982, 179–181.

(4) Stuart C. Shapiro and James Geller, Artificial intelligence and automated design, in Anton C. Harfmann, Yehuda E. Kalay, Bruce R. Majkowski, and Lucien M. Swerdloff, Eds., *The Computability of Design,* SUNY at Buffalo, 1986, 13 pages, unpaginated.

(5) D. Kumar, S. S. Ali, J. Haas, and S. C. Shapiro, The SNePS Acting System. *Proceedings of the Fifth Annual University at Buffalo Graduate Conference,* Department of Computer Science, SUNY at Buffalo, Buffalo, NY, 1990, 91-100.

(6) H. Hexmoor, G. Caicedo, F. Bidwell, and S. C. Shapiro, "Air Battle Simulation: An Agent with 'conscious' and 'unconscious' Layers," *Proceedings of the Eighth Annual University at Buffalo Graduate Conference on Computer Science,* Technical Report 93-14, Department of Computer Science, SUNY at Buffalo, March, 1993, 52–59

(7) Albert Goldfain, Michael W. Kandefer, Stuart C. Shapiro, and Josephine Anstey, Co-Designing Agents, *Proceedings of the North East Student Colloquium on Artificial Intelligence (NESCAI '06)*, Cornell U., Ithaca, NY, 2006, 142–148.

(8) Ari I. Fogel and Stuart C. Shapiro, On the Use of Epistemic Ordering Functions as Decision Criteria for Automated and Assisted Belief Revision in SNePS, *Proceedings of the CSE Graduate Research Conference*, Department of Computer Science and Engineering, University at Buffalo, Buffalo, NY, 2011, unpaginated. 8 pages.

(9) Daniel R. Schlegel and Stuart C. Shapiro, Visually Interacting with a Knowledge Base Using Frames, Logic, and Propositional Graphs, *Proceedings of the CSE Graduate Research Conference*, Department of Computer Science and Engineering, University at Buffalo, Buffalo, NY, 2011, unpaginated. 6 pages.

I. ARTICLES IN ACM SIG PUBLICATIONS

(1) D. P. Friedman and S. C. Shapiro, A case for while-until. *SIGPLAN Notices 9,* 7 (July 1974), 7–14.

(2) S. C. Shapiro, SCRABBLE crossword game playing programs. *SIGART Newsletter,* No. 80 (April 1982), Special Issue on Game Playing Programs, 109–110.

(3) S. C. Shapiro, S. N. Srihari, M.-R. Taie, and J. Geller, Development of an intelligent maintenance assistant. In Special Section on AI in Engineering, *SIGART Newsletter,* No. 92 (April 1985), 48–49.

(4) S. C. Shapiro, Case studies of SNePS, Special Issue on Implemented Knowledge Representation and Reasoning Systems, *SIGART Bulletin 2,* 3 (June 1991), 128–134.

(5) D. Kumar and S. C. Shapiro, Architecture of an Intelligent Agent in SNePS, *SIGART Bulletin 2,* 4 (August 1991), 89–92.

(6) Stuart C. Shapiro, The Turing Test and the economist, *ACM SIGART Bulletin 3,* 4 (October 1992), 10–11.

J. ABSTRACTS, POSTERS AND DEMONSTRATION DESCRIPTIONS AT MAJOR CONFERENCES

(1) S. C. Shapiro, Compiling deduction rules from a semantic network into a set of processes. *Workshop on Automatic Deduction: Collected Abstracts,* MIT, Cambridge, MA., Aug. 17–19, 1977.

(2) J. Geller and S. C. Shapiro, Abstract on Intelligent Interfaces in B. Neches and T. Kaczmarek, Eds., *AAAI-86 Workshop on Intelligence in Interfaces: Participant List and Abstracts,* AAAI, 1986, 31–36.

(3) Frances L. Johnson and Stuart C. Shapiro, Knowledge State Reconsideration: Hindsight Belief Revision (student abstract), *Proceedings of the Nineteenth National Conference on Artificial Intelligence (AAAI-04),* AAAI Press/The MIT Press, Menlo Park, CA, 2004, 956–957.

(4) John F. Santore and Stuart C. Shapiro, Identifying an Object that is Perceptually Indistinguishable from one Previously Perceived (student abstract), *Proceedings of the Nineteenth National Conference on Artificial Intelligence (AAAI-04),* AAAI Press/The MIT Press, Menlo Park, CA, 2004, 968–969.

(5) Frances L. Johnson and Stuart C. Shapiro, Dependency-Directed Reconsideration (member abstract). In Kenneth Forbus, Dedre Gentner, & Terry Reigier, Eds., *Proceedings of the Twenty-Sixth Annual Conference of the Cognitive Science Society (CogSci2004)*, Lawrence Erlbaum Assoc., Mahwah, NJ, 2005, p. 1573.

(6) Stuart C. Shapiro, Josephine Anstey, David E. Pape, Trupti Devdas Nayak, Michael Kandefer, and Orkan Telhan, The Trial The Trail, Act 3: A Virtual Reality Drama Using Intelligent Agents (demonstration description). In R. Michael Young & John Laird, Eds., *Proceedings of the First Annual Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE-05)*, AAAI Press, Menlo Park, CA, 2005, 157–158.

(7) Stuart C. Shapiro, Josephine Anstey, David E. Pape, Trupti Devdas Nayak, Michael Kandefer, and Orkan Telhan, MGLAIR Agents in Virtual and other Graphical Environments (demonstration description), *Proceedings of the Twentieth National Conference on Artificial Intelligence (AAAI-05)*, AAAI Press, Menlo Park, CA, 2005, 1704–1705.

(8) Josephine Anstey, Sarah Bay-Cheng, Stuart C. Shapiro, and Dave Pape, Human Trials Intermedia Performance, SIGGRAPH 2006 Research Posters, Boston, MA, July 30 – August 3, 2006.

(9) A. Patrice Seyed, Stuart C. Shapiro, and Barry Smith, Integrating BFO with OntoClean: Towards a Method for Evaluating and Correcting Ontologies, Sixth International Conference on Formal Ontology in Information Systems (FOIS 2010), Toronto, CA, May 11–14, 2010.

(10) Daniel R. Schlegel and Stuart C. Shapiro, Concurrent Reasoning with Inference Graphs (student abstract), *Proceedings of the Twenty-Seventh AAAI Conference on Artificial Intelligence (AAAI-13),* AAAI Press/The MIT Press, Menlo Park, CA, 2013, 1637-1638.

(11) Daniel R. Schlegel and Stuart C. Shapiro, Inference Graphs: A New Kind of Hybrid Reasoning System (student abstract). In *Proceedings of the Twenty-Eighth Conference on Artificial Intelligence (AAAI-14)*, AAAI Press/The MIT Press, Menlo Park, CA, 2014, 3134-3135.

K. INVITED PAPERS PRESENTED AT CONFERENCES, WORKSHOPS, AND SYMPOSIA

(1) S. C. Shapiro, "Using Non-Standard Connectives and Quantifiers for Representing Deduction Rules in a Semantic Network." Invited paper presented at Current Aspects of AI Research, a seminar held at the Electrotechnical Laboratory, Tokyo, August 27–28, 1979.

(2) S. C. Shapiro, "What do Semantic Network Nodes Represent?" Invited paper presented at the workshop on Foundational Threads in Natural Language Processing, Computer Science Department, SUNY at Stony Brook, July 27–29, 1981.

(3) S. C. Shapiro, D. P. McKay, J. Martins, and E. Morgado, "A 'Higher Order' Logic Programming Language." Invited paper presented at the Workshop on Logic Programming for Intelligent Systems, Long Beach, CA, August 18–21, 1981.

(4) S. C. Shapiro, "The CASSIE Projects: An Approach to Natural Language Competence." Invited paper presented at the 4th Portuguese Conference on Artificial Intelligence, Lisbon, Portugal, September 26–29, 1989.

(5) S. C. Shapiro, "Formalizing English," invited paper presented at the AAAI Fall Symposium on Knowledge Representation for Natural Language Processing in Implemented Systems, November 4–6, 1994.

L. INVITED TALKS AT CONFERENCES, WORKSHOPS, AND SYMPOSIA

(1) S. C. Shapiro, "Semantic Networks." Invited talk presented at the Second Biennial Conference on Computing in Indiana, Bloomington, IN March, 1976.

(2) S. C. Shapiro, "Deduction Rules in a Semantic Network." Invited talk presented at the National Computer Conference, New York, NY, June, 1976.

(3) S. C. Shapiro, "Control in SNIP, the SNePS Inference Package." Invited talk presented at the Logic Programming Workshop, Syracuse University, Syracuse, NY, April 7–10, 1981.

(4) S. C. Shapiro, "Semantic Networks and Logic." Invited talk presented at the Logic Programming Workshop, Syracuse University, Syracuse, NY, April 7–10, 1981.

(5) S. C. Shapiro, "KL-ONE in SNePS." Invited talk presented at the KL-ONE Workshop 1981, Jackson, NH, October 16–20, 1981.

(6) S. C. Shapiro, "Computer Models of Meaning." Invited talk presented at the Niagara Linguistics Society Workshop on Computers and Natural Language, Amherst, NY, November 5, 1983.

(7) S. C. Shapiro "Overview of Computationalism," invited talk presented at *Where Does I Come From: Subjectivity and the Debate over Computational Cognitive Science,* Center for Cognitive Science, SUNY at Buffalo, Buffalo, NY, May 21-22, 1990.

(8) S. C. Shapiro "Knowledge Representation for Natural Language Processing," invited talk presented at the AAAI Spring Symposium on Implemented Knowledge Representation and Reasoning Systems, Stanford U., March 26–28, 1991.

(9) S. C. Shapiro "Automated Catalogs: Possible Futures from an AI Perspective," invited talk presented at *Users for our Systems? Systems for our Users?,* a Conversations in the Disciplines program, SUNY at Buffalo, April 15, 1991.

(10) Stuart C. Shapiro, "The Intelligent Agent Approach to Computer-Human Interaction," invited lecture presented at the 6th Autumn School, Campus Thomson - Institut de la R&D, September 10, 1992.

(11) S. C. Shapiro and H. Hexmoor, "Examining the Expert Reveals Expertise," invited talk presented at the Florida AI Research Symposium (FLAIRS-94), Pensacola Beach, FL, May 5–7, 1994.

(12) S. C. Shapiro, "Formalizing English," invited plenary talk presented at the Third Golden West International Conference on Intelligent Systems (GWIC), Las Vegas, NV, June 6–8, 1994.

(13) S. C. Shapiro, H. Chalupsky, and A. Campbell, "Ontologic Mediators," invited talk presented at the ARPA I3 Principal Investigator's Workshop, Atlanta, GA, June 15–17, 1994.

(14) S. C. Shapiro, "SNePS as a Database Management System," invited talk presented at the Third International SNePS Workshop, Buffalo, NY, July 29, 1994.

(15) S. C. Shapiro, "Steps Toward a Computational Rational Agent," invited plenary talk presented at the Eighth Florida Artificial Intelligence Research Symposium (FLAIRS-95), Melbourne, FL, April 27–29, 1995.

(16) S. C. Shapiro, "Use of Deixis by a Computational Cognitive Agent," invited talk presented at Time, Space and Identity: The Second International Colloquium on Deixis, Nancy, France, March 28–30, 1996.

(17) Stuart C. Shapiro, "Implementations and Research: Discussions at the Boundary" (invited panel position statement). In Luigia C. Aiello, Jon Doyle, & Stuart C. Shapiro, Eds., *Principles of Knowledge Representation and Reasoning: Proceedings of the Fifth International Conference (KR '96),* Morgan Kaufmann, San Francisco, 1996, 663–664.

(18) Stuart C. Shapiro, "An Introduction to SNePS 3," invited plenary talk presented at The 8th International Conference on Conceptual Structures (ICCS 2000), Darmstadt, Germany, August 14–18, 2000.

(19) Stuart C. Shapiro, Eyal Amir, Henrik Grosskreutz, David Randell, and Mikhail Soutchanski, Commonsense and Embodied Agents: A Panel Discussion, Common Sense 2001: The Fifth International Symposium on Logical Formalizations of Commonsense Reasoning, Courant Institute of Mathematical Sciences, New York University, New York, NY, May 20–22, 2001.

(20) Stuart C. Shapiro "Statement for Panel on Research Issues in Handling Inconsistency," invited panel presentation at the IJCAI 2001 Workshop on Inconsistency in Data and Knowledge, Seattle, WA, August 6, 2001.

(21) Stuart C. Shapiro, "Knowledge Representation for Natural Language Competence," invited talk presented as part of the Panel on Knowledge and Language: Building Large-Scale Knowledge Bases for Intelligent Applications, Symposium in Honor of Casimir Borkowski, School of Information Sciences, University of Pittsburgh, September 19, 2001.

(22) Stuart C. Shapiro, "Inconsistency Tolerance in SNePS," invited talk presented at the Dagstuhl Seminar on Inconsistency Tolerance, Schloss Dagstuhl, Wadern, Germany, June 9–13, 2003.

(23) Stuart C. Shapiro, "Cassie as a Self-Aware SNePS/GLAIR Agent" invited panel presentation at the DARPA Workshop on Self-Aware Computer Systems, Washington, DC, April 27–28, 2004.

(24) Stuart C. Shapiro, "MGLAIR," invited panel presentation at CogRob2006: the AAAI Workshop on Cognitive Robotics, Boston, MA, July 16–17, 2006.

(25) Stuart C. Shapiro, Combining Numeric and Symbolic Reasoning in SNePS, invited talk presented at the Fifth Annual Workshop on Critical Issues in Information Fusion, Beaver Hollow Conference Center, Java Center, NY, September 19–21, 2006.

(26) Stuart C. Shapiro, Lessons from the 60s and 70s, invited panel presentation at the Institute for Discrete Sciences Workshop on Associating Semantics with Graphs, The DyDAn Center at the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), Rutgers University, April 16–17, 2007.

(27) Stuart C. Shapiro, Semantics of a Propositional Network, invited talk presented at the Institute for Discrete Sciences Workshop on Associating Semantics with Graphs, The DyDAn Center at the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), Rutgers University, April 16–17, 2007.

(28) Stuart C. Shapiro, invited presentation on the panel, "Brainstorm on language, embodiment and the critical mass of intelligence," *AAAI Fall Symposium on Biologically Inspired Cognitive Architectures,* Arlington, VA, November 7–9, 2008.

(29) Stuart C. Shapiro and Jonathan P. Bona, The GLAIR Cognitive Architecture, invited keynote talk, *AAAI Fall Symposium on Biologically Inspired Cognitive Architectures,* Arlington, VA, November 7–9, 2009.

(30) Stuart C. Shapiro, "Comments on Cognitive Architectures," invited panel participation at the AAAI Fall Symposium on Biologically Inspired Cognitive Architectures, Arlington, VA, Nov. 5–7, 2009.

(31) Stuart C. Shapiro, "The GLAIR Architecture for Cognitive Robotics," invited talk presented at the Dagstuhl Seminar on Cognitive Robotics, Schloss Dagstuhl - Leibniz Center for Informatics, Wadern, Germany, February 21–26, 2010.

(32) Stuart C. Shapiro, "Comments on Acting and Planning", invited panel participation at the Dagstuhl Seminar on Cognitive Robotics, Schloss Dagstuhl - Leibniz Center for Informatics, Wadern, Germany, February 21–26, 2010.

(33) Stuart C. Shapiro, "The GLAIR Architecture for Cognitive Robots," invited talk presented at the 3^{rd} International Symposium on Practical Cognitive Agents and Robots, Toronto Canada, May 10, 2010.

(34) Stuart C. Shapiro and Jonathan P. Bona, Specifying Modalities in the MGLAIR Architecture, invited keynote talk, *Workshop on Formalizing Mechanisms for Artificial General Intelligence and Cognition (Formal MAGIC)*, Beijing, China, July 31, 2013.

(35) Stuart C. Shapiro, MGLAIR: Modal Grounded Layered Architecture with Integrated Reasoning, invited keynote talk, The Sixth Conference on Artificial General Intelligence, Beijing, China, August 1, 2013.

(36) Stuart C. Shapiro, Building an MGLAIR Agent, invited 3-hour tutorial, The Sixth Conference on Artificial General Intelligence, Beijing, China, August 3, 2013.

M. OTHER WORKSHOP AND CONFERENCE PRESENTATIONS

(1) R. Bechtel and S. C. Shapiro, "A logic for semantic networks." Presented at the 1976 Computer Science Conference (February 1976). Available as Technical Report No. 47, Computer Science Department, Indiana University, Bloomington, IN, March, 1976.

(2) D. P. McKay and S. C. Shapiro, "Inference with Recursive Rules." Presented at the Second Annual Meeting of the Cognitive Science Society, Yale University, New Haven, CT, June 16–19, 1980.

(3) J. Choi and S. C. Shapiro, Fast reasoning with non-standard connectives and quantifiers in SNePS. *Second Workshop on Current Trends in SNePS,* SUNY at Buffalo, October, 1990.

(4) S. C. Shapiro, "Case Studies of SNePS," paper presented at the AAAI Spring Symposium on Implemented Knowledge Representation and Reasoning Systems, Stanford U., March 26–28, 1991.

(5) J. Choi and S. C. Shapiro, "Learning in deduction by knowledge migration and shadowing," *AAAI-91 Workshop on Knowledge Acquisition: From Science to Technology to Tools,* AAAI, Anaheim, CA, 1991.

(6) H. Hexmoor and S.C. Shapiro, "Examining the Expert Reveals Expertise," *Proceedings of the Third International Workshop on Human and Machine Cognition: Expertise in Context,* Seaside, FL, 1993.

(7) A. E. Campbell and S. C. Shapiro, "Ontological Mediation: An Overview," IJCAI-95 Workshop on Basic Ontological Issues for Knowledge Sharing, Montréal, Canada, 1995.

(8) H. O. Ismail and S. C. Shapiro, Endowing Agents with a Personal Sense of Time, talk presented at Smart-Systems 2000, The First International Conference for Smart Systems and Robotics in Space and Medicine, Houston, TX, September 6–8, 2000.

(9) Miguel E. Ruiz, Stuart Shapiro, June Abbas, Silvia B. Southwick, and David Mark, UB at GeoCLEF 2006, *Working Notes for the CLEF 2006 Workshop,* Alicante, Spain, September 20–22, 2006.

(10) Michael Kandefer, Stuart Shapiro, Adam Stotz, and Moises Sudit, Symbolic Reasoning in the Cyber Security Domain, *Proceedings of MSS 2007 National Symposium on Sensor and Data Fusion*, McLean, VA, June 2007.

N. OTHER INVITED TALKS

(1) Stuart C. Shapiro, Reminiscences of the Sixties, Emeritus Professors Panel, Fiftieth Anniversary Celebration, Department of Computer Sciences, University of Wisconsin-Madison, Madison, WI, September 13, 2014.

(2) Stuart C. Shapiro, Artificial Intelligence and the Film "Eva," North Park Theatre, Buffalo, NY, March 14, 2015.

(3) Stuart C. Shapiro, Artificial Intelligence, Congregation Shir Shalom Men's Club, September 27, 2015.

(4) Stuart C. Shapiro, and Daniel R. Schlegel, Propositional Knowledge Representation for Biomedical Informatics, Grand Rounds, Department of Biomedical Informatics, University at Buffalo, Buffalo, NY, August 24, 2016.

(5) Stuart C. Shapiro, Artificial Intelligence, University at Buffalo Emeritus Center, October 9, 2018.

(6) Stuart C. Shapiro, Artificial Intelligence, Canterbury Woods at Gates Circle, November 16, 2018.

(7) Stuart C. Shapiro, Design of Cognitive Agents, Science Today, College of Liberal Arts and Sciences, SUNY Oswego, April 11, 2019.

O. SHOWS AND PERFORMANCES

(1) Josephine Anstey, Dave Pape, Sarah Bay-Cheng, and Stuart C. Shapiro, Human Trials: a networked virtual reality (VR) drama, E-Poetry Symposium 2006, Buffalo, NY, April 1, 2006.

(2) *365 Days/365 Plays Week 24,* by Suzan-Lori Parks, presented by the Intermedia Performance Studio (principals: Josephine Anstey, Sarah Bay-Cheng, Dave Pape, Stuart C. Shapiro), Center for the Arts, University at Buffalo, Buffalo, NY, April 26–27, 2007.

(3) *WoyUbu*, an intermedia mash-up of *Woyzeck* by Georg Büchner (1836) and *Ubu Roi* by Alfred Jarry (1896), adapted by Sarah Bay-Cheng, Josephine Anstey, and Holly Johnson, presented by the Intermedia Performance Studio in collaboration with the Real Dream Cabaret, and performed by live actors, robots, and puppets, March 13, 14, 20, 21, 27, 28, 2009, Buffalo, NY. Also performed as part of the Ingenuity Festival, Cleveland, OH, July 10, 11, 12, 2009. Stuart C. Shapiro programmed and operated the robot acting as "The Bear", and served as robotics adviser.

P. NON-RESEARCH PUBLICATIONS

(1) S. C. Shapiro, Artificial intelligence at Indiana University. *Proc. First Biennial Conference on Computing in Indiana,* IU ACM Student Chapter, April, 1974, 26–27.

(2) S. C. Shapiro, "Artificial Intelligence in the Undergraduate Computer Science and Engineering Curriculum." Presented at the IEEE Computer Society Curricula Workshop in Computer Science and Engineering Education, Normal, IL, June, 1976.

(3) S. C. Shapiro, H. Chalupsky, and D. Kumar, Report on the AAAI 1992 Spring Symposium on Propositional Knowledge Representation, *AI Magazine 14,* 3 (Fall 1992), 27.

(4) S. C. Shapiro, "SIGART" section of "The Scope and Tutorial Needs of the ACM SIGs," *ACM Computing Surveys 27,* 1 (March 1995), 124–127.

(5) S. C. Shapiro, IFIP TC12 Meeting, *intelligence: New Visions of AI in Practice 12,* 3 (Fall 2001), 6.

Q. OTHER TECHNICAL PAPERS (Not otherwise published)

(1) S. C. Shapiro, G. H. Woodmansee, and M. W. Kreuger, A semantic associational memory net that learns and answers questions (SAMENLAQ). Technical Report No. 8, Computer Sciences Department, University of Wisconsin, January, 1968.

(2) S. C. Shapiro, A memory net structure: present implementation and a proposed language. Technical Report No. 53, Computer Sciences Department, University of Wisconsin, December, 1968.

(3) S. C. Shapiro, The MIND system: procedures for the storage and retrieval of information in the MIND memory file, D-19454-PR, The Rand Corporation, Santa Monica, CA, October 13, 1969.

(4) S. C. Shapiro, The MIND system: a data structure for semantic information processing. R-837-PR, The Rand Corporation, Santa Monica, CA, August, 1971. Also AD No. 733 560, Defense Documentation Center, Alexandria, VA. (PhD dissertation)

(5) S. C. Shapiro, Program Control of the ADDS Consul 880. Technical Report No. 1, Computer Science Department, Indiana University, Bloomingtoon, IN, February, 1973.

(6) S. C. Shapiro, An interactive visual computer simulator. Technical Report No. 7, Computer Science Department, Indiana University, Bloomingtoon, IN, November, 1973.

(7) S. C. Shapiro and D. A. Grace, A guide to the use of HYCOMP1. Technical Report No. 8, Computer Science Department, Indiana University, Bloomingtoon, IN, December, 1973.

(8) S. C. Shapiro, PLATO lessons for a data structures course. Technical Report No. 15, Computer Science Department, Indiana University, Bloomingtoon, IN, August, 1974.

(9) S. Hoover and S. C. Shapiro, GRAPHER: an interactive environment for the study of graph theory. Technical Report No. 28, Computer Science Department, Indiana University, Bloomingtoon, IN, May, 1975.

(10) S. C. Shapiro and M. Wand, The relevance of relevance. Technical Report No. 46, Computer Science Department, Indiana University, Bloomingtoon, IN, Revised November, 1976.

(11) E. W. Brown III and S. C. Shapiro, TREETRAV: an interactive PLATO lesson on binary tree traversals. Technical Report No. 58, Computer Science Department, Indiana University, Bloomingtoon, IN, November, 1976.

(12) S. C. Shapiro, An introduction to SNePS (Semantic Net Processing System). Technical Report No. 31, Computer Science Department, Indiana University, Bloomingtoon, IN, Revised December 1976.

(13) S. C. Shapiro and The SNePS Implementation Group, *SNePS User's Manual,* Department of Computer Science, State University of New York at Buffalo, Buffalo, NY, 1981.

(14) S. C. Shapiro, COCCI: a deductive semantic network program for solving microbiology unknowns. Technical Report No. 173, Department of Computer Science, SUNY at Buffalo, March, 1981.

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D. UB

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October, 2008 "Intermedia Performance," *Annual Report on Research and Creative Activity at the University at Buffalo,* p. 10–13.

PROFESSIONAL ACTIVITIES

Offices Held

- ACM Special Interest Group on Artificial Intelligence: Chair, 1991–93, 1993–95; Past-Chair (member of the board), 1995–99.
- ACM SIGBoard: Member-at-Large (elected by the SIG Chairs), 1995–96, 1996–98.
- Principles of Knowledge Representation and Reasoning, Incorporated: Member of the Advisory Board, 1995–1998, 2000–2003; President and Director, 1998–2000.

Editorial Service

- *Cognition and Brain Theory,* Associate Editor for Artificial Intelligence, 1979–84.
- *American Journal of Computational Linguistics,* Member of Editorial Board, 1980–82.
- *Minds and Machines Vol. 3,* Guest Editor of Special Issue on Knowledge Representation for Natural Language Understanding, November, 1993.
- *International Journal of Applied Software Technology (IJAST),* Member of Editorial Board, 1994–98.
- *International Journal of Expert Systems,* Guest Co-Editor, with Syed S. Ali and Łucja Iwańska, of Special Issue on Knowledge Representation and Inference for Natural Language Processing, 1996.
- *intelligence: New Visions of AI in Practice,* Member of Advisory Board, 1997–2002.

Ad Hoc Referee for

Funding Agencies: National Science Foundation; European Science Foundation.

Journals: *Artificial Intelligence; Artificial Intelligence for Engineering Design, Analysis and Manufacturing; Biomedical Informatics; Cognitive Science; Communications of the ACM; Computational Intelligence; Computational Linguistics; Computer Magazine; Data & Knowledge Engineering; IEEE Expert; IEEE Software; IEEE Transactions on Systems, Man and Cybernetics; Information Processing and Management; International Journal of Computer and Information Sciences; Journal of the ACM; Journal of Applied Logic; Journal of Logic and Computation; Minds and Machines.*

Conferences: Annual Meeting of the Cognitive Science Society; Computer Science Conference; Hawaii International Conferences on System Sciences; IEEE International Symposium on Robot and Human Interactive Communication; International Joint Conference on Artificial Intelligence; International Workshop on Advances in Geographic Information Systems; National Conference on Artificial Intelligence; National Computer Conference; User Interface Software Technology (UIST).

Manuscript and Book Reviewing for

Academic Press; Addison-Wesley; Computer Science Press; Franklin, Beedle & Associates; Jones and Bartlett Publishers; McGraw-Hill; Reston Publishing Company; Science Research Associates; John Wiley & Sons.

International Panel and Council Service

- Scientific Adivsory Group, Institute of Mechanical Engineering, Technical University of Lisbon, Portugal, 1998–2000.
- ACM representative to IFIP TC12, Technical Committee on Artificial Intelligence, 1/1/99–12/31/01.

National Panel and Council Service

National Science Foundation, Local Course Improvement program review panel, 1976. National Research Council, Air Force Studies Board, Review Panel for the Adaptive Network Research Program of the System Avionics Div. of Wright-Patterson AFB, 1981–82. National Research Council, NSF Graduate Fellowship

Evaluation Panel in Applications of Mathematics, 1983. National Research Council, NSF Graduate Fellowship Evaluation Panel in Computer Science, 1984–85. National Research Council, Board on Mathematical Sciences, Review Panel for the Research Program of the Mathematical and Information Sciences Directorate, AFOSR, 1986–88. NSF Minority Graduate Fellowship Evaluation Panel in Mathematics, Physics, Astronomy and Computer Science, Oak Ridge Associated Universities, 1994–95. Air Force Research Laboratory (AFRL) Information Directorate, Search Committee for Senior Research Scientist in Artificial Intelligence, 2000–2001.

Regional Panel and Council Service

SUNY College at Potsdam, Computer Science Department, Curriculum Advising Council, 1977–79. Erie Community College, Computer Science Curriculum Advisory Council, 1982–92. Northeast Artificial Intelligence Consortium, Executive Committee, 1986–87. College of Staten Island, CUNY, Computer Science Department External Review Team, 1986–87. SUNY Oswego, Cognitive Science Program, External Review Team, 2019.

Conference Service

Conference Chair: Sixth International Conference on Principles of Knowledge Representation and Reasoning (KR'98), 1998.

Co-organizer: Conference on the Comparison and Evaluation of Models of Knowledge, State University of New York at Buffalo, March, 1982.

Program Chair: AAAI Spring Symposium on Propositional Knowledge Representation, March, 1992.

Program Co-Chair: Fifth International Conference on Principles of Knowledge Representation and Reasoning (KR'96), November, 1996.

Program Vice-Chairman: International Symposium on Multiple-Valued Logic, 1975.

Panel Organizer & Chair: Panel on Commonsense and Embodied Agents, Common Sense 2001: The Fifth International Symposium on Logical Formalizations of Commonsense Reasoning, New York, NY, May 20–22, 2001.

Program Committee member: 20th Annual Meeting of the Association for Computational Linguistics, 1982; First International Conference on Principles of Knowledge Representation and Reasoning (KR'89), May, 1989; Workshop on Formal Foundations of Semantic Networks, February, 1989; First Annual SNePS Workshop, November, 1989; Second Annual SNePS Workshop, October, 1990; AAAI Spring Symposium on Implemented Knowledge Representation and Reasoning Systems, March, 1991; Third International Conference on Principles of Knowledge Representation and Reasoning, October, 1992; First International Conference on Information and Knowledge Management (CIKM-92), November, 1992; Computer Science Conference, February, 1993; Third International SNePS Workshop, July, 1994; AAAI Fall Symposium on Knowledge Representation for Natural Language Processing in Implemented Systems, October, 1994; Fourth International Conference on Information and Knowledge Management (CIKM-94), November 8–11, 1995; Special Track on Real-World Natural Language Understanding, Florida AI Research Symposium, May 20–22, 1996; AAAI Fall Symposium on Knowledge Representation Systems Based on Natural Language, November 9–11, 1996; 8th Portuguese Conference on Artificial Intelligence (EPIA-97), October 6-9, 1997; AAAI Fall Symposium on Context in Knowledge Representation and Natural Language, November 8–10, 1997; Sixth International Conference on Information and Knowledge Management (CIKM-97), November 10-14, 1997; AAAI Workshop on Representations for Multi-modal Human-Computer Interaction, July 26-30, 1998; 9th International Conference On Conceptual Structures, July 30 – August 3, 2001; IJCAI Workshop on Inconsistency in Data and Knowledge, August 4–6, 2001; NonMonotonic Reasoning Workshop (NMR'2002) Special Session on Changing and Integrating Information: From Theory to Practice, April 19–21, 2002; Eighth International Conference on Principles of Knowledge Representation and Reasoning (KR2002), April 22–25, 2002; Intelligent Information Processing (IIP-2002), August 25–30, 2002; Ninth International Conference on Principles of Knowledge Representation and Reasoning (KR2004), June 2–5, 2004; AAAI-2004 Workshop on Anchoring Symbols to Sensor Data, July 25–26, 2004; 26th Annual Meeting of the Cognitive Science Society, August

5–7, 2004; The First IFIP International Conference on Artificial Intelligence Applications and Innovations (AIAI 2004), August, 22–27, 2004; Symposium on Logical Formalizations of Commonsense Reasoning (CommonSense-05), May 22–24, 2005; 27th Annual Meeting of the Cognitive Science Society, July 21–23, 2005; Nineteenth International Joint Conference on Artificial Intelligence (IJCAI-05) Poster Track, July 30 – August 5, 2005; Tenth International Conference on Principles of Knowledge Representation and Reasoning (KR2006), June 2–5, 2006; Twenty-first National Conference on Artificial Intelligence (AAAI-06), July 16–20, 2006; Workshop on Metareasoning in Agent-Based Systems, Sixth International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS-2007), May 14–18, 2007; CogRob08, The Sixth International Cognitive Robotics Workshop, Patras Greece, July 21–22, 2008; Eleventh International Conference on Principles of Knowledge Representation and Reasoning (KR2008), September 16–19, 2008; Twelfth International Conference on Principles of Knowledge Representation and Reasoning (KR2010), May 9–13, 2010; 1st International Workshop on Formalisms and Methodology for Learning by Reading (FAM-LbR), June 5–6, 2010; IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA), February 22–24, 2011; 10th International Symposium on Logical Formalizations of Commonsense Reasoning, March 21-23, 2011; The Fourth Conference on Artificial General Intelligence, August 3–7, 2011; 14th International Conference on Information Fusion (Fusion 2011), July 5–8, 2011; Deep Knowledge Representation Challenge Workshop, June 26, 2011; AAAI Fall Symposium on Advances in Cognitive Systems, November 4–6, 2011; AAAI-12 Special Track on Cognitive Systems, July 22–26, 2012.

Session Chairman: Twelfth Annual Meeting, Association for Computational Linguistics, 1974; IEEE Computer Society Curricula Workshop in Computer Science and Engineering Education, 1976; Computer Science Conference, 1979; The 1985 Conference on Intelligent Systems and Machines, Oakland University, Rochester, MI; Computer Science Conference, 1986; The 1st International Conference on Applications of Artificial Intelligence to Engineering Problems, Southampton University, April, 1986; Sixth Canadian Conference on Artificial Intelligence, École Polytechnique De Montréal, May, 1986; Tenth International Joint Conference on Artificial Intelligence, August, 1987; 4th Portuguese Conference on Artificial Intelligence, Lisbon, Portugal, September, 1989; Third International Conference on Principles of Knowledge Representation and Reasoning, October, 1992; Computer Science Conference, February, 1993; Workshop on Logic-Based Artificial Intelligence, Washington, D.C., June, 1999; Seventh International Conference on Principles of Knowledge Representation and Reasoning, April, 2000; Eighteenth International Joint Conference on Artificial Intelligence, August, 2003; Ninth International Conference on Principles of Knowledge Representation and Reasoning (KR2004), June 2–5, 2004; Twenty-first National Conference on Artificial Intelligence (AAAI-06), July 16–20, 2006; AAAI Fall Symposium on Biologically Inspired Cognitive Architectures, Arlington, VA, November 7–9, 2008; Ninth International Symposium on Logical Formalizations of Commonsense Reasoning (Commonsense-2009), Toronto, CA June 1–3, 2009; AAAI Fall Symposium on Biologically Inspired Cognitive Architectures Arlington, VA, Nov. 5–7, 2009; Dagstuhl Seminar on Cognitive Robotics, Dagstuhl, Germany, February 21–26, 2010; Twelfth International Conference on Principles of Knowledge Representation and Reasoning (KR2010), May 9–13, 2010; Tenth International Symposium on Logical Formalizations of Commonsense Reasoning (Commonsense-2011), Stanford University, March 21–23, 2011; 14th International Conference on Information Fusion (Fusion 2011), Chicago, IL, July 5–8, 2011;.

Invited, Plenary Speaker: Third Golden West International Conference on Intelligent Systems (GWIC), Las Vegas, NV, June, 1994; Florida Artificial Intelligence Research Symposium (FLAIRS-95), Melbourne, FL, April 27–29, 1995; Time, Space and Identity: The Second International Colloquium on Deixis, Nancy, France, March 28–30, 1996; 8th International Conference on Conceptual Structures (ICCS 2000), Darmstadt, Germany, August 14–18, 2000; 3^{rd} International Symposium on Practical Cognitive Agents and Robots, Toronto Canada, May 10, 2010.

Invited Keynote Speaker: AAAI Fall Symposium on Biologically Inspired Cognitive Architectures, Arlington, VA, November 5–7, 2009; Workshop on Formalizing Mechanisms for Artificial General Intelligence and Cognition (Formal MAGIC), Beijing, China, July 31, 2013; The Sixth Conference on Artificial General Intelligence, Beijing, China, August 1, 2013.

Discussant: Workshop for Intelligent Interfaces, Monterey, CA, March, 1988; AAAI Fall Symposium on Knowledge Representation Systems Based on Natural Language, Cambridge, MA, November 9–11, 1996.

UNIVERSITY SERVICE

At Indiana University

Kronos Study Committee, 1972–73. PLATO Instructional Development Committee, 1972–74. Steering Committee, IU Congitive Institute, 1973–76. Bloomington Campus Computer Use Committee: 1974–76, Chair, Interactive Computing Subcommittee, 1974–75. PLATO Use Committee, 1974–76. Review Committee for NSF ISEP proposal competition, 1976.

At State University of New York at Buffalo

University-wide: Academic Computing Advisory Committee: 1977–81, Chair, Allocations Policy Subcommittee, 1979–80; General Education Committee: 1981–83; College Skills Subcommittee, 1981–82. Internal member of external review of Linguistics Dept. Graduate Program, 1987. Advisory Board of Buffalo Site, National Center for Geographic Information and Analysis, 1989–91. President's Review Board on Faculty Appointments, Promotions and Tenure, 1991–93. Sesquicentennial Planning Committee, 1993–1997. University Commencement Committee, 1994–2004. Commencement Marshall, 1995,1996,1998–2003. Chair, Task Force on Computer and Information Science and Engineering, 1997. Student Access Standards committees: 1997–2002; Chair 1998–99. Member of search committee for the Industry Contact Coordinator of the UB Business Alliance, 1998. Advisory Team, "Pharmaceutical Biotechnology Virtual Laboratory: An Instructional Tool for the Decision-Making Processes Involved in Pharmaceutical Research and Development," Department of Pharmaceutics, 1/2000–2002. Member of search committee for the Dean of the College of Arts and Sciences, 2001–2002. Member, Review panel for Planning Proposals to the Interdisciplinary Research And Creative Activities Fund (IRCAF) of The Vice President For Research, 2002. Member, Search Committee for a faculty member/researcher in Visualization, 2003. Member, Graduate School Program Review Planning Committee, Spring, 2005. Member of search committee for the Dean of the College of Arts and Sciences, 2006–2007. Member, Review panel for Humanities and Civic Engagement proposals to the Interdisciplinary Research Development Fund (IRDF) of The Vice President For Research, 2007. Chair, Institutional Repository Task Force, 2007–2008. Member, Review panel for Computer Science and Information Technology proposals to the Interdisciplinary Research Development Fund (IRDF) of The Vice President For Research, 2009.

Faculty Senate: Alternate Senator, 1979–80; Senator, 1980–84; Executive Committee, 1981–84; Computer Services Committee, 1981–85, Chair, 1983–85; Grading Committee Chair, 1986–87. Writing Skills Testing Committee, 1981.

Graduate School: Graduate School Executive Committee, 1991–93; Graduate Policy Committee, 1991–94; Commencement Marshall, 1999.

Faculty of Natural Sciences & Mathematics: Executive Committee 1978–79, 1984–90, 1996–1998; Elected Personnel Committee member, 1990–91, 93–94, alternate 1983–84; Divisional Committee 1990–93.

School of Engineering and Applied Sciences: Administrative Council, 1998–99; Computing Advisory Committee, 1998–99; Promotion Committee alternate member, 2007–2008; Faculty Personnel Committee, Spring, 2009.

College of Arts and Sciences: Dean's Science Advisory Group, 1998–99; Elected Personnel Committee: alternate member, 1999–2000; member, 2000–2001.

Graduate Group in Cognitive Science: 1981–90; Director, 1981–1984.

Center for Cognitive Science: Steering Committee, 1989–90; Director of Graduate Studies, 1994–96; Advisory Committee, 1999–2001; Director, 2004–2008; Interim Director of Graduate Studies, Spring, 2010.

Emeritus Center: Member, Board of Directors, 2016–2018.

DEPARTMENTAL SERVICE

At Indiana University

Colloquium Committee Chair 1971–72. Library Committee Chair 1972–73. Supervisor of Graduate Assistants working as computer consultants, 1972–73. Graduate Advising Committee Chair 1973–75. Graduate Admissions and Awards Committee Chair 1973–75. PLATO Committee Chair 1974–76. Curriculum Committee 1975–76. Computing Area Policy Committee 1975–76. PhD Program Proposal Committee 1975–76. Faculty Recruiting Committee 1975–76. Supervisor of Associate Instructors Fall, 1976.

At State University of New York at Buffalo

Department of Computer Science Colloquium Committee Chair 1977–78. Faculty Recruiting Committee 1977–80, 1984–87; Chair 1978–79, 1984–86. Facilities Committee 1978–96. Personnel Committee 1978–1998; Chair 1978–79, 1984–90, 1996–1998. Acting Chair of Department 1978–79. Executive Committee 1978–79, 1980–82, 1984–94, 1995–98; Chair 1978–79, 1984–90, 96–1998. Graduate Exam Committee 1979–81, 82–83. Advisor, Student ACM Chapter 1979–84. Undergraduate Studies Committee 1980–84, 94–96; Chair 1980–82, 83–84. Undergraduate Admissions Committee 1980–82, 83–87; Chair 1980–82, 83–84. Director of Undergraduate Studies 1980–82, 83–84. Graduate Admissions Committee 1983–87, 88-89. Chair of Department 1984–90, 1996–1998. Director of Graduate Studies 1990–93. Graduate Affairs Committee (includes Grad. Admissions) 1990–94, Chair 1990–93.

Department of Computer Science and Engineering

Chair of Department 1998–99. Executive Committee 1998–2001, 2002–2004; Chair 1998–99. Personnel Committee 1998–present; Chair 1998–99. Technical Staff Search Committee Fall, 1999. Strategic Recruiting Committee Fall, 1999. UG CS Curriculum Committee Chair, 1999–2000. Lecturer Search Committee Fall, 1999. Executive Officer Search Committee May, 2000. Ad Hoc Committee for CSE 115 Curriculum, Spring, 2002. Undergraduate Affairs Committee, 2002–2003. Executive Officer Search Committee, 2003. Graduate Affairs Committee, 2003–2004. Grievance Committee, 2005–2006. 40th Anniversary Committee, 2006–2007. Alumni Speakers Selection Committee, 2006–2007. Facilities Committee, 2007–2008. Brochure Committee Chair, 2009–2010. Faculty Search Committee, 2010–2011. CSE 50^{th} Anniversary Planning Committee, 2015–present.

PUBLIC SERVICE

Judge, Western New York Science Congress, 1990, 1992, 1994, 1997–1999, 2001, 2006.
Committeeman (elected) of the Erie County Democratic Committee
and of the Town of Amherst Democratic Committee, 2002–2012.
Webmaster, Town of Amherst Democratic Committee, 2003–2010.
Member, Town of Amherst Information Technology Advisory Committee, 2006–2008.
Webmaster, Zonta Club of Buffalo, 2006–2012.
Board of Directors, Amherst Industrial Development Agency: Member, 22 Jan 2008 – 31 Dec 2014: Secretary, 19 March 2010 – 31 December 2014.
Member, Advisory Board of Directors, Kavinoky Theatre, February 2014 – December 2019.
Member, Board of Trustees, Congregation Shir Shalom, Amherst, NY, 1 July 2016 – 30 June 2019.

COURSES TAUGHT (by title)

Undergraduate Courses

Introduction to Computer Science 1, Introduction to Computer Science 2, Programming in Lisp, Data Structures, Abstract Data Types, Programming Languages, Cognitive Science Colloquium.

Undergraduate/Graduate Courses

Database Concepts, Introduction to Artificial Intelligence, Knowledge-Based Artificial Intelligence, Knowledge Representation.

Graduate Courses

Introduction to Graduate Studies in Computer Science, Introduction to Cognitive Science, Programming Languages, Techniques of Artificial Intelligence, Natural Language Understanding, Computational Linguistics, Knowledge Representation, Advanced Knowledge Representation, Seminars on Knowledge Representation, Seminar on Reasoning/Planning/Acting, Seminar on Robotics, Seminar on Knowledge Representation and Natural Language Processing, Seminar on Knowledge Representation and Cognitive Robotics, Seminars on Cognitive Robotics/Agents, Seminar on Co-Designing Agents, Seminar on Implementing KRR Systems, Topics in Artificial Intelligence, Topics in Cognitive Science, Topics in Computational Linguistics.

COURSES TAUGHT (by department and semester)

Undergraduate Courses

UW CS 203–204, : F1966–S1967 (as TA)
UW CS 302, Algebraic Language Programming: Su1971
UW CS 467, Programming Computers for Non-Numerical Applications: S1971,Su1971

IU C 103, Numerical Computer Programming: F1971,S1972
IU C 201, Introduction to Computer Programming: F1971,S1973,S1974,F1974,F1975
IU C 307, Applied Programming Techniques: Su1975
IU C 343, Data Structures: F1972,Su1973
IU C 399, Independent Study: S1973
IU C 461, Artificial Intelligence: F1972,F1973
IU C 490, Seminar in Computer Science (Artificial Intelligence) : S1972
IU C 490, Seminar in Computer Science (Computer Music) : S1973

UB CS 113, Introduction to Computer Science 1: F1977,F1990
UB CS 114, Introduction to Computer Science 2: S1978,F1979,S1984
UB CS 202, Programming in Lisp: S1994,F1995
UB CS 250, Data Structures: S1979,F1980,F1981,S1987
UB CS 305, Programming Languages: F1993
UB CS 346, Higher Level Languages: S1977
UB CS 499, Independent Study: many semesters

UB CSE 115, Introduction To Computer Science for Majors I: S2001,F2007
UB CSE 116, Introduction To Computer Science for Majors 2: S2003
UB CSE 202, Programming in Lisp: F1999,F2000
UB CSE 305, Programming Languages: F2003,S2005,S2010
UB SSC 391, Cognitive Science Colloquium: F2004,S2005,F2005,S2006,F2006,S2007,F2007,S2008

Undergraduate/Graduate Courses

UB CS 4/562, Database Concepts: S1983
UB CS 4/572, Introduction to Artificial Intelligence: S1978,S1980,S1982,S1990,S1993,S1994,S1996

UB CSE 4/563, Knowledge Representation: S2004,S2006,S2007,S2008,S2009,F2009,F2010
UB CSE 4/572, Knowledge-Based Artificial Intelligence: S2000

Graduate Courses

UW CS 732, Artificial Intelligence and Models of Thinking: S1971

IU C 561, Question-Answering by Computers: S1973,S1974,S1975,F1975,F1976
IU C 563, Artificial Intelligence I: F1974,F1975,F1976
IU C 564, Artificial Intelligence 2: S1975,S1976
IU C 690, Special Topics in Computing (Cognitive Models in Psychology and Computer Science): S1975
IU C 890, Reading and Research: Su1973//[2ex] UB CS 501, Introduction to Graduate Studies in Computer Science I: F1996,F1997,F1998
UB CS 502, Introduction to Graduate Studies in Computer Science II: S1997
UB CS 503, Computer Science for Non-Majors I: F1990
UB CS 505, Programming Systems Fundmentals: F1982,F1984,F1991
UB CS 572, Introduction to Artificial Intelligence: S1985
UB CS 575 / APY 526: Introduction to Cognitive Science: F1982,F1985,F1986
UB CS 642, Techniques of Artificial Intelligence: F1981,F1983,F1988,F1995
UB CS 675, Natural Language Understanding: F1977,F1979,F1980,S1983,S1984,S1991
UB CS/LIN 675, Computational Linguistics: S1997
UB CS 676, Knowledge Representation: S1986,F1992,F1997
UB CS 699, Supervised Teaching: most semesters
UB CS 700, Independent Study: every semester
UB CS 701, Seminar: S1983,S1989
UB CS 702, Seminar: S1983
UB CS 703, Seminar (Reasoning/Planning/Acting): F1985
UB CS 703, Seminar (Implementing Natural Language-Using Intelligent Systems): S1992
UB CS 704, Seminar (Natural Language Understanding): S1980
UB CS 704, Seminar: S1981
UB CS 705, Seminar: F1983
UB CS 705, Seminar (Logical Foundations of Artificial Intelligence): F1989
UB CS 705, Seminar (Readings in Artificial Intelligence): F1990
UB CS 707, Topics in Cognitive Science: S1982
UB CS 715. Seminar (The Cyc Project): S1993
UB CS 715. Seminar: F1993
UB CS 715. Seminar (Readings in KR and NL): S1996
UB CS 745, Seminar: F1982
UB CS 748, Seminar (Readingsin Knowledge Representation), S1999
UB CS 785, Knowledge Representation: F1978,S1980
UB CS 799, Supervised Research: most semesters
UB CS 800, Thesis Guidance: every semester

UB, Programming in Lisp for Graduate Students (no credit): Su2004
UB CSE/LIN/PHI/PSY 575 / APY 526: Introduction to Cognitive Science: F2005,F2006
UB CSE 663, Advanced Knowledge Representation: F2002,F2004,F2005,F2007,S2010,S2011
UB CSE 676, Knowledge Representation: F1999
UB CSE 700, Independent Study: every semester
UB CSE 712, Seminar (Knowledge Representation and Cognitive Robotics): S2003
UB CSE 716, Seminar (Cognitive Robotics/Agents): F2003
UB CSE 716, Seminar (Co-designing Agents): S2005
UB CSE 718, Seminar (Implementing KRR Systems), F2006
UB CSE 725, Seminar (Implementing KR&R Systems): F2000
UB CSE 736, Seminar (Cognitive Robotics): S2009
UB CSE 799, Supervised Research: most semesters
UB CSE 800, Thesis Guidance: every semester

THESIS AND DISSERTATION COMMITTEES

Member of Senior Honors Thesis Committee for J. D. Lowrance, Indiana University, 1975.

Advanced Honors Thesis Supervisor (at University at Buffalo)

(1) Rao, Vikranth B. 2004 Princess Cassie: An Embodied Cognitive Agent in a Virtual World

MS Thesis, Paper, and Project Committees Chaired

At Indiana University

(1) Bechtel, Robert J. 1976 Logic for Semantic Networks

At State University of New York at Buffalo

(2) Webster, Diana 1979 MEDIC—A Medical Example of SNePS
(3) Neal, Jeannette G. 1981 A Knowledge Engineering Approach to Natural Language Understanding
(4) Srihari, Rohini K. 1981 Combining Path-Based and Node-Based Inference in SNePS
(5) Shubin, Harold L. 1981 Inference and Control in Multiprocessing Environments
(6) Tranchell, Lynn M. 1982 A SNePS Implementation of KL-ONE
(7) Choy, Chi 1984 A Graph Editor for The Semantic Network Processing System
(8) Suchin, Jennifer 1985 A Semantic Network Representation of the Peripheral Nervous System
(9) Hull, Richard G. 1986 A New Design for SNIP the SNePS Inference Package
(10) Chan, Chung M. 1987 Forward Path-Based Inference in SNePS
(11) Li, Naicong 1987 Pronoun Resolution in SNePS
(12) Chun, Soon Ae 1987 SNePS Implementation of Possessive Phrases
(13) Dobes, Zuzana 1989 A Multi-Media Natural Language Understanding System
(14) Gucwa, John R. 1989 Integration of the Form Modality into the CUBRICON System
(15) Zaidel, Martin J. 1991 XGinseng: An X Windows Graphic Display system for SNePS Networks
(16) Lewocz, John S. 1992 XGinseng: An X Windows Editor for SNePS Networks
(17) Makar, Robert J. 1995 Virtual World Camera Simulation Module for the GLAIR Mobile Robot Lab
(18) Church, Robert G. 2000 JOGS: An Examination of Selected Issues in Expert System Design and the Use of Production Systems for Reasoning
(19) Maia, Tiago Vaz 2001 Mental Models versus Formal Rules—A Study of the Controversy
(20) Bhushan, Bharat 2003 Preferential Ordering of Beliefs for Default Reasoning
(21) Fineberg, Jeffrey S. 2004 Implementation of the Java SNePS 3 Building Box
(22) Kandefer, Michael W. 2005 Multi-Agent Systems for a Virtual Drama
(23) Devdas Nayak, Trupti 2005 Patofil: An MGLAIR Agent for a Virtual Reality Drama
(24) Clader, Christopher 2007 An Implementation of Unification in SNePS 3
(25) Nagarajan, Madhumitha 2008 A Prolog Meta-Interpreter for SNePSLOG
(26) Torbenson, Gregory 2008 Long-Term Memory for a SNePS-Based Cognitive Agent
(27) White, John C. 2008 Expanding the Java SNePS-GUI
(28) Smith, Margaret M. 2008 Patofil: Phase 4 of the Development of a SNePS Agent for a Virtual Reality Drama
(29) Sherman, Austin M. 2009 The SNePS Relational Database System
(30) Fogel, Ari I. 2011 On the Use of Epistemic Ordering Functions as Decision Criteria for Automated Belief Revision in SNePS
(31) Prentice, Michael 2011 Tractor: An Architecture for Natural Language Processing
(32) Fang, Erdong 2012 Activities in the Zoo World

Supervision of MS Theses and Papers of people with previous PhDs in other fields

(1) Maida, Anthony S. 1981 Intensional Concepts in Semantic Networks with Application to Three Knowledge Representation Problems
(2) Nutter, J. Terry 1984 Default Reasoning in A.I. Systems
(3) Rapaport, William J. 1984 Belief Representation and Quasi-Indicators
(4) Saks, Victor H. 1985 A Matcher for Intensional Semantic Networks

Membership in PhD Committees (in Computer Science (or CSE) except where noted)

At Indiana University: R. M. Thompson, Linguistics, 1972; B. Durding, Psychology, 1974; W. O. Shaffer, Psychology, 1975; James R. Sawusch, Psychology, 1976.

At State University of New York at Buffalo: Carl Smith, 1979; George Sicherman, 1987; Mingruey Tai, 1987; Jonathan Hull, 1988; Zhigang Xiang, 1988; Rohini Srihari, 1989; Janyce Wiebe, 1989; Juergen Haas, 1993; Robin Hill, 1994; Devashis Jana, 1994; Karen Ehrlich 1995; Kyonghee Moon, 1997; Chain-Wu Lee, 1999; Pallavi Tambay, 2004; Atsuko Nishiyama, Linguistics, 2006; Albert Goldfain 2008; Denis Mindolin 2009; Timothy J. Burns (2011); Roelant Ossewaarde, Linguistics (2011); Scott Settembre (2012).

Others: Nicolas Sabouret (Universite de Paris Sud), 2003.

PhD Committees Chaired

(1)	Martins, João P.	1983	Reasoning in Multiple Belief Spaces
(2)	Neal, Jeannette G.	1985	A Knowledge Based Approach to Natural Language Understanding
(3)	Morgado, Ernesto J.	1986	Semantic Networks as Abstract Data Types
(4)	Almeida, Michael J.	1987	Reasoning about the Temporal Structure of Narratives
(5)	Geller, James	1988	A Knowledge Representation Theory for Natural Language Graphics
(6)	Yuhan, Albert H.	1991	Dynamic Computation of Spatial Reference Frames in Narrative Understanding
(7)	Choi, Joongmin	1993	Experienced-Based Learning in Deductive Reasoning Systems
(8)	Kumar, Deepak	1994	From Beliefs and Goals to Intentions and Actions: An Amalgamated Model of Inference and Acting
(9)	Ali, Syed S.	1994	A "Natural Logic" for Natural Language Processing and Knowledge Representation
(10)	Lammens, Johan M.	1994	A Computational Model of Color Perception and Color Naming
(11)	Haller, Susan M.	1995	Interactive Generation of Plan Descriptions and Justifications
(12)	Chalupsky, Hans	1996	SIMBA: Belief Ascription by Way of Simulative Reasoning
(13)	Hexmoor, Henry H.	1996	Representing and Learning Routine Activities
(14)	Campbell, Alistair E.	2000	Ontological Mediation: Finding Dialect Translations by Asking Questions
(15)	Ismail, Haythem O.	2001	Reasoning and Acting in Time
(16)	Burhans, Debra T.	2002	A Question-Answering Interpretation of Resolution Refutation
(17)	Santore, John F.	2005	Identifying Perceptually Indistinguishable Objects
(18)	Johnson, Frances L.	2006	Dependency-Directed Reconsideration: An Anytime Algorithm for Hindsight Knowledge-Base Optimization
(19)	Seyed, A. Patrice	2012	A Method for Evaluating and Standardizing Ontologies
(20)	Bona, Jonathan P.	2013	MGLAIR: A Multimodal Cognitive Agent Architecture
(21)	Schlegel, Daniel R.	2015	Concurrent Inference Graphs