

SRI International
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EDUCATION

Ph.D., University of California at Berkeley, Education in Math, Science, and Technology (EMST), 1995

Advisors: Michael Ranney (Chair), Marcia Linn, Peter Pirolli, and Michael Clancy

Topics: Cognitive modeling, reasoning, experimental methods, software design, science instruction.

Dissertation: *Computational Tools for Modeling and Aiding Reasoning: Assessing and Applying the Theory of Explanatory Coherence* (received Outstanding Dissertation Award). GPA 3.97.

M.S., University of California at Berkeley, Electrical Engineering and Computer Sciences (EECS), 1989

Advisors: Marcia Linn, Michael Clancy, and Robert Wilensky

Topics: AI techniques, knowledge representation, programming instruction, software design.

Thesis: *A Pascal Template Library*.

B.S., University of Nebraska at Lincoln, Computer Science, Mathematics (double major), 1987

Topics: Theoretical and applied computer science and mathematics, programming and problem solving.

Senior Thesis: *Natural Language Understanding*.

Phi Beta Kappa; Graduated with High Distinction, GPA 4.0.

TECHNICAL SKILLS

Languages: Java (including Swing), JSP, PHP, SQL, HTML, JavaScript, XML

Platforms: MacOS X, Unix, Windows

Tools: DreamWeaver, Photoshop, Apache, Tomcat, Ant, MySQL, IDEA, Eclipse, CVS

PROFESSIONAL EXPERIENCE

Design of Innovative Learning Technology. Over 12 years of experience leading teams of developers, content experts, and education practitioners to develop innovative learning technology for online communities, collaborative learning, and simulations. Experienced in a range of design and engineering processes, including interface design and prototyping, usability and user testing, system architecture and database specification, and the implementation of Web and Java applications.

SRI International, Center for Technology in Learning, Menlo Park, CA

7/95-
present

Senior Cognitive and Computer Scientist. Direct the technology design, development, and user experience research for several projects at SRI, including:

- Tapped In (tappedin.org), an online community to support teacher professional development (co-principle investigator).
- CLTNet (cltnet.org), an online network to support NSF Centers for Learning and Teaching
- ChemSense (chemsense.org) software and activities to help high-school students and teacher visualize and discuss nanoscale phenomena (principle investigator).
- NanoSense (nanosense.org), introducing nanoscale science to high school students and teachers (principle investigator).
- Group Scribbles (groupscribbles.sri.com), a collaborative application based on the familiar Post-It note metaphor.
- Calipers (calipers.sri.com), simulation-based assessments to assess science learning.
- PADI (padi.sri.com), a system for designing reusable assessments.
- Tuples (tuples.sri.com), software to support the coordination of multiple learners in collaborative educational activities.
- OERL (oerl.sri.com), a digital library of evaluation products.
- PALS (pals.sri.com), a digital library of standards-based performance assessments.

Xerox Palo Alto Research Center (PARC), User Interface Research, Palo Alto, CA

2/95-7/95

Research Consultant with Peter Pirolli and Stuart Card. Tested the effectiveness of information

retrieval tools for browsing and searching text collections, and studied their effects on the incidental learning of topic structure.

Apple Computer, Advanced Technologies Group, Cupertino, CA

Software Consultant, Authoring Tools & Titles, with Jim Spohrer. Designed and implemented an agent programming editor for AgentSK8, an agent-based "Sim City"-like programming environment based on AgentSheets. 2/95-7/95

Software Engineer, Intelligent Applications Group, with James Miller and Tom Bonura. Developed an "intelligent agent" to help users manage their email, using machine learning techniques, Lenat's CYC program, and other AI methods. Summer 1993

Software Engineer, Human Interface Group, with John Thompson-Rohrlich and Joy Mountford. Extended Apple research email system with an interface for creating email filters. Summer 1989

University of California at Berkeley, Berkeley, CA

Research Assistant, Education in Math, Science, and Technology, with Michael Ranney. Research in reasoning and explanatory coherence, cognitive science, cognitive modeling, experimental methods, software design. 1990-1995

Research Assistant, Electrical Engineering and Computer Sciences, with Lawrence Rowe. Developed and tested a multimedia/hypermedia course on semiconductor manufacturing using Picasso, a research graphical user interface environment. 1990-1992

Research Assistant, Education in Math, Science, and Technology, with Marcia Linn. Studied programmers to identify effective Pascal and Lisp programming representations; developed and tested hypermedia template model to teach Pascal. 1988-1990

IBM/ROLM, Knowledge Based Systems Division, Santa Clara, CA

Knowledge Engineer, working with Brad Poole. Developed a tool to automate knowledge acquisition for a telecommunications switch diagnostic expert system. Summer 1988

TEACHING EXPERIENCE

University of California at Berkeley, Berkeley, CA

Graduate Student Instructor, Cognitive Science Program. Introduction to Cognitive Science with Michael Ranney (fall 1991, fall 1992) and Peter Pirolli (spring 1994). Issues in Cognitive Science with Stephen Palmer (fall 1993). Led discussions on perception, knowledge representation, concepts and categories, memory, reasoning, language, connectionism, development. Guest-lectured on logic and connectionism. 1991-1994 (4 sem.)

Graduate Student Instructor, Electrical Engineering and Computer Sciences. Self-Paced Programming (Computer Science 3s, 7s, 8s, 9a-d) with Michael Clancy (6 semesters). Tutored FORTRAN, Pascal, C, and Lisp; graded programs and exams. Introduction to Pascal Programming (Computer Science 8) with Oliver Grillmeyer (fall 1987, spring 1988). Led weekly discussions and labs, graded exams. 1987-1992 (8 sem.)

Graduate Student Mentor, Summer Research Opportunities Program. Mentored a psychology undergraduate conducting an extended, more temporal analysis of the experiment reported by Schank and Ranney (1992). 1992

University of Nebraska at Lincoln, Lincoln, NE

Computer Consultant, Computing Resource Center. Helped students and faculty with hardware, software, and programming problems. 1985-1987

Mathematics Assistant, SOS Program. Lecturer for a college algebra course for disadvantaged students. Spring 1987

Mathematics Assistant, Mathematics Department. Tutored undergraduates in algebra, calculus, and statistics. 1984-1987

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Member*, Association for Computing Machinery (ACM), Bay Area Special Interest Group on Computer-Human Interaction (BayCHI).
- Editorial Board*, Journal of the Learning Sciences (2000-present); Review Board, 1998-2000.
- Review Board*, Journal of the Learning Sciences (1998-2000).
- Reviewer*, Computer-Human Interaction (CHI), Computer Support for Collaborative Learning (CSCL), Computer Support for Cooperative Work (CSCW), American Educational Research Association (AERA), User Interface Software and Technology (UIST), Journal of Computer Mediated Communication, International Journal of Man-Machine Studies, International Conference on Computers in Education, Journal of Cognitive Science
- Guest Speaker* for various UC Berkeley, Stanford, and Mills College courses: Getting Your Doctorate and Getting a Good Job (UCB, 2004-2005), Learning, Design, and Technology Design Methods (Stanford University, 2001), Introduction to Cognitive Science (UCB, 1994-2002), Science and Math Education First Year Seminar (UCB, 1994-95, 2003), Teaching Techniques for Graduate Student Instructors (UCB, 1993-94), Contemporary Computing (Mills College, 2001)
- Mentor* for Stanford University course Contextual and Organizational Issues in HCI (2000-2002)
- Workshop Leader*, Expanding Your Horizons in Science and Math (1996-1999)
- Local Co-Chair*, 1992 Directions and Implications of Advanced Computing Conference, Berkeley, CA.
- Co-Chair*, Computer Professionals for Social Responsibility (CPSR), Berkeley Chapter (1990-1991).

GRANTS

- Principle Investigator*, Supporting Disciplined Improvisation During Face-to-Face Discussion, NSF #0713711, \$449,485, September 2007 - February 2010.
- Principle Investigator*, NanoSense: The Basic Sense Behind Nanoscience, NSF #0426319, \$923,863, September 2004 - August 2008.
- Principle Investigator*, ChemSense II: Investigating Learning and the Impact of Sustained Integration of Representational Tools, NSF #0125726, \$1,158,750, January 2002 - December 2004.
- Principle Investigator*, ChemSense: Promoting Representational Competence to Facilitate Understanding and Epistemological Thinking in Chemistry, NSF #9814653, \$1,212,228, January 1999 - March 2002.
- Principle Investigator*, Adapting high-end visualizations to a student-centered learning environment, NSF EOT-PACI subgrant, \$80K, January 2000 - December 2003.
- Co-Principle Investigator*, An Infrastructure for Research on Online Teacher Communities of Practice, NSF #0106926, \$249,983, July 2001 - December 2002.
- Co-Principle Investigator*, Tapped In: A Testbed for New Models of On-line Teacher Professional Development, NSF #9725528, \$1,036,361, December 1997 - November 2000.
- Co-Principle Investigator*, Interoperable Components for Shared Active Representations, \$10K, NSF CILT subgrant, August 1998 - December 1998.

AWARDS, FELLOWSHIPS AND SCHOLARSHIPS

- 1995 *Outstanding Dissertation Award*, University of California, Berkeley.
- 1995 *McDonnell Postdoctoral Fellowship* Alternate, McDonnell Foundation.
- 1994-95 *Regents Fellowship*, University of California, Berkeley.
- 1993-94 *Provost's Research Fund Award*, University of California, Berkeley.
- 1993 *Outstanding Graduate Student Instructor Award*, University of California, Berkeley.
- 1992-93 *John U. Michaelis Scholarship*, University of California, Berkeley.
- 1992 *David Marr Award for Excellent Student Papers*, Cognitive Science Society.
- 1990-91 *Regents Fellowship*, University of California, Berkeley.
- 1988-89 *Amelia Earhart Fellowship*, ZONTA International.
- 1987-88 *Full Tuition Scholarship*, University of California, Berkeley.
- 1987 *Outstanding Undergraduate Achievement Award in Science*, University of Nebraska.
- 1986-87 *Irwin Dubinsky and J. Stebbins Mathematics Scholarships*, University of Nebraska.
- 1982-87 *David Memorial Trust Scholarship*, University of Nebraska.
- 1983-85 *John W. McDonald and Dreier Scholarships*, University of Nebraska.
- 1983 *Pi Mu Epsilon National Honorary Mathematics Fraternity*, University of Nebraska.

PUBLICATIONS

- Schlager, M., Farooq, U., Fusco, J., Schank, P., & Dwyer, N. (submitted). Analyzing online social networking in professional learning communities: Cyber networks require cyber-research tools. *Journal of technology education*.

- Quellmalz, E., Barger, A., Haertel, G., Schank, P., Buckley, B., Gobert, J., Horwitz, P., & Ayala, C. (in press). Exploring the role of technology-based simulations in science. In Coffey, Douglas, & Sterns (Eds.), *Assessing science learning: Perspectives from research and practice*. NSTA Press.
- Ranney, M., Rinne, L., Yarnall, L., Munnich, E., Miratrix, L., & Schank, P. (2008). Designing and assessing numeracy training for journalists: Toward improving quantitative reasoning among media consumers. *Proceedings of the Eighth International Conference of the Learning Sciences*. Mahwah, NJ: Erlbaum.
- Farooq, U., Schank, P., Harris, A., Fusco, J. & Schlager, M. (2008). Sustaining a community computing infrastructure for online teacher professional development: A case study of designing Tapped In. *Journal of Computer Supported Cooperative Work*. The Netherlands: Springer.
- Michalchik, V., Kozma, R., Rosenquist, A., & Schank, P. (2008). Representational resources for constructing shared understandings in the high school chemistry classroom. In J. Gilbert, M. Nakhleh, & M. Reiner (Eds.), *Visualization: Theory and practice in science education*. New York: Springer.
- Schank, P., Krajcik, J., & Yunker, M. (2007). Can nanoscience be a catalyst for education reform? In F. Allhoff, P. Lin, J. Moor, & J. Weckert (Eds.), *Nanoethics: The ethical and social implications of nanotechnology*. Hoboken, NJ: Wiley.
- Schank, P., & Wise, A. (2006). Introducing high school students to nanoscale science. *Forum on Education of The American Physical Society Summer 2006 Newsletter*.
- Hamel, L., & Schank, P. (2005). Participatory, Example-based Data Modeling in PADI. PADI Technical Report 3, Menlo Park, CA: SRI International.
- Hamel, L., & Schank, P. (2005). A Wizard for PADI Assessment Design. PADI Technical Report 11. Menlo Park, CA: SRI International.
- Sabelli, N., Schank, P., Rosenquist, A., Stanford, T., Patton, C., Cormia, R., & Hurst, K. (2005). *Report of the workshop on science and technology education at the nanoscale*. Technical Report, Menlo Park, CA: SRI International.
- Roschelle, J., Schank, P., Brecht, J., Tatar, D., & Chaudhury, S. R. (2005). From response systems to distributed systems for enhanced collaborative learning. *Proceedings of the International Conference on Computers in Education* (pp. 363-370). Amsterdam, The Netherlands: IOS Press.
- Schank, P., & Hamel, L. (2004). Collaborative modeling: Hiding UML and promoting data examples in NEMO. *Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work* (pp. 574-577). New York, NY: ACM Press.
- Hamel, L., Haertel, G., Kennedy, C., Mislevy, R., Risconsente, M., & Schank, P. (2003). Principled Assessment Design for Inquiry (PADI) object model documentation. PADI Technical Report. SRI International, Menlo Park, CA.
- Vermaat, H., Kramers-Pals, H., & Schank, P. (2003). The Use of Animations in Chemical Education. *Proceedings of the International Convention of the Association for Educational Communications and Technology*, pp. 430-441. Anaheim, CA.
- Schank, P., & Kozma, R. (2002). Learning Chemistry Through the Use of a Representation-Based Knowledge Building Environment. *Journal of Computers in Mathematics and Science Teaching*, 21(3), 253-279.
- Schlager, M.S., Fusco, J., & Schank, P. (2002). Evolution of an On-line Community. In K. Renninger and W. Schumar (Eds.), *Building Virtual Communities: Learning and Change in the Cyberspace*, Cambridge, UK: Cambridge University Press, 129-158.
- Diehl, C., Ranney, M., & Schank, P. (2001). Model-based feedback supports reflective activity in collaborative argumentation. In P. Dillenbourg, A. Eurelings, & K. Hakkarainen (Eds.), *European perspectives on computer-supported collaborative learning* (pp. 189-196) [Proceedings of the First European Conference on Computer-Supported Collaborative Learning], Netherlands: Universiteit Maastricht.
- Schank, P., Fenton, J., Schlager, M., & Fusco, J. (1999). From MOO to MEOW: Domesticating technology for online communities. *Proceedings of the Third International Conference on Computer Support for Collaborative Learning* (pp. 518-526). Mahwah, NJ: Lawrence Erlbaum.
- Quellmalz, E., Schank, P., Hinojosa, T., & Padilla, C. (1999). Performance Assessment Links in Science (PALS). ERIC/AE Digest Series ED0-TM-99-04, University of Maryland, College Park. <http://ericae.net/digests/tm9904.pdf>
- Ranney, M., & Schank, P. (1998). Toward an integration of the social and the scientific: Observing, modeling, and promoting the explanatory coherence of reasoning. In S. Read & L. Miller (Eds.), *Connectionist models of social reasoning and social behavior* (pp. 245-274). Mahwah, NJ: Lawrence Erlbaum.
- Schlager, M., Fusco, J., & Schank, P. (1998). Conceptual cornerstones for an on-line community of education professionals. *IEEE Technology and Society, Special Issue on Computers in the Classroom: The Internet in K-12*, 17 (4), 15-21.
- Kozma, R., & Schank, P. (1998). Connecting with the twenty-first century: Technology in support of education reform. In D. Palumbo and C. Dede (Eds.), *Association for Supervision and Curriculum Development 1998 Yearbook: Learning and Technology*, pp. 3-27. Alexandria, VA: ASCD.

- Schlager, M., & Schank, P. (1997). TAPPED IN: A new on-line community concept for the next generation of Internet technology. In R. Hall, N. Miyake & N. Enyedy (Eds.), *Proceedings of the Second International Conference on Computer Support for Collaborative Learning*, pp. 231-240. Hillsdale, NJ: Erlbaum.
- Ranney, M., Schank, P., Hoadley, C., & Neff, J. (1996). "I know one when I see one": How (much) do hypotheses differ from evidence? In R. Fidel, B.H. Kwasnik, C. Beghtol, & P.J. Smith (Eds.) *Advances in classification research: Vol. 5.* (ASIS Monograph Series; pp. 141-158.) Medford, NJ: Learned Information. [An earlier version appeared in the (October, 1994) *Proceedings of the Fifth American Society for Information Science SIG/CR Workshop on Classification Research* (pp. 139-156)]
- Pirolli, P., Schank, P., Hearst, M., & Diehl, C. (1996). Scatter/Gather browsing communicates the topic structure of a very large text collection. *Human Factors in Computing Systems CHI '96*, 213-220, New York, NY: Association for Computing Machinery.
- Schank, P. & Schlager, M. (1996). Facilitating Collaborative Problem Solving with Distant Mentor. *CSCW '96 Videos, Demonstrations, and Short Papers*, 7-8.
- Schank, P. and Schlager, M. (1996). Assessing and supporting remote collaborative problem solving. In *Proc. 18th Annual Conf. of the Cognitive Science Society*, pp. 835. Mahwah, NJ: Erlbaum.
- Ranney, M., & Schank, P. (1995). Protocol modeling, bifurcation/bootstrapping, and *Convince Me*: Computer-based methods for studying beliefs and their revision. *Behavior Research Methods, Instruments and Computers*, 27, 239-243.
- Ranney, M., Schank, P., & Diehl, C. (1995). Competence Versus Performance in Critical Reasoning: Reducing the Gap by Using Convince Me. *Psychology Teaching Review*, 4, 2, 151-164.
- Schank, P. (1995). Computational tools for modeling and aiding reasoning: Assessing and applying the Theory of Explanatory Coherence. (Doctoral dissertation, University of California, Berkeley). (University Microfilms No. 9621352).
- Schank, P. & Ranney, M. (1995). Improved reasoning with Convince Me. *Human Factors in Computing Systems CHI '95 Conference Companion*, 276-277. New York, NY: Association for Computing Machinery.
- Hoadley, C., Ranney, M., & Schank, P. (1994). WanderECHO: A connectionist simulation of limited coherence. *Proceedings of the Sixteenth Annual Conference of the Cognitive Science Society*, 421-426, Hillsdale, NJ: Erlbaum.
- Ranney, M., Schank, P., & Diehl, C. (1994). Reducing the competence/performance gap with Convince Me, the reasoner's workbench. In A. Trapp & N. Hammond (Eds.), *Computers in Psychology Handbook*, 54-56. York, England: CTI Centre For Psychology, University of York. [Also to appear in *Psychology Software News*.]
- Schank, P., Ranney, M., & Hoadley, C. (1994). Convince Me [Computer program and manual]. In J.R. Jungck, N. Peterson, & J.N. Calley (Eds.), *The BioQUEST Library*. College Park, MD: Academic Software Development Group, University of Maryland. [An updated version appeared in the 1995 *BioQUEST Library*]
- Schank, P., Ranney, M., Hoadley, C., Diehl, C., & Neff, J. (1994). A reasoner's workbench for improving scientific thinking: Assessing Convince Me. *Proceedings of the International Symposium on Mathematics/Science Education and Technology*. Charlottesville, VA: AACE.
- Ranney, M., Schank, P., Mosmann, A., & Montoya, G. (1993). Dynamic explanatory coherence with competing beliefs: Locally coherent reasoning and a proposed treatment. In T.-W. Chan (Ed.), *Proceedings of the International Conference on Computers in Education: Applications of Intelligent Computer Technologies* (pp. 101-106).
- Schank, P., Linn, M., & Clancy, M. (1993). Supporting Pascal programming with an on-line template library and case studies. *International Journal of Man-Machine Studies*, 38, 1031-1048.
- Schank, P. & Ranney, M. (1993). Can reasoning be taught? *Educator*, 7 (1), 16-21. [Special issue on Cognitive Science and Education].
- Schank, P., and Rowe, L. (1993). The design and assessment of a hypermedia course on semiconductor manufacturing. *Journal of Educational Multimedia and Hypermedia*, 2 (3), 299-320.
- Schank, P., and Ranney, M. (1992). Assessing explanatory coherence: A new method for integrating verbal data with models of on-line belief revision. *Proceedings of the Fourteenth Annual Conference of the Cognitive Science Society*, 599-604. Hillsdale, NJ: Erlbaum.
- Schank, P., and Ranney, M. (1991). The psychological fidelity of ECHO: Modeling an experimental study of explanatory coherence. *Proceedings of the Thirteenth Annual Conference of the Cognitive Science Society*, 892-897. Hillsdale, NJ: Erlbaum.