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Visiting Assistant Professor, Department of Linguistics, Cornell University (Fall 2011)
Assistant Professor, Department of Computer Science and Center of Cognitive Science,
Rutgers University (2005–2011)

- Education** PhD in computer science 2005, Harvard University
[Dissertation: “Linguistic side effects”](#)
Committee: Stuart M. Shieber (advisor), Barbara J. Grosz, Avi Pfeffer, Norman Ramsey
Apparently noncompositional phenomena in natural languages can be analyzed like computational side effects in programming languages: anaphora can be analyzed like state, intensionality can be analyzed like environment, quantification can be analyzed like delimited control, and so on. We thus term apparently noncompositional phenomena in natural languages *linguistic side effects*. We put this new, general analogy to work in linguistics as well as programming-language theory.
BA in mathematics 1999, cum laude in general studies, Harvard University
Phi Beta Kappa; Harvard College and John Harvard Scholarships
- Awards** Best paper (with Oleg Kiselyov) 2009, working conference on domain-specific languages
Beth dissertation award 2006, Association for Logic, Language and Information
Best paper (with Balder D. ten Cate) 2002, ESSLLI student session
First place (with Dylan P. Thurston) 2001, ACM ICFP programming contest
- Book chapters** [Fun with type functions](#). Oleg Kiselyov, Simon Peyton Jones, and Chung-chieh Shan. In *Reflections on the work of C. A. R. Hoare*. ed. A. W. Roscoe, Cliff B. Jones, and Ken Wood, 303–333. Springer, 2010.
[Axiomatizing Groenendijk’s logic of interrogation](#). Balder D. ten Cate and Chung-chieh Shan. In *Questions in dynamic semantics*, ed. Maria Aloni, Alastair Butler, and Paul Dekker, 63–82. Elsevier, 2007.
[Linguistic side effects](#). In *Direct compositionality*, ed. Chris Barker and Pauline Jacobson, 132–163. Oxford University Press, 2007. Presented since 2002 at the Universities of AZ, BC, CA San Diego, IL Urbana-Champaign, PA, Rochester, UT, VT, and WA; Boston, Brown, Cornell, Harvard, Indiana, Rutgers, and Stanford Universities; City College of New York; DIMACS; MIT; logic and computational linguistics workshop; New England programming languages and systems symposium; Oregon Graduate Institute; direct compositionality workshop.
- Refereed journal articles** Functional unlparsing. Kenichi Asai, Oleg Kiselyov, and Chung-chieh Shan. *Higher-Order and Symbolic Computation*, to appear. Presented at the symposium in honor of Mitchell Wand, 2009.
[Purely functional lazy nondeterministic programming](#). Sebastian Fischer, Oleg Kiselyov, and Chung-chieh Shan. *Journal of Functional Programming* 21(4–5):413–465, 2011.
[Shifting the stage: staging with delimited control](#). Yuki Yoshi Kameyama, Oleg Kiselyov, and Chung-chieh Shan. *Journal of Functional Programming* 21(6):617–662, 2011.
[The character of quotation](#). *Linguistics and Philosophy* 33(5):417–443, 2010. Presented at the Yale syntax colloquium, November 5, 2010.
[Finally tagless, partially evaluated: tagless staged interpreters for simpler typed languages](#). Jacques Carette, Oleg Kiselyov, and Chung-chieh Shan. *Journal of Functional Programming* 19(5):509–543, 2009. Presented since 2008 at the New Jersey programming languages and systems seminar, the University of Waterloo, and Cornell University.

- Donkey anaphora is in-scope binding. Chris Barker and Chung-chieh Shan. *Semantics and Pragmatics* 1(1):1–46, 2008.
- A static simulation of dynamic delimited control. *Higher-Order and Symbolic Computation* 20(4):371–401, 2007.
- Explaining crossover and superiority as left-to-right evaluation. Chung-chieh Shan and Chris Barker. *Linguistics and Philosophy* 29(1):91–134, 2006. Presented at the ESSLLI 2004 workshops on syntax, semantics and pragmatics of questions and on semantic approaches to binding theory. Also poster at North East Linguistic Society, November 8–10, 2002.
- A modal interpretation of the logic of interrogation. Rani Nelken and Chung-chieh Shan. *Journal of Logic, Language and Information* 15(3):251–271, 2006.
- On the static and dynamic extents of delimited continuations. Dariusz Biernacki, Olivier Danvy, and Chung-chieh Shan. *Science of Computer Programming* 60(3):274–297, 2006.
- Types as graphs: continuations in Type Logical Grammar. Chris Barker and Chung-chieh Shan. *Journal of Logic, Language and Information* 15(4):331–370, 2006. Presented at the New Jersey programming languages and systems seminar, February 27, 2004.
- On the dynamic extent of delimited continuations. Dariusz Biernacki, Olivier Danvy, and Chung-chieh Shan. Report RS-05-13, BRICS. Abbreviated version in *Information Processing Letters* 96(1):7–17, 2005.
- Temporal versus non-temporal “when”. *Snippets* 6:14–15, 2002.

**Refereed
conference
and
workshop
papers**

- Entailment above the word level in distributional semantics. Marco Baroni, Raffaella Bernardi, Ngoc-Quynh Do, and Chung-chieh Shan. In *Proceedings of the 13th conference of the European chapter of the ACL*, 2012.
- Generating quantifiers and negation to explain homework testing. Jason Perry and Chung-chieh Shan. In *Proceedings of the 5th workshop on innovative use of NLP for building educational applications*, ed. Joel Tetreault, Jill Burstein, and Claudia Leacock, 57–65, 2010. Presented at the Free University of Bozen/Bolzano, 2011.
- Position paper: the case for JavaScript transactions. Mohan Dhawan, Chung-chieh Shan, and Vinod Ganapathy. In *Proceedings of the 5th workshop on programming languages and analysis for security*, ed. Anindya Banerjee and Deepak Garg, 2010.
- Principles of interdimensional meaning interaction. Chris Barker, Raffaella Bernardi, and Chung-chieh Shan. In *Proceedings from Semantics and Linguistic Theory XX*, ed. Nan Li and David Lutz, 109–127. Cornell University Press, 2010.
- Characterizing quotation. In *Proceedings from Semantics and Linguistic Theory XIX*, ed. Satoshi Ito and Ed Cormany and David Lutz, 413–426. Cornell University Press, 2009. (Invited.) Presented at Radboud University Nijmegen, 2008.
- Embedded probabilistic programming. Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the working conference on domain-specific languages*, ed. Walid Taha, 360–384. Lecture notes in computer science 5658, Springer, 2009. (Best paper award.) Posters at the NIPS*2008 workshop on probabilistic programming and at IBM PL Day in Hawthorne.
- J is for JavaScript: a direct-style correspondence between Algol-like languages and JavaScript using first-class continuations. Olivier Danvy, Chung-chieh Shan, and Ian Zerny. In *Proceedings of the working conference on domain-specific languages*, ed. Walid Taha, 1–19. Lecture notes in computer science 5658, Springer, 2009.
- Lifted inference: normalizing loops by evaluation. Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the workshop on normalization by evaluation*, 2009. Presented at the New Jersey programming languages and systems seminar, October 2, 2009, the probabilistic programming workshop, January 9, and Northeastern University, February 10, 2010.

- Monolingual probabilistic programming using generalized coroutines. Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the 25th conference on uncertainty in artificial intelligence*, 285–292, 2009. Presented at the probabilistic programming workshop, January 8, 2010.
- Purely functional lazy non-deterministic programming. Sebastian Fischer, Oleg Kiselyov, and Chung-chieh Shan. In *Proceedings of the international conference on functional programming*, 11–22, 2009.
- Shifting the stage: staging with delimited control. Yukiyoishi Kameyama, Oleg Kiselyov, and Chung-chieh Shan. In *Proceedings of the symposium on partial evaluation and semantics-based program manipulation*, 111–120, 2009. Presented since 2008 at the Universities of Århus and Copenhagen, McGill and Utrecht Universities, IBM PL Day in Hawthorne, and Microsoft Research Cambridge.
- Closing the stage: from staged code to typed closures. Yukiyoishi Kameyama, Oleg Kiselyov, and Chung-chieh Shan. In *Proceedings of the symposium on partial evaluation and semantics-based program manipulation*, 147–157, 2008.
- Inverse scope as metalinguistic quotation in operational semantics. In *Proceedings of the 4th international workshop on logic and engineering of natural language semantics*, ed. Kei Yoshimoto, 167–178, 2007. Revised version in *New frontiers in artificial intelligence: JSAI 2007 conference and workshops, revised selected papers*, ed. Ken Satoh, Akihiro Inokuchi, Katashi Nagao, and Takahiro Kawamura, 123–134. Lecture notes in computer science 4914, Springer, 2008.
- Lightweight monadic regions. Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the Haskell symposium*, 1–12, 2008.
- Pure, declarative, and constructive arithmetic relations (declarative pearl). Oleg Kiselyov, William E. Byrd, Daniel P. Friedman, and Chung-chieh Shan. In *Proceedings of the 9th international symposium on functional and logic programming*, ed. Jacques Garrigue and Manuel Hermenegildo, 64–80. Lecture notes in computer science 4989, Springer, 2008.
- Boosting optimal logical patterns using noisy data. Noam Goldberg and Chung-chieh Shan. In *Proceedings of the SIAM international conference on data mining*, 228–236, 2007.
- Causal reference and inverse scope as mixed quotation. In *Proceedings of the 16th Amsterdam colloquium*, ed. Maria Aloni, Paul Dekker, and Floris Roelofsen, 199–204. Institute for Logic, Language and Computation, University of Amsterdam, 2007.
- Delimited continuations in operating systems. Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the conference on modeling and using context*, ed. Boicho Kokinov, Daniel C. Richardson, Thomas R. Roth-Berghofer, and Laure Vieu, 291–302. Lecture notes in computer science 4635, Springer, 2007. Posters at USENIX technical conference and at CONTEXT.
- Finally tagless, partially evaluated: tagless staged interpreters for simpler typed languages. Jacques Carette, Oleg Kiselyov, and Chung-chieh Shan. In *Proceedings of the 5th Asian symposium on programming languages and systems*, ed. Zhong Shao, 222–238. Lecture notes in computer science 4807, Springer, 2007.
- Lightweight static resources: sexy types for embedded and systems programming. Oleg Kiselyov and Chung-chieh Shan. In *Draft proceedings of the 8th symposium on trends in functional programming*, ed. Marco T. Morazán and Henrik Nilsson. Technical report TR-SHU-CS-2007-04-1, Department of Mathematics and Computer Science, Seton Hall University, 2007.
- A substructural type system for delimited continuations. Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the international conference on typed lambda calculi and*

- applications*, ed. Simona Ronchi Della Rocca, 223–239. Lecture notes in computer science 4583, Springer, 2007. Presented at the New Jersey programming languages and systems seminar, February 16.
- [Delimited dynamic binding](#). Oleg Kiselyov, Chung-chieh Shan, and Amr Sabry. In *Proceedings of the international conference on functional programming*, 26–37, 2006.
- [Lightweight static capabilities](#). Oleg Kiselyov and Chung-chieh Shan. In *Proceedings of the programming languages meets program verification workshop*, ed. Aaron Stump and Hongwei Xi, 79–104. Electronic notes in theoretical computer science 174(7), Elsevier, 2006.
- [Functional pearl: backtracking, interleaving, and terminating monad transformers](#). Oleg Kiselyov, Chung-chieh Shan, Daniel P. Friedman, and Amr Sabry. In *Proceedings of the international conference on functional programming*, 192–203, 2005.
- [Binding alongside Hamblin alternatives calls for variable-free semantics](#). In *Proceedings from Semantics and Linguistic Theory XIV*, ed. Kazuha Watanabe and Robert B. Young, 289–304. Cornell University Press, 2004.
- [Delimited continuations in natural language: quantification and polarity sensitivity](#). In *Proceedings of the 4th continuations workshop*, ed. Hayo Thielecke, 55–64. Technical report CSR-04-1, School of Computer Science, University of Birmingham, 2004.
- [Functional pearl: implicit configurations—or, type classes reflect the values of types](#). Oleg Kiselyov and Chung-chieh Shan. Technical report TR-15-04, Division of Engineering and Applied Sciences, Harvard University. [Abbreviated version](#) in *Proceedings of the 2004 Haskell workshop*, 33–44. Association for Computing Machinery, 2004.
- [A logic of interrogation should be internalized in a modal logic for knowledge](#). Rani Nelken and Chung-chieh Shan. In *Proceedings from Semantics and Linguistic Theory XIV*, ed. Kazuha Watanabe and Robert B. Young, 197–211. Cornell University Press, 2004.
- [Polarity sensitivity and evaluation order in type-logical grammar](#). In *Proceedings of the 2004 human language technology conference of the North American chapter of the ACL*, ed. Susan Dumais, Daniel Marcu, and Salim Roukos, 2:129–132. Association for Computational Linguistics, 2004.
- [Shift to control](#). In *Proceedings of the 5th workshop on Scheme and functional programming*, ed. Olin Shivers and Oscar Waddell, 99–107. Technical report 600, Computer Science Department, Indiana University, 2004.
- [A continuation semantics of interrogatives that accounts for Baker’s ambiguity](#). In *Proceedings from Semantics and Linguistic Theory XII*, ed. Brendan Jackson, 246–265. Cornell University Press, 2002.
- [The partition semantics of questions, syntactically](#). Chung-chieh Shan and Balder D. ten Cate. In *Proceedings of the ESSLLI-2002 student session*, ed. Malvina Nissim, 255–269. 14th European summer school in logic, language and information, 2002. (Best paper award.)
- [Question answering: from partitions to Prolog](#). Balder D. ten Cate and Chung-chieh Shan. In *Proceedings of TABLEAUX 2002: automated reasoning with analytic tableaux and related methods*, ed. Uwe Egly and Christian G. Fermüller, 251–265. Lecture notes in computer science 2381, Springer, 2002. Also in *Proceedings of NLULP-02: the 7th international workshop on natural language understanding and logic programming*, ed. Shuly Wintner. Datalogiske skrifter 92, Department of Computer Science, Roskilde University, 2002.
- [Monads for natural language semantics](#). In *Proceedings of the ESSLLI-2001 student session*, ed. Kristina Striegnitz, 285–298. 13th European summer school in logic, language and information, 2001.

A variable-free dynamic semantics. In *Proceedings of the 13th Amsterdam colloquium*, ed. Robert van Rooy and Martin Stokhof, 204–209. Institute for Logic, Language and Computation, University of Amsterdam, 2001.

Fred: artificial neural networks evolving in virtual worlds. In *Proceedings of the international symposium on artificial neural networks*, 343–348. National Cheng-Kung University, Taiwan, 1994.

Other papers

Isolating untrusted JavaScript code using transactions. Mohan Dhawan, Chung-chieh Shan, and Vinod Ganapathy, 2010.

ICFP 2008 poster session. Benjamin Pierce, Colin Runciman, and Chung-chieh Shan. Technical report 640, Department of Computer Science, Rutgers University, 2008.

Interpreting quotations. Presented at the Rutgers linguistics colloquium, October 12, 2007, and at the Semantics Research Group, March 21, 2008.

Interpreting types as abstract values. Oleg Kiselyov and Chung-chieh Shan. Lecture notes for the Formosan Summer School on Logic, Language, and Computation, 2008.

Lightweight static guarantees. Oleg Kiselyov and Chung-chieh Shan. Poster presented at USENIX technical conference, 2007.

Non-adjacent probabilities: must they inform word learning? Dana L. Chesney and Chung-chieh Shan. Poster presented at Association for Psychological Science annual convention, 2007.

Higher-order modules in System F_ω and Haskell. May 15, 2006.

A computational interpretation of classical S4 modal logic. Presented at the New England programming languages and systems symposium, June 6, 2003, and at the 3rd intuitionistic modal logics and applications workshop, June 30, 2005.

Sexy types in action. *ACM SIGPLAN Notices* 39(5):15–22, 2004.

From shift and reset to polarized linear logic. 2003.

Quantifier strengths predict scopal possibilities of Mandarin Chinese *wh*-indefinites. Presented at Harvard University linguistics, April 9, 2003.

Markup optimisation by probabilistic parsing. Chung-chieh Shan and Dylan P. Thurston, 2001. First-place winner in the ACM International Conference on Functional Programming programming contest.

Meanings of multiple-*wh* questions. Paper for Harvard Linguistics 118 (Susumu Kuno, Introduction to discourse analysis) and 205 (Jonathan Nissenbaum, Topics at the syntax-semantics interface), Fall 2000.

Model selection for belief networks when learning with incomplete data. Paper for Harvard Computer Science 282 (Avi Pfeffer, Probabilistic reasoning), Fall 2000.

Random-self-reducibility in the polynomial hierarchy. Paper for Harvard Mathematics Tutorial (Henry Cohn, Probabilistic proof systems), Fall 1997.

Hierarchical distributed election protocols. Steve Chien and Chung-chieh Shan. Paper for Harvard Computer Science 262 (Jim Waldo, Introduction to distributed computing) with several bugs fixed, Spring 1997.

Other talks Programming as collaborative reference. Oleg Kiselyov and Chung-chieh Shan. Off the beaten track workshop, 2012.

Back to the model. Jason Perry and Chung-chieh Shan. LSA workshop on semantics for textual inference, 2011.

Computational effects across generated binders. Part 1: problems and solutions. Part 2: enforcing lexical scope. Yuki Yoshi Kameyama, Oleg Kiselyov, and Chung-chieh Shan.

IFIP Working Group 2.11 (program generation), INRIA Paris, and Cornell University, 2011.

Functional modularity in the lambda calculus. Association for Symbolic Logic winter meeting (with the American Philosophical Association Eastern Division annual meeting). Session on lambda calculi, type systems, and applications to natural language, 2011. (Invited.)

How to reify fresh type variables? Oleg Kiselyov and Chung-chieh Shan. Shonan meeting on dependently typed programming, 2011.

Shadows of meaning. Amsterdam Colloquium, 2011. (Invited.)

What are these control hierarchies? Theory and practice of delimited continuations workshop (Novi Sad), 2011. (Invited.)

Bounded-rational theory of mind for conversational implicature. Oleg Kiselyov and Chung-chieh Shan. Texas Linguistics Society (UT Austin) and Logical Methods for Discourse (LORIA), 2009, and Semantics Research Group and NYU Linguistics semantics group, 2010.

Innate concepts as specialized programs? On Noah Goodman’s talk “Concept learning as probabilistic program induction”. Cornell workshop on grammar induction, 2010.

Lightweight static capabilities. Oleg Kiselyov and Chung-chieh Shan. Utrecht University computer science, 2009, and Stanford University computer science, 2010.

Mandarin Chinese wh-indefinite scope by mixed quotation. Cornell linguistics, 2010.

Mechanizing multilevel metatheory with control effects. Yuki Yoshi Kameyama, Oleg Kiselyov, and Chung-chieh Shan. Workshop on mechanizing metatheory, 2010.

The MetaOCaml files: status report and research proposal. Oleg Kiselyov and Chung-chieh Shan. ML workshop and IFIP Working Group 2.11 (program generation), 2010.

Probabilistic programming using first-class stores and first-class continuations. Oleg Kiselyov and Chung-chieh Shan. ML workshop, 2010.

Self-applicable probabilistic inference without interpretive overhead for bounded-rational theory of mind. Oleg Kiselyov and Chung-chieh Shan. UC Berkeley, IFIP Working Group 2.11 (program generation), University of Rochester, MIT, 2009, Stanford University linguistics, Microsoft Research New England, Tufts University, Tokyo Institute of Technology, and New England programming languages and systems symposium, 2010.

Typed metaprogramming with effects. 5th international workshop on logical frameworks and meta-languages: theory and practice, 2010. (Invited.)

Donkey sentences as program generators. University of Århus, 2008.

Functional un-unparsing. University of Århus, 2008.

Theory of mind and bounded rationality without interpretive overhead. Oleg Kiselyov and Chung-chieh Shan. University of Amsterdam and University of Århus, 2008.

Reasoning about contexts in Henkin models. Chris Barker and Chung-chieh Shan. Workshop on lambda calculus and formal grammar, 2008.

Embedding languages. Rutgers computer science, 2007.

Quotation and effects in natural language: three applications. Oleg Kiselyov and Chung-chieh Shan. IFIP Working Group 2.11 (program generation), 2007.

Quoting side effects. 13th annual Reflections | Projections computing conference, ACM UIUC, 2007.

Language machines. DIMACS Research Experience for Undergraduates seminar, 2006.

Mutable bindings in evaluation contexts. Lightning talk, Workshop on mechanizing metatheory, 2006.

Against the division of labor in scope and binding. Linguistic Society of America 79th annual meeting, 2005.

On Anna Szabolcsi's paper "Proof-theoretic semantics". Rutgers semantics workshop, 2005.
Interaction meanings and intermeaning actions. Rutgers semantics reading group, 2005.

Other projects

McBride A BIB \TeX bibliography style that follows the "Documentation Two" specifications in the *Chicago Manual of Style*. 2002–2004.
longtable A modified version of L \TeX 's longtable package that fixes many bugs. 2003.
psbind A program that trims and reassembles pages in a PostScript document for n -up printing. If you dislike how psnup leaves too much white space in its output, this program is for you. 2001–2003.
Miss Protocol An advice column on computer technology. 2000–2003.
split-linguist A filter to split up digest messages from the LINGUIST mailing list. 2001–2002.
A Haskell 98 implementation of Guy L. Steele, Jr., *Building interpreters by composing monads*, in *POPL '94: conference record of the annual ACM symposium on principles of programming languages*. 2001.
bif2bnt A Web service to convert Bayes nets from BIF format to BNT format. 2000.
fmt2 A program that reformats Chinese text in Big-5 encoding. It breaks lines intelligently using an algorithm similar to that of \TeX . 1998–2000.
The first movement of a sonatina in C major 1999.
Course Decision Assistant Geoffrey Mainland, Chung-chieh Shan, and Alex Wong. An online searchable course catalog for Harvard University. 1996–1999.
Change my signature A Web service that lets anyone change the signature file I use in my personal email messages and Usenet postings. 1997.
huhebi: the self-organizing narrative An early experiment in hypertext collaboration. 1995.
The Microsoft conspiracy Chung-chieh Shan and Kaihsu Tai. An early experiment in non-hypertext collaboration. Taipei: Informationist. 1995.
Miscellany Academic: academia advice, computational linguistics, computer science, research ideas, terminology lookup, typesetting. Other: bicycle, comics recommendations, deaf people, digital piano selection advice, midnight ambiance, sexual orientation, silicon wall clock, string collection, twelve days of the invasion.

Teaching

Lambda: the ultimate syntax-semantics interface, with Oleg Kiselyov (North American summer school in logic, language, and information, 2010; IFIP working conference on domain-specific languages, 2011; Cornell University, 2011)
Composing meanings as programs (European summer school in logic, language and information, 2008)
Continuations: natural language meaning as computation, with Chris Barker (European summer school in logic, language and information, 2004)
Programming languages (undergraduate and graduate), artificial intelligence (graduate), computational modeling (graduate), natural-language semantics (graduate)

Professional activities

Editorial board: *Semantics and Pragmatics*.
Program committee: AISC (artificial intelligence and symbolic computation) 2012. LACL (logical aspects of computational linguistics) 2012. NASSLLI (North American summer school in logic, language, and information) 2012. Off the beaten track: underrepresented problems for programming language researchers 2012. Onward! 2012. WGP (workshop on generic programming) 2012. Continuation workshop 2011 (chair). DSL (domain-specific languages) 2011 (chair). GPCE (generative programming and component engineering) 2011. LACL 2011. ML workshop 2011 (chair). PEPM (workshop on partial evaluation and program manipulation) 2011. UAI (uncertainty in artificial intelligence) 2011. AISC 2010. ESSLLI

(European summer school in logic, language and information) 2010. FLOPS (international symposium on functional and logic programming) 2010. Haskell symposium 2010. NASSLLI 2010. UAI 2010. APLAS (Asian symposium on programming languages and systems) 2009. IFL (implementation and application of functional languages) 2009. Continuation Fest 2008 (chair). GPCE 2008. ICFP (international conference on functional programming) 2008 (poster chair). Haskell workshop 2007. PLPV (programming languages meets program verification workshop) 2007. Scheme workshop 2007.

Member: Association for Computing Machinery. Association for Logic, Language and Information. IFIP TC2 working group on program generation.

Other

experience

Chief technology officer, Idiom Technologies (Waltham, MA), 1999–2000.

Research intern, Mitsubishi Electric Research Laboratory (Cambridge, MA), summer 1998. (Mentor: Matthew Brand)

Research intern, Center for the Neural Basis of Cognition (Pittsburgh, PA), summer 1997. (Mentor: Tai Sing Lee)

Software design engineer, Microsoft Corporation (Redmond, WA), summer 1996.

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