

# Bradley P. Allen

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## Research Statement

My research addresses the implementation problem in knowledge engineering: the difficulty of translating expert knowledge expressed in natural language into a formal knowledge representation to be adopted by organizations and communities for use in automated reasoning. The goal is to enable domain experts to build and maintain knowledge-based systems using natural language directly, without depending on knowledge engineers as intermediaries. I have shown that large language models (LLMs) can use natural language intensional definitions of concepts and roles to evaluate knowledge graphs; that they can articulate rationales for such evaluations, surfacing factual and metalinguistic errors in knowledge graphs; and that they can self-report bilateral doxastic states, enabling sound and complete paraconsistent reasoning even when LLM beliefs are inconsistent. My ongoing work extends this toward structured human-LLM dialogue protocols for collaborative knowledge base construction, bilateral modal logics for reasoning about LLM beliefs, and a systematic comparison of knowledge engineering with the metaphilosophical methodology of conceptual engineering.

## Publications

- [1] Bradley P. Allen. Elenchus: Generating knowledge bases from prover-skeptic dialogues. *arXiv preprint arXiv:2603.06974*, 2026.
- [2] Bradley P. Allen, Prateek Chhikara, Thomas Macaulay Ferguson, Filip Ilievski, and Paul Groth. Sound and Complete Neurosymbolic Reasoning with LLM-Grounded Interpretations. In Leilani H. Gilpin, Eleonora Giunchiglia, Pascal Hitzler, and Emile van Krieken, editors, *Proceedings of The 19th International Conference on Neurosymbolic Learning and Reasoning*, volume 284 of *Proceedings of Machine Learning Research*, pages 392–419. PMLR, 2025.
- [3] Bradley P. Allen and Paul T. Groth. A Benchmark for the Detection of Metalinguistic Disagreements between LLMs and Knowledge Graphs. In *Proceedings of the Special Session on Harmonising Generative AI and Semantic Web Technologies (HGAIS 2024) co-located with the 23rd International Semantic Web Conference (ISWC 2024)*, volume 3953 of *CEUR Workshop Proceedings*, Baltimore, Maryland, 2025. CEUR-WS.org.
- [4] Bradley P. Allen and Paul Groth. Evaluating Class Membership Relations in Knowledge Graphs using Large Language Models. In Albert Meroño-Peñuela, Óscar Corcho, Paul Groth, Elena Simperl, Valentina Tamma, Andrea Giovanni Nuzzolese, María Poveda-Villalón, Marta Sabou, Valentina Presutti, Irene Celino, Artem Revenko, Joe Raad, Bruno Sartini, and Pasquale Lisena, editors, *The Semantic Web: ESWC 2024 Satellite Events*, volume 15344 of *Lecture Notes in Computer Science*, Cham, 2025. Springer.
- [5] Bradley Allen, Fina Polat, and Paul Groth. SHROOM-INDElab at SemEval-2024 Task 6: Zero- and Few-Shot LLM-Based Classification for Hallucination Detection. In *Proceedings of the 18th International Workshop on Semantic Evaluation (SemEval-2024)*, Mexico City, Mexico, 2024. Association for Computational Linguistics.

- [6] Bradley P. Allen and Filip Ilievski. Standardizing Knowledge Engineering Practices with a Reference Architecture. *Transactions on Graph Data and Knowledge*, 2(1):5:1–5:23, 2024.
- [7] Bradley P. Allen. Conceptual Engineering Using Large Language Models. In Guido Löhr Vincent C. Müller, Leonard Dung and Aliya Rumana, editors, *Philosophy of Artificial Intelligence: The State of the Art*, pages 1–22, Cham, 2026. Springer Nature Switzerland.
- [8] Bradley P. Allen, Lise Stork, and Paul Groth. Knowledge engineering using large language models. *Transactions on Graph Data and Knowledge*, 1(1):3:1–3:19, 2023.
- [9] Bradley P Allen, Filip Ilievski, and Saurav Joshi. Identifying and consolidating knowledge engineering requirements. *arXiv preprint arXiv:2306.15124*, 2023.
- [10] Elena Simperl, Paul Groth, Steffen Staab, Marta Sabou, Eva Blomqvist, and Bradley Allen. Knowledge engineering with language models and neural methods. *Dagstuhl Reports*, 12(9):93–96, 2023.
- [11] Bradley P Allen. A brief history of knowledge engineering: A practitioner’s perspective. *Dagstuhl Reports*, 12(9):65–72, 2023.
- [12] Paul Groth, Antony Scerri, Ron Daniel, and Bradley Allen. End-to-end learning for answering structured queries directly over text. *arXiv preprint arXiv:1811.06303*, 2018.
- [13] Paul Groth, Sujit Pal, Darin McBeath, Bradley Allen, and Ron Daniel. Applying universal schemas for domain specific ontology expansion. In *5th Workshop on Automated Knowledge Base Construction (AKBC) 2016*, 2016.
- [14] Bradley Paul Allen. The role of metadata in the second machine age. In *DC-2016, Copenhagen, Denmark*, 2016.
- [15] Bradley P Allen and Valery A Petrushin. Semantic web techniques for searching and navigating video shots in bbc rushes. In *Proc. NIST TRECVID Workshop*, 2006.
- [16] Bradley P Allen and Joseph T Tennis. Building metadata-based navigation using semantic web standards: the Dublin Core 2003 conference proceedings. In *Proceedings of the 2004 Joint ACM/IEEE Conference on Digital Libraries, 2004.*, page 411. IEEE, 2004.
- [17] Bradley P Allen. Case-based reasoning: Business applications. *Communications of the ACM*, 37(3):40–43, 1994.
- [18] Bradley P Allen and S Daniel Lee. A knowledge-based environment for the development of software parts composition systems. In *11th International Conference on Software Engineering*, pages 104–112. IEEE, 1989.
- [19] S Daniel Lee and Bradley P Allen. Deploying expert systems in Ada. In *Proceedings of the conference on Tri-Ada’89: Ada technology in context: application, development, and deployment*, pages 181–190. ACM, 1989.
- [20] Bradley P Allen and Peter L Holtzman. Simplifying the construction of domain-specific automatic programming systems: The NASA automated software development workstation project. In *NASA. Lyndon B. Johnson Space Center, Houston, Texas, First Annual Workshop on Space Operations Automation and Robotics (SOAR 87)*, 1987.
- [21] Bradley P Allen and Peter L Holtzman. A learning apprentice for software parts composition. In *NASA. Marshall Space Flight Center, Third Conference on Artificial Intelligence for Space Applications, Part 1*, 1987.

- [22] Bradley P Allen and J Mark Wright. Integrating logic programs and schemata. In *Proceedings of the Eighth international joint conference on Artificial intelligence-Volume 1*, pages 340–342. Morgan Kaufmann Publishers Inc., 1983.
- [23] MS Fox, BP Allen, SF Smith, and GA Strohm. ISIS: a constraint-directed reasoning approach to job scheduling system summary. Technical report, report no. CMU-RI-TR-83-8, Intelligent system laboratory, The Robotics Institute, Carnegie Mellon University, 1983.
- [24] Mark S Fox, Bradley P Allen, and Gary Strohm. Job-Shop Scheduling: An Investigation in Constraint-Directed Reasoning. In *AAAI*, pages 155–158, 1982.

1,335 citations; *h-index* 15; *i10-index* 16 (Google Scholar, 21 May 2026).

## Education

**University of Amsterdam**, PhD, Computer Science, 2026.

**Carnegie Mellon University**, BS, Applied Mathematics, 1982.

## Service

### Program Committee Member

European Semantic Web Conference (ESWC), 2024, 2026.

International Conference on Knowledge Engineering and Knowledge Management (EKAW), Research Track, 2024, 2026.

Amsterdam AI Thesis Awards, 2025.

The Web Conference, PhD Symposium Track, 2025.

International Semantic Web Conference (ISWC), 2024.

### Reviewer

*Conferences*: NeurIPS, 2026; International Conference on Learning Representations (ICLR), 2026; The Web Conference, 2024, 2025.

*Journals*: Semantic Web Journal; Journal of Web Semantics.

## Research Experience

**University of Amsterdam, Researcher**, 2023–present. Conducting research at the Informatics Institute's Intelligent Data Engineering Lab (INDE Lab) into the use of large language models in knowledge engineering.

**Robotics Institute, Carnegie Mellon University, Senior Research Programmer**, 1982–1984. Designed and developed knowledge-based scheduling systems and frame-based knowledge representation languages at the Institute's Intelligent Systems Laboratory.

## Industry Experience

**SearchStax, Inc., Member, Board of Directors**, 2024–present. Advising SearchStax, a provider of site search software-as-a-service for enterprises.

**Merit International Inc., Chief Architect**, 2021–2025. Technology innovation and architectural governance for Merit's digital trust platform.

**Elsevier Inc., Chief Architect / Vice President, Elsevier Labs**, 2009–2021. Led architecture and R&D groups, establishing data platforms for analytics solutions for researchers and medical professionals.

**Siderean Software, Inc., Founder and CTO**, 2001–2008. Founded semantic search company recognized as a visionary in Gartner's Magic Quadrant for Enterprise Information Access (2007). Assets sold to Open Text Corporation (2011).

**TriVida Corporation, Founder and CTO**, 1997–2001. Web personalization SaaS startup. Sold to Be Free, Inc. (now Conversant) in 2000.

**Limbex Corporation, Founder and CTO**, 1995–1996. Created WebCompass, winner of Byte Magazine's Best Of Show at COMDEX Fall '95. Sold to Quarterdeck Corporation (now Symantec) in 1996.

**Inference Corporation, Vice President / Senior Computer Scientist**, 1984–1995. Created CBR Express and was principal member of the team that built ART, one of the first commercial expert system development environments. As Director of Advanced Technology (1987–1991), managed a profit center conducting research projects for NASA and DARPA. Inference became a public company in 1995.

## Patents

- [1] Bradley P. Allen, Cormac Twomey, and John B. Jensen. Method and apparatus for using faceted meta-data to navigate through information resources. US Patent 7,146,362, 2006.
- [2] Bradley P. Allen, Jeffrey M. Greif, David L. Adam, John B. Jensen, Michael W. Lo, and Cormac Twomey. Online predictive memory. US Patent 6,078,918, 2000.
- [3] Bradley P. Allen. Autonomous learning and reasoning agent. US Patent 5,852,814, 1998.
- [4] Bradley P. Allen. Autonomous learning and reasoning agent. US Patent 5,586,218, 1996.
- [5] Bradley P. Allen and S. Daniel Lee. Case-based reasoning system. US Patent 5,581,664, 1996.