

CURRICULUM VITAE

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Nationality Australian

Qualifications

1993 Doctor of Computer Science and Mathematics
Katholieke Universiteit Nijmegen, The Netherlands

1989 Master of Science (*Cum Laude*)
Katholieke Universiteit Nijmegen, The Netherlands

1982 Bachelor of Science (Major: Computer Science)
University of Queensland, Brisbane, Australia

Professional Memberships

- ACM-SIGIR (Association of Computing Machinery Specialist Interest Group in Information Retrieval)
- ASIST (American Society for Information Science and Technology)
- International Quantum Structures Association

Employment

2006 -	Professor of Information Technology <i>Queensland University of Technology, Australia</i>
2001 - 2005	Distinguished Research fellow <i>CRC for Distributed Systems Technology, Australia</i>
1999 - 2000	Senior Research Scientist <i>CRC for Distributed Systems Technology, Australia</i>
1994 - 1998	Lecture (tenured) <i>Queensland University of Technology, Australia</i>
1992 - 1993	Lecturer <i>Universiteit Utrecht, The Netherlands</i>
1989 - 1992	Researcher <i>Katholieke Universiteit Nijmegen, The Netherlands</i>
1987 - 1989	Scientific Programmer <i>Katholieke Universiteit Nijmegen, The Netherlands</i>
1984 - 1987	Database Analyst <i>Queensland Information Technology Pty. Ltd., Australia</i>
1983 - 1984	Database Programmer <i>Mount Isa Mines Holdings Ltd., Australia</i>
1982 - 1983	Technical Programmer <i>G.H.D Pty. Ltd., Australia</i>

Visiting Professor and Adjunct Appointments

2005 -	Abductive Reasoning Group, Department of Philosophy <i>University of British Columbia, Canada</i>
2001 - 2006	Department of Computing Science <i>University of Glasgow, Scotland</i>

RESEARCH

Areas of investigation: past and present

My research lies within the intersection of information science, applied logic, cognitive science and more lately quantum theory:

- **Quantum Interaction:**
 - The application of quantum theory to model highly contextual systems such as the human mental lexicon, service ecosystems. The development of non-reductionist models of complex phenomena inspired by quantum theory.
- **Practical Logics of Cognitive Systems:**
 - Computational models of socio-cognitive knowledge representation; associational and analogical reasoning in semantic space; analysis of the evolution of “meaning” within semantic space models
 - scientific discovery in semantic space models computed from biomedical literature; social network discovery from human electronic communication; discovery of explicit and tacit community knowledge
- **Information retrieval theory:**
 - Axiomatic theory for information retrieval; logics of “aboutness”; theoretical comparison of information retrieval models; probabilistic models of information retrieval.
 - Theory and operational models of information retrieval logics, e.g., based on belief revision, information flow, belief networks, preference logic of navigation, filtering and search.
- Cognitive- and user- based evaluation of internet search:
 - Process-oriented models of search; analysis of cognitive load within search
- Hypermedia- structure and navigation:
 - Stratified hypermedia structures; theory and practice of lattice structures for browsing hypermedia

RESEARCH

Extramural Funding

- “Automatic text classification: An evaluation”, *Looksmart*, 1998 (US\$3,000)
- “Query refinement in Patent Search: a pilot study”, with R. McArthur (DSTC), *United States Patents Office*, 1998-1999 (US\$96,000)
- “Integrating WebKB and the HyperIndex Browser”, with P. Eklund (Griffith Uni.) and P. Martin (Griffith Uni.), *National Security Agency*, 1999-2000 (US\$200,000)
- “Dynamic Taxonomic support for Educational Pathways”, *Education Australia - EdNA*, 2000 (AUD\$9,500)
- “Interactive query formulation for the Queensland Health Intranet”, *Queensland Health*, 2000 (AUD\$15,840)
- “Concept Learning and Structure Formation for Document Navigation”, with P. Eklund (Uni. Wollongong), D. Song (DSTC). *Australian Research Council Discovery Grant 2003-2005* (AUD\$211,035).
- “Web Service Discovery by Abduction”, *SAP*, 2005 (AUD\$45,000)
- Total revenue of licensing research technology 1999-2005: approx. (AUD\$550,000)
- “Efficient similarity query processing in high dimensional databases”, with X. Zhou (Uni. Queensland), D. Song (Open University). *Australian Research Council Discovery Grant 2006-2008* (AUD\$210,000).
- “Service Ecosystems Management for Collaborative Process Improvement”, with M. Roseman (QUT), M. Dumais (QUT), A. Spink (QUT) *Australian Research Council Linkage Grant 2006-2009* (AUD\$258,920).
- “The Quantum Mechanics of Semantic Space”, with C.J. van Rijsbergen (University of Glasgow), S. Malin (Colgate University) *Australian Research Council Discovery Grant 2007-2009* (AUD\$240,000).
- Partner investigator: EPSRC grant “Towards context-sensitive information retrieval based on quantum theory (EP/F01408/1: 2008-2011) with D. Song and S. Rueger (Open University, U.K.) and C.J. van Rijsbergen and M. Lalmas (University of Glasgow), (GBP 323,703)
- “Generalised Quantum Models of Complexity with Application to Cognitive Systems” with K. Kitto (QUT), *Australian Research Council Discovery Grant 2010-2012*, (AUD\$270,000)

Editorial Board Appointments

- *Journal of Algorithms in Cognition, Informatics and Logic* (Elsevier)
- *Information Retrieval* (Springer)
- *Journal of Applied Logic* (Elsevier)
- *Information Science and Knowledge Management* book series (Springer)

Invited Presentations

- Keynote address: “Is there something quantum-like about the human mental lexicon?”, *The Second International Conference on the Theory of Information Retrieval (ICTIR'09)*, Cambridge, September 10-12, 2009
- Keynote address: “Semantic Space: Bridging the divide between cognitive science, information processing technology and quantum mechanics”, *The Third IEEE International Symposium on Information Technology*, Kuala Lumpur, 26-29 August, 2008
- “Term semantics by association”, *Science meets Industry Information Retrieval Symposium (IRFS 2007)*, Vienna, 8-9 November, 2007
- “The Quantum Mechanics of Semantic Space”, *Data Ecologies 07*, Linz, Austria, July 19-20, 2007
- “Quantum logic of semantic space: An exploratory investigation into context effects”. *Information Retrieval Research Festival*, University of Glasgow, 25th -30th July, 2005.
- “Ankle deep semantics: Augmenting ontologies with word clusters and instance information”, *EVOLVE: Web services conference*, Sydney, 2002

In the media

- “The power of search”, *Sydney Morning Herald*, April 13, 2004
- “Search engine narrows the field”, *The Australian*, October 3, 2000
- “Surfer makes browsing the web easier”, *Business Queensland*, October 28, 1996

TEACHING AND SUPERVISION

Subject areas taught

- Databases and Information Systems
- Information Retrieval
- Knowledge-based Systems
- The Science of Information
- Organizational Databases

Formal teaching surveys average between 4 (“very good”) and 5 (“excellent”)

Ph.D. supervision

- *An axiomatic theory for information retrieval* (Theo Huibers, Universiteit Utrecht, The Netherlands), 1995
- *Dynamic Scalable Resolution of Conceptual Heterogeneity in Distributed Information Systems* (Steve Milliner, Queensland University of Technology), 2000
- *Adaptive information filtering agents on the web* (Raymond Lau, Queensland University of Technology), 2003
- *Computing with Meaning by Operationalising Socio-Cognitive Semantics* (Robert McArthur, Queensland University of Technology), 2007
- *What is information?* (James Cole, University of Queensland), [2009]
- *Dual-control Information Retrieval* (Vitaliy Vitsentiy, Queensland University of Technology), [2009]

REFEREES

Professor Keith van Rijsbergen
Department of Computing Science
University of Glasgow
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Professor W. Bruce Croft
Center for Intelligent Information Retrieval
University of Massachusetts, Amherst
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Professor John H. Woods
Department of Philosophy
University of British Columbia and
Charles S. Peirce Professor of Logic
King's College London
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Dr. Ross Wilkinson
ICT Centre
Commonwealth Scientific and Industrial Research Organisation
`ross.wilkinson@csiro.au`

References

Books

- [1] P.D. Bruza and M. Weeber, editors. *Literature-based Discovery*. Information Science and Knowledge Management. Springer, 2008.

Edited Proceedings

- [2] P. D. Bruza, D. Sofge, W. Lawless, C.J. van Rijsbergen, and M. Klusch, editors. *Proceedings of the Third Quantum Interaction Symposium*, volume 5494 of *Lecture Notes in Artificial Intelligence*. Springer, March 2009.
- [3] B.Z. Halimah., M.T.S. Tengku, C.J. Van Rijsbergen, L. Zadeh, P.D. Bruza, T. Shih, and N.T. Mohd, editors. *Proceedings Symposium on Information Technology (ITSim '08)*. IEEE Press, 2008.
- [4] P.D. Bruza, W. Lawless, C.J. Van Rijsbergen, D. Sofge, B. Coecke, and S. Clark, editors. *Proceedings of the Second Quantum Interaction Symposium (QI-2008)*. College Publications, 2008.
- [5] P.D. Bruza, W. Lawless, C.J. van Rijsbergen, and D. Sofge, editors. *Quantum Interaction*. Association for the Advancement of Artificial Intelligence, AAAI Press, 2007.
- [6] P.D. Bruza, A Spink, and R. Wilkinson, editors. *Proceedings of the Eleventh Australasian Document Computing Symposium (ADCS 2006)*, Australia, 2006. Queensland University of Technology, Faculty of Information Technology. Published as a special issue of the Australian Journal of Intelligent Information Processing Systems (AJIIPS), vol 9, no. 2.
- [7] K. Järvelin, J. Allan, P.D. Bruza, and M. Sanderson, editors. *Proceedings of the Twenty-Seventh Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*. ACM Press, 2004.
- [8] P.D. Bruza, A. Turpin, and A. Moffat, editors. *Proceedings of the Ninth Australasian Document Computing Symposium ADCS 2004*. University of Melbourne, Australia, 2004.
- [9] P.D. Bruza and J. Thom, editors. *Proceedings of the Eighth Australasian Document Computing Symposium ADCS 2003*. CSIRO Mathematical and Information Sciences, Canberra, Australia, 2003.
- [10] P.D. Bruza and J. Thom, editors. *Proceedings of the Second Australasian Document Computing Symposium ADCS'97*. Royal Melbourne Institute of Technology, Australia, 1997.

Chapters

- [11] P. Bruza, D. Widdows, and J. Woods. A Quantum Logic of Down Below. In K. Engesser, D. Gabbay, and D. Lehmann, editors, *Handbook of Quantum Logic and Quantum Structures*, volume 2, pages 625–660. Elsevier, 2009. arXiv:quant-ph/0612051.

- [12] D. Song, G. Cao, P.D. Bruza, and R. Lau. Concept induction via fuzzy c-means clustering on a high dimensional semantic space. In J. Valente de Oliveira and W. Pedrycz, editors, *Advances in Fuzzy Clustering and its Applications*. John Wiley and Sons, 2006.
- [13] P. Bruza and R. Cole. Quantum Logic of Semantic Space: An Exploratory Investigation of Context Effects in Practical Reasoning . In S. Artemov, H. Barringer, A. S. d’Avila Garcez, L. C. Lamb, and J. Woods, editors, *We Will Show Them: Essays in Honour of Dov Gabbay*, volume 1, pages 339–361. London: College Publications, arxiv:quant-ph/0612178 edition, 2005.
- [14] R.M. McArthur and P.D. Bruza. Dimensional representations of knowledge in online community . In Y. Ohsawa and P. McBurney, editors, *Chance Discovery - Foundations and Applications*, volume XVI of *Advances in Information Processing*. Springer-Verlag, 2003.
- [15] R.M. McArthur and P.D. Bruza. Discovery of tacit knowledge and topical ebbs and flows within the utterances of online community. In Y. Ohsawa and P. McBurney, editors, *Chance Discovery - Foundations and Applications*, volume XVI of *Advances in Information Processing*. Springer-Verlag, 2003.
- [16] P.D. Bruza, D. Song, K.F. Wong, and C.H. Cheng. Commonsense Aboutness for Information Retrieval. In M. Mohammadian, editor, *Advances in Intelligent Systems: Theory and Applications*, volume 59 of *Frontiers in Artificial Intelligence and Applications*, pages 288–295. IOS Press, 2000.
- [17] P.D. Bruza and B. van Linder. Preferential Models of Query by Navigation. In F. Crestani, M. Lalmas, and C.J. van Rijsbergen, editors, *Information Retrieval: Uncertainty and Logics*, volume 4 of *The Kluwer International Series on Information Retrieval*. Kluwer Academic Publishers, 1998.
- [18] T.W.C. Huibers and P.D. Bruza. Situations: A general framework for studying Information Retrieval. In R. Leon, editor, *Information retrieval: New systems and current research*, pages 3–25. Taylor Graham, Drymen, Scotland, 1996.

Journal Articles

- [19] P.D. Bruza. What does quantum theory have to say about human memory? *Australasian Science*, (Invited article - In Press), 2009.
- [20] P.D. Bruza, K. Kitto, D. Nelson, and C.L. McEvoy. Is there something quantum-like in the human mental lexicon? *Journal of Mathematical Psychology*, 53:362–377, 2009.
- [21] R. Lau, P.D. Bruza, and D. Song. Towards a Belief Revision Based Adaptive and Context Sensitive Information Retrieval System. *ACM Transactions on Information Systems*, 26(2), 2008.
- [22] D. Widdows, P.D. Bruza, W. Lawless, C.J. van Rijsbergen, and D. Sofge. Quantum interaction. *AI Magazine*, 28(3):99–101, 2007.
- [23] R. Lau, D. Song, P.D. Bruza, K.F. Wong, and D. Chen. An adaptive information agent for document title classification and filtering in document-intensive domains. *Decision Support Systems*, 44:251–265, 2007.
- [24] J King, , P.D. Li, Y. Bruza, and R. Nayak. Preliminary investigations into ontology-based collection selection. *Australian Journal of Intelligent Information Processing Systems (AJIIPS)*, 9(2):33–40, 2006.

- [25] P.D. Bruza, R.J. Cole, Z. Abdul Bari, and D. Song. Towards operational abduction from a cognitive perspective. *Logic Journal of the IGPL*, 14(2):161–177, 2006.
- [26] A.B Barros, M. Dumas, and P.D. Bruza. The Move to Web Service Ecosystems. *BPTrends*, 3(12), 2005.
- [27] P.D. Bruza, D.W. Song, and R.M. McArthur. Abduction in semantic space: Towards a logic of discovery. *Logic Journal of the IGPL*, 12(2):97–110, 2004.
- [28] D.W. Song and P.D. Bruza. Towards context sensitive information inference. *Journal of the American Society for Information Science and Technology*, 54(3):321–334, 2003.
- [29] S. Dennis, P.D. Bruza, and R.M. McArthur. Web searching: A process oriented experimental study of three interactive search paradigms. *Journal of the American Society for Information Science and Technology*, 53(2):120–133, 2002.
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- [32] R. Lau, A. ter Hofstede, and P.D. Bruza. Belief Revision for Adaptive Information Filtering Agents. *International Journal of Cooperative Information Systems*, 10(1 - 2):57–79, 2001.
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- [34] H.A. Proper and P.D. Bruza. What is information discovery about? *Journal of the American Society for Information Science*, 50(9):737–750, 1999.
- [35] M. Lalmas and P.D. Bruza. The Use of Logic in Information Retrieval Modeling. *Knowledge Engineering Review*, 13(3):263–295, 1998.
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- [40] P.D. Bruza and Th.P. van der Weide. Assessing the Quality of Hypertext Views. *ACM SIGIR FORUM*, 24(3):6–25, 1990.

Refereed Conference Articles

- [41] D. Novakovich, P.D. Bruza, and L. Sitbon. nducing shades of meaning by matrix methods : A first step towards thematic analysis of opinion. In *Proceedings of the Third International Conference on Advances in Semantic Processing (SEMAYRO 2009)*. IEEE Press, 2009.

- [42] P.D. Bruza, A.B Barros, and M. Kaiser. Augmenting web service discovery by cognitive semantics and abduction. In *Proceedings 2009 IEEE/WIC/ACM International Joint Conference on Web Intelligence and Intelligent Agent Technology*, pages 403–410. IEEE Press, 2009.
- [43] P.D. Bruza. Is there something quantum-like in the human mental lexicon? In L. Azzopardi, G. Kazai, S.E. Robertson, S. Rueger, M. Shokouhi, D. Song, and E. Yilmaz, editors, *Advances in Information Retrieval Theory*, volume 5766 of *Lecture Notes in Computer Science*. Springer, 2009. (Keynote presentation).
- [44] E.C.M. Hoenkamp, P.D. Bruza, D. Song, and Q. Huang. An effective approach to verbose queries using a limited dependencies language model. In L. Azzopardi, G. Kazai, S.E. Robertson, S. Rueger, M. Shokouhi, D. Song, and E. Yilmaz, editors, *Advances in Information Retrieval Theory*, volume 5766 of *Lecture Notes in Computer Science*, pages 116–127. Springer, 2009.
- [45] P. D. Bruza, K. Kitto, D. Nelson, and C.L. McEvoy. Extracting spooky-activation-at-a-distance from considerations of entanglement. In *Proceedings of the Third Quantum Interaction Symposium*, volume 5494, pages 71–83. Springer, 2009.
- [46] K. Kitto, P. D. Bruza, and L. Sitbon. Generalising unitary time evolution. In *Proceedings of the Third Quantum Interaction Symposium*, volume 5494, pages 17–28. Springer, 2009.
- [47] C. Flender, K. Kitto, and P. D. Bruza. Nonseparability of shared intentionality. In *Proceedings of the Third Quantum Interaction Symposium*, volume 5494, pages 211–224. Springer, 2009.
- [48] C. Flender, K. Kitto, and P. D. Bruza. Beyond ontology in information systems. In *Proceedings of the Third Quantum Interaction Symposium*, volume 5494, pages 289–298. Springer, 2009.
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- [50] A. Bose, R. Nayak, and P.D. Bruza. Improving web service discovery by using semantic models. In J. Bailey, D. Maier, and B. Thalheim, editors, *Proceedings 9th International Conference on Web Information Systems Engineering (WISE 2008)*, volume 5175 of *Lecture Notes in Computer Science*, pages 366–380. Springer, 2008.
- [51] P.D. Bruza. emantic space: Bridging the divide between cognitive science, information processing technology and quantum mechanics. In *Proceedings Symposium on Information Technology (ITSim '08)*, pages 1–9, 2008. (Keynote presentation).
- [52] P.D Bruza, K Kitto, D. Nelson, and C.L. McEvoy. Entangling words and meaning. In *Proceedings of the Second Quantum Interaction Symposium (QI-2008)*, pages 118–124. College Publications, 2008.
- [53] P.D. Bruza and J. Woods. Quantum collapse in semantic space: interpreting natural language argumentation. In *Proceedings of the Second Quantum Interaction Symposium (QI-2008)*, pages 141–147. College Publications, 2008.
- [54] D. Song, Q Huang, S. Rueger, and P.D. Bruza. Facilitating query decomposition in query language modeling by association rule mining using multiple sliding windows. In *Proceedings of ECIR '08*, 2008.

- [55] C. Goucai, J. Warren, R.M. McArthur, P.D. Bruza, D. Kralik, and K. Price. Understanding individual experiences of chronic illness with semantic space models of electronic discussions. In *Proceedings of the Twentieth IEEE International Symposium on Computer-Based Medical Systems*, pages 548–553. IEEE Computer Society, 2007.
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- [68] D. Song, P. D. Bruza, Z. Huang, and R. Lau. Classifying document titles based on information inference. In *Proceedings of the 14th International Symposium on Methodologies for Intelligent Systems (ISMIS 2003)*, pages 297–306. Springer, 2003.
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