Robert C. Williamson — Publications
May 23, 2005

All of my "publications" are listed below, even unpublished ones. The numbers associated with each publication are a "serial number" assigned in approximately chronological order. Since omission of unpublished ones would leave gaps, and since a chronological ordering is rather useful, I have left all of the entries here. Names in *italics* denote coauthor who was a graduate student at the time of writing the initial paper.

Theses

- Robert C. Williamson, *Number Theoretic Transform Convolver*, Bachelor of Engineering Thesis (Q.I.T. 1983).
- Robert C. Williamson, *Software Implementation of Polynomial Transform based Convolution Algorithms*, Master of Engineering Science Thesis, (University of Queensland 1985).
- Robert C. Williamson, *Probabilistic Arithmetic*," PhD Thesis, (University of Queensland 1989).

Edited Volumes

[P92] Peter L. Bartlett, Anthony Burkitt, and Robert C. Williamson (Editors), *Proceedings of the Seventh Australian Conference on Neural Networks*, Department of Engineering, ANU, April 1996. ISBN 0 7315 2429 2, 261 pages.

[P152] David Helmbold and Bob Williamson (Editors), *Computational Learning Theory: 14th Annual Conference on Computational learning theory, COLT2001 and 5th European Conference on Computational learning Theory, EuroCOLT2001, Amsterdam, Netherthelands, Proceedings,* Springer Lecture Notes in Artifical Intelligence (LNAI) 2111, Springer, Berlin, 2001, ISBN 3-540-42343-5. (629 pages)

Book Chapters

[P8] Robert C. Williamson, "Interval Arithmetic and Probabilistic Arithmetic," in *Contributions to Computer Arithmetic and Self-Validating Numerical Methods*, Edited by C. Ullrich, pages 67–80, J.C. Baltzer AG, Scientific Publishing Co., 1990.

[P107] Robert C. Williamson, Alex J.Smola and Bernhard Schölkopf, "Entropy Numbers, Operators, and Support Vector Kernels", chapter in *Advances in Kernel Methods — Support Vector Learning*, MIT Press, to appear, 1998.

[P120] Alex J.Smola, Andreé Elisseff, Bernhard Schölkopf and Robert C. Williamson, "Entropy Numbers for Convex Combinations and MLPs," pages 369–387 in Alex Smola, Peter Bartlett, Bernhard Schölkopf and Dale Schuurmans (Editors), *Advances in Large Margin Classifiers*, MIT Press, 2000.

[P158] Ralf Herbrich and Robert C. Williamson, Learning and Generalization: Theoretical Bounds, invited submission to Michael Arbib (Ed.) *Handbook of Brain Theory and Neural Networks*, 2nd Edition, MIT Press, 2002. ISBN 0-262-01197-2

[P94] *Jennifer A. Fulton*, Robert R. Bitmead and Robert C. Williamson, "Smoothing Approaches to Reconstruction of Missing Data in Array Processing," pages 87–94, in *Defence Applications of Signal Processingi — Proceedings of the US/Australia Joint Workshop on Defence Applications of Signal Processing*, Elsevier, 2001. (Work submitted in 1997!)

[P153] Darren B. Ward, Rodney A. Kennedy and Robert C. Williamson, "Constant Directivity beamforming," pages 3–17 in Michael Brandstein and Darren Ward (Eds) *Microphone Arrays: Signal Processing Techniques and Applications*, Springer, Berlin, 2001. ISBN 3-540-41953-5.

Book Chapters (Submitted)

[P138] Ralf Herbrich, Thore Graepel and Robert C. Williamson, The Structure of Version Space, submitted to Book, Edited by Dawn Holmes and L.C. Jain, Springer, January 2005. Also Microsoft Technical Report MSR-TR-2004-63 July 2004.

Journal Papers

[P3] Robert C. Williamson and Tom Downs, "The Inverse and Determinant of a 2×2 Uniformly Distributed Random Matrix," *Statistics and Probability Letters*, **7,** pages 167-170, (1989).

[P5] Robert C. Williamson and Tom Downs, "Probabilistic Arithmetic: Numerical Methods for Calculating Convolutions and Dependency Bounds," *International Journal of Approximate Reasoning* **4**, pages 89–158 (1990).

[P6] Robert C. Williamson, "An Extreme Limit Theorem for Dependency Bounds of Normalised Sums of Random Variables," *Information Sciences*, **56**, pages 113–141 (1991).

[P7] Robert C. Williamson, "The Law of Large Numbers for Fuzzy Variables under a General Triangular Norm Extension Principle," *Fuzzy Sets and Systems*, **41**, 55–81, (1991).

[P18] Brian C. Lovell and Robert C. Williamson, The Statistical Performance of Some Instantaneous Frequency Estimators,, *IEEE Transactions on Signal Processing* **40**, pages 1708–1723, (July 1992).

[P34] Brian C. Lovell, Robert C. Williamson and Boaulem Boashash, The Relationship Between Instantaneous Frequency and Time Frequency Representations, *IEEE Transactions on Signal Processing*, **41**, pages 1458–1461 (1993).

[P44] Robert C. Williamson, *Ben James*, Brian D.O. Anderson and Peter J. Kootsookos, "Threshold Effects in Maximum Likelihood Multiharmonic Frequency Estimation," *Signal Processing*, **37**, pages 309–331, (1994).

[P45] *Ben James*, Brian D.O. Anderson, and Robert C. Williamson, "Conditional Mean and Maximum Likelihood Approaches to Multiharmonic Frequency Estimation," *IEEE Transactions on Signal Processing*, **42**, pages 1366–1375 (June 1994)

[P32] *Mehmet Karan*, Brian D.O. Anderson and Robert C. Williamson, "Performance of Maximum Likelihood Estimator for Frequency Tracking Problems", *IEEE Transactions on Signal Processing*, **42**(10), 2749–2757, (1994) .

[P43] *Darren Ward*, Rodney A. Kennedy and Robert C. Williamson, "The Theory of Broadband Sensor Arrays with Frequency Invariant Far-Field Beam Patterns" *Journal of the Acoustical Society of America* **97**(2), 1023–1034, (February 1995)

[P30] Robert C. Williamson and Uwe Helmke, "Existence and Uniqueness Results for Neural Network Approximations," *IEEE Transactions on Neural Networks*, **6**(1), 2–13, (1995)

[P31] *Ben James*, Brian D.O. Anderson and Robert C. Williamson, "Characterization of Threshold for Single Tone Maximum Likelihood Estimation," *IEEE Transactions on Signal Processing* **43**(4), 817–821, (April 1995)

[P56] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "Lower Bounds on the VC-Dimension of Smoothly Parametrized Function Classes", *Neural Computation* **7**(5), 1040–1053 (1995) (N.B. theorem 10 in this paper is wrong; A correction has been accepted for publication which rescues the result on neural networks.)

[P33] Uwe Helmke and Robert C. Williamson, "Neural Networks, Rational Functions and Realization Theory" *Mathematics of Control, Signals and Systems*, **8**(1), 27–50, (1995).

[P54] *Mehmet Karan*, Brian D.O. Anderson and Robert C. Williamson, "Efficient Calculation of the Moments of Matched and Mismatched Hidden Markov Models," *IEEE Transactions on Signal Processing*, **43**(10), 2422–2425, (1995)

[P41] *Kim L. Blackmore*, Iven M.Y. Mareels, and Robert C. Williamson, "Learning Nonlinearly Parametrized Decision Regions" Summary in *Journal of Mathematical Systems, Estimation and Control* , **6**(1), 129–132 (1996). Full version to appear later, and available electronically from ftp://ftp.birkhauser.com/journals/jmsec/articles/gzip/88289.ps.gz .

[P55] Peter J. Kootsookos and Robert C. Williamson, "FIR Approximation of Fractional Sample Delay Systems" *IEEE Transactions on Circuits and Systems II: Analog and Digital Signal Processing* **43**(3), 269–271 (1996)

[P46] Peter L. Bartlett and Robert C. Williamson, "The VC-Dimension and Pseudodimension of Two-Layer Neural networks with Discrete Inputs," *Neural Computation* **8**, 653–656 (1996).

[P61] *Darren B. Ward*, Rodney A. Kennedy and Robert C. Williamson, "FIR Filter Design for Frequency Invariant Beamformers," *IEEE Signal Processing Letters*, **3**, pages 69–71, March 1996.

[P42] *Kim L. Blackmore*, Robert C. Williamson and Iven M.Y. Mareels, "Local Minima and Attractors at Infinity of Gradient Descent Learning Algorithms," Summary in *Journal of Mathematical Systems, Estimation and Control*, **6**(2), pages 231–234, (1996). Full version to appear later, and available electronically from ftp://trick.nte.springer.de/jmsec/85167.ps.

[P53] Peter L. Bartlett, Philip M. Long and Robert C. Williamson, "Fat-Shattering and the Learnability of Real-Valued Functions" *Journal of Computer and System Sciences*, **52**(3), 434–452, (1996).

[P57] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "Efficient Agnostic Learning of Neural Networks with Bounded Fan-in" *IEEE Transactions on Information Theory*, **42**(6), 2118–2132, (1996).

[P64] *Jennifer Fulton*, Robert R. Bitmead, and Robert C. Williamson, "Sampling versus Quantization in Speech Coders", *Signal Processing* **56**(3), 209–218, 1997.

[P59] *Kim L. Blackmore*, Robert C. Williamson and Iven M.Y. Mareels, "Decision Region Approximation", *IEEE Transactions on Information Theory*, **43**(3), 903–907, 1997.

[P63] *Kim L. Blackmore*, Robert C. Williamson, Iven M.Y. Mareels, William A. Sethares, "On-line Learning via Congregational Gradient Descent", *Mathematics of Control, Signals and Systems*, **10**(4), 331–363, 1997.

[P97] Darren B. Ward, Robert C. Williamson and Rodney A. Kennedy, "Broadband Microphone Arrays for Speech Acquisition," in *Acoustics Australia*, **26**(1), 17–20, April 1998.

[P65] *Erik Weyer*, Iven M.Y. Mareels and Robert C. Williamson, "On the Relationship Between Behavioural and Standard Methods for System Identification", *Automatica* **34**(6), 801–804, 1998.

[P77] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "The Importance of Convexity in Learning with Squared Loss" *IEEE Transactions on Information Theory* **44**(5), 1974–1980, 1998.

[P85] John Shawe-Taylor, Peter L. Bartlett, Robert C. Williamson and Martin Anthony, "Structural Risk Minimization over Data-Dependent Hierarchies", *IEEE Transactions on Information Theory*, **44**(5), 1926–1940 (1998).

[P88] Peter J. Kootsookos, *Darren B. Ward*, and Robert C. Williamson, "Imposing Pattern nulls on broadband array responses," *Journal of the Acoustical Society of America*, **105**(6), 3390–3398, June 1999. (Expanded journal version of P74.)

[P117] *Thushara D. Abhayapala*, Rodney A. Kennedy and Robert C. Williamson, "Spatial Aliasing for Nearfield Sensor Arrays," *Electronics Letters*, **35**(10), 764–765, 13 May 1999.

[P78] *Erik Weyer*, Iven M.Y. Mareels, and Robert C. Williamson, "Sample Complexity of Stochastic Least Squares System Identification", *IEEE Transactions on Automatic Control*, **44**(7), 1370–1383 (1999) (submitted 1995 and actually based in part on results in a CDC paper from 1992!)

[P108] *Thushara D. Abhayapala*, Rodney A. Kennedy and Robert C. Williamson, "Noise Modelling for Nearfield Array gain Optimization," *IEEE Signal Processing Letters*,**6**(8), 210–212, August 1999.

[P93] *Thushara Abhayapala*, Rodney A. Kennedy and Robert C. Williamson, "Nearfield broadband array design using a radially invariant modal expansion", *Journal of the Acoustical Society of America*, **107**(1), 392–403, 2000.

[P101] *Biljana Radlović*, Robert C. Williamson and Rodney A. Kennedy, "Equalization in an Acoustic Reverberant Environment: Robustness Results," *IEEE Transactions on Speech and Audio Processing*, **8**(3), 311–319, May 2000.

[P115] Bernhard Schölkopf, Alex Smola, Robert Williamson and Peter Bartlett, "New Support Vector Algorithms," *Neural Computation* **12**(5), 1207–1245, May 2000.

[P116] Alex J. Smola, Sebastian Mika, Bernhard Schölkopf and Robert C. Williamson, "Regularised Principal Manifolds", *Journal of Machine Learning Research*, **1**, 179–209, 2001.

[P128] *Simon I. Hill* and Robert C. Williamson, "Convergence of Exponentiated Gradient Algorithms," *IEEE Transactions on Signal Procesing*, **49**(6), 1208–1215, June 2001.

[P132] Bernhard Schölkopf, John C. Platt, John Shawe-Taylor, Robert C. Williamson and Alex J.Smola, "Estimating the Support of a High-Dimensional Distribution,", Microssoft technical report MSR-TR-99-87. Slightly abridged version in *Neural Computation* **13**(7), 1443–1471, 2001. [Full version of P126].

[P102] Robert E. Mahony and Robert C. Williamson, "Prior Knowledge and Preferential Structures in Learning Algorithms," *Journal of Machine Learning Research*, **1**, 311–355, 2001. (see the final version on the JMLR web page

[P100] Robert C. Williamson, Alex Smola and Bernhard Schölkpof, "Generalization Performance of Regularization Networks and Support Vector Machines *via* Entropy Numbers of Compact Operators," *IEEE Transactions on Information Theory*, **47**(6), 2516–2532, 2001.

[P133] *Ying Guo*, Peter L. Bartlett, John Shawe-Taylor and Robert C. Williamson, "Covering Numbers for Support Vector Machines", *IEEE Transactions on Information Theory* **48**(1), 239–250, January 2002. [Refined version of P118]

[P159] Ralf Herbrich and Robert C. Williamson, "Algorithmic Luckiness" Journal of Machine Learning Research **3**, 175–212 (2002).

[P172] Jyrki Kivinen, Alexander J. Smola and Robert C. Williamson, Online Learning With Kernels, *IEEE Transactions on Signal Processing*, **52**(8), 2165–2176, August 2004.

[P142] Richard K. Martin, William A. Sethares, and Robert C. Williamson, "Exploiting Sparsity in Adaptive Filters," *IEEE transactions on Signal Processing*, **50**(8), 1883–1893, August 2002.

[P168] Darren B. Ward, *Eric A. Lehmann* and Robert C. WIlliamson, Particle Filtering Algorithms for Tracking an Acoustic Source in a Reverberant Environment, *IEEE Transactions on Speech and Audio Processing*, **11**(6), 826-836, November 2003.

Accepted Journal Papers

[P129] Robert C. Williamson, John Shawe-Taylor, Bernhard Schölkopf and Alex J. Smola, "Sample Based Generalization Bounds," accepted subject to revision to *IEEE Transactions on Information Theory*, November 1999.

Submitted Journal Papers

[P89] *D.B. Ward*, R.A. Kennedy, and R.C. Williamson, "Adaptive broadband beamforming with a frequency invariant beampattern parameterization," *Intern. Journal of Adapt. Control and Signal Process.*, (submitted March 1997).

[P147] Ying Guo, Peter Bartlett, Alex J. Smola, Robert C. Williamson and Jonathan Baxter, "Norm-based Regularization of Boosting," submitted to *Journal of Machine Learning Research*, August 2001.

[P171] *Cheng Soon Ong*, Alexander J. Smola and Robert C. Williamson, "Learning the Kernel with Hyperkernels,", submitted to *Journal of Machine Learning Research*, May 2003.

[P173] *Eric A. Lehmann* and Robert C. Williamson, "Particle Filter Design using Importance Sampling for Acoustic Source Localisation and Tracking in Reverberant Environments," submitted to *EURASIP Journal on Applied Signal Processing*, special issue on Advances in Multi-Microphone Speech Processing. January 2005.

[P175] Adam Kowalczyk, Alex J. Smola and Robert C. Williamson, "Logic, Trees and Kernels, submitted to *Journal of Machine Learning Research*, 2003.

Patents

[P141] William A. Sethares, Richard K. Martin and Robert C. Williamson, "New Adaptive methods that Exploit Sparsity," preliminary patent disclosure, 9 pages. July 2000.

Refereed Conference Papers (International)

[P2] R.C. Williamson and T. Downs, "Probabilistic Arithmetic and the Distribution of Functions of Random Variables," *Proceedings of the 1987 IASTED International Symposium on Signal Processing and its Applications*, 112–119, Brisbane, (1987)

[P1] R.C. Williamson and L.C. Westphal, "Efficient Software Implementation of Cyclic Convolution Algorithms Based on Polynomial Transforms," *IREECON International Digest of Papers*, 579–582, Melbourne, (1985)

[P4] Robert C. Williamson, "Interval Arithmetic and Probabilistic Arithmetic," *IMACS–GAMM–GI International Symposium on Computer Arithmetic and Self-Validating Numerical Methods*, Basel, (4 pages, no page numbers) (October 1989)

[P9] Brian C. Lovell, Peter J. Kootsookos and Robert C. Williamson, "Efficient Frequency Estimation and Time-Frequency Representations," *Proceedings of the International Symposium on Signal Processing and its Applications (ISSPA90)*, 170–173, (August 1990)

[P11] Robert C. Williamson, "ε-Entropy and the Complexity of Feedforward Neural Networks," *Neural Information Processing Systems 3*, pages 946–952, Morgan Kaufmann, San Mateo, (April 1991)

[P10] Mark J. Damborg, Robert C. Williamson, *Andrew D.B. Paice* and John B. Moore, "Adaptive Nonlinear Estimation with Artificial Neural Networks," *Proceedings of International Symposium on Information Theory and its Applications (ISSITA)*, pages 743–746 (1990)

[P12] Brian C. Lovell, Peter J. Kootsookos and Robert C. Williamson, "The Circular Nature of Discrete-time Frequency Estimates," *Proceedings of International Conference on Acoustics, Speech and Signal Processing,* pages 3369-3372, (May 1991)

[P13] Peter L. Bartlett and Robert C. Williamson, "Perceptron Learning with Reasonable Distributions of Training Examples," *Proceedings of the International Conference on Artificial Neural Networks,* Volume 2, pages 1033–1036, (1991)

[P14] Robert C. Williamson and William A. Sethares, "A Provably Convergent Perceptron-like Algorithm for Learning Hyper-cubic Decision Regions," *Proceedings of the International Conference on Artificial Neural Networks,* Volume 2, pages 1029–1032, (1991)

[P15] Peter L. Bartlett and Robert C. Williamson, "Investigating the Distribution Assumptions in the PAC Learning Model," *Proceedings of the Workshop on Computational Learning Theory,* Morgan Kauffmann, San Mateo, pages 24–32, (1991)

[P19] *Ben James*, Brian D.O. Anderson, and Robert C. Williamson, "Characterization of Threshold for Multiharmonic Maximum Likelihood Frequency Estimation," *Proceedings of the International Symposium on Signal Processing and Applications,* pages 255–258, (1992)

[P20] Robert C. Williamson and Peter L. Bartlett, "Splines, Rational Functions, and Neural Networks," *Advances in Neural Information Processing Systems 4*, Morgan Kaufmann, San Mateo, pages 1040–1047, (1992)

[P21] *Erik Weyer*, Robert C. Williamson and Iven M.Y. Mareels, "An Approach to System Identification Based on Risk Minimization and Behaviours", *Proceedings of the 31st Conference on Decision and Control,* pages 927–932, (1992)

[P35] *Erik Weyer*, Robert C. Williamson, and Iven M.Y. Mareels, "A Principle for System Identification in the Behavioural Framework" Proceedings of the 12th World Congress of the International Federation of Automatic Control, Volume 7, pages 387–390 (July 1993)

[P36] *Kim L. Halliwell*, Robert C. Williamson, and Iven M.Y. Mareels, "Learning Nonlinearly Parametrized Decision Regions" Proceedings of the 12th World Congress of the International Federation of Automatic Control, Volume 5, pages 431–434 (July 1993)

[P37] Uwe Helmke and Robert C. Williamson "Rational Parametrizations of Neural Networks," *Neural Information Processing Systems – 5*, Morgan Kaufmann, San Mateo, pages 623–630, (1993).

[P38] *Mehmet Karan*, Brian D.O. Anderson and Robert C. Williamson, "A Note on the Calculation of the Kullback-Leibler Number between Hidden Markov Models", *Proceedings of the Second International Workshop on Intelligent Signal Processing and Communication Systems*, Japan, pages 93-98, (October 1993)

[P39] *Mehmet Karan*, Brian D.O. Anderson and Robert C. Williamson, "Robustness of Maximum-Likelihood Frequency Estimators Under Model Errors", *Proceedings of IEEE Conference on Decision and Control*, pages 3034-3039, (December 1993)

[P80] Uwe Helmke and Robert C. Williamson, "Parametrization Aspects of Neural Networks and Linear System Theory," *Proceedings of the European Control Conference*, Groningen, 1993.

[P47] *Mehmet Karan*, Brian D.O. Anderson and Robert C. Williamson, "A Simple Calculation of the Joint Moments of Hidden Markov Models," *Proceedings of International Conference on Acoustics, Speech and Signal Processing*, pages IV-333–IV-335, (May 1994)

[P48] *Darren Ward*, Rodney A. Kennedy and Robert C. Williamson, "Design of Frequency-Invariant Broadband Far-field Sensor Arrays," pages 1274–1277 of volume 2 of *Proceedings of the IEEE Antennas and Propagation Society International Symposium and URSI Radio Science Meeting* (July 1994). ISBN 0-7803-2009-3.

[P49] Peter L. Bartlett, Philip M. Long and Robert C. Williamson, "Fat-shattering and the learnability of real-valued functions", *Proceedings of the Seventh Annual ACM Conference on Computational Learning Theory*, pages 299-310, (July 1994)

[P50] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "Lower Bounds on the VC-Dimension of Smoothly Parametrized Function Classes", *Proceedings of the Seventh Annual ACM Conference on Computational Learning Theory*, pages 362–367, (July 1994)

[P67] *Kim L. Blackmore*, Robert C. Williamson, Iven M.Y. Mareels, William A. Sethares, "On-line Learning via Congregational Gradient Descent" pages 265–272 in Proceedings of the Eighth Annual ACM Conference on Computational Learning Theory (1995).

[P68] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "On Efficient Agnostic Learning of Linear Combinations of Basis Functions" pages 369–376 in Proceedings of the Eighth Annual ACM Conference on Computational Learning Theory (1995).

[P69] *Darren B. Ward*, Rodney A. Kennedy and Robert C. Williamson, "Broadband Beamforming with a Single Set of Filter Coefficients" in *Proceedings of the 1995 IEEE Singapore Int. Conf. on Signal Processing, Circuits and Systems*, pp88-93, Singapore, July 1995.

[P71] A. Kowalczyk, J. Szymanski, and R.C. Williamson, "Learning Curves from a Modified VC-Formalism: a Case Study,", *Proceedings of IEEE International Conference on Neural Networks (ICNN'95)*, Volume **6**, pp2939–2943.

[P81] John Shawe-Taylor, Peter Bartlett, Robert C. Williamson, Martin Anthony, "A Framework for Structural Risk Minimisation" *Proceedings of the 9th Annual Conference on Computational Learning Theory*, pages 68-76, 1996.

[P82] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "The Importance of Convexity in Learning with Squared Loss" *Proceedings of the 9th Annual Conference on Computational Learning Theory*, pages 140–146, 1996.

[P70] A. Kowalczyk, J. Szymanski, P.L. Bartlett and R.C. Williamson, "Examples of Learning Curves from a Modified VC-Formalism," *Advances in Neural Information Processing Systems 8*, MIT Press, 1996 (ISBN 0-262-20107-0).

[P74] Peter J. Kootsookos, *Darren B. Ward*, and Robert C. Williamson, "Frequency Invariant Broadband Beamforming with Exact Null Design", pages 105–108 in *Proceedings of the 8th IEEE signal Processing Workshop on Statistical Signal and Array Processing*, 1996. ISBN 0-8186-7576-4.

[P75] Rodney A. Kennedy, Thushara Abhayapala, *Darren B. Ward*, and Robert C. Williamson, "Nearfield Broadband Frequency Invariant Beamforming", pages 905–908 of volume 2 of *Proceedings of IEEE Conference on Acoustics, Speech and Signal Processing*, 1996.

[P72] *Erik Weyer*, Iven M.Y. Mareels and Robert C. Williamson, "Behavioural Oriented Identification in a Stochastic Framework," Proceedings of the 13th IFAC World Congress 1996. Volume I, pages 1–6. ISBN 0-08-042605-0 (CDROM); 0-08-042908-4 (paper).

[P73] *Erik Weyer*, Iven M.Y. Mareels and Robert C. Williamson, "Sample Complexity of Least Squares Identification of FIR and ARX Models," Proceedings of the 13th IFAC World Congress 1996. Volume J, pages 239–244. ISBN 0-08-042605-0 (CDROM); 0-08-042908-4 (paper).

[P83] *Kim L. Blackmore*, Robert C. Williamson, and Iven M.Y. Mareels, "Hasty Congregational Gradient Descent for Online Optimisation," in the *Proceedings of the Australian Engineering Mathematics Conference 1996* (An International Conference on Engineering Mathematics: Research, Education and Industry Linkage), 15–17 July 1996.

[P90] John Shawe-Taylor and Robert C. Williamson, "A PAC Analysis of a Bayesian Estimator", *Proceedings of the Tenth Annual Conference on Computational Learning Theory (COLT97)*, pages 2–9, July 1997. (Published by the Association for Computing Machinery, New York. ISBN 0-89791-891-6)

[P84] *Darren B. Ward*, Rodney A. Kennedy and Robert C. Williamson, "An Adaptive Algorithm for Broadband Frequency Invariant Beamforming," *Proceedings of the IEEE Conference on Acoustics, Speech and Signal Processing*, April 1997.

[P96] Robert C. Williamson, "Some Results in Statistical Learning Theory with Relevance to Nonlinear System Identification," IFAC Nonlinear Control Systems Design Symposium 1998 (NOLCOS98), Preprints, Volume 2, pages 443–448. To appear in the proceedings published by Elsevier

[P95] *Thushara D. Abhayapala*, Rodney A. Kenedy and Robert C. Williamson, "Broadband Beamforming Using Elementary Shape Invariant Beampatterns," Proceedings of ICASSP'98, volume 4, pages 2041–2044.

[P98] Bernhard Schölkopf, Peter L. Bartlett, Alex Smola and Robert C. Williamson, "Support Vector Regression with Automatic Accuracy Control", In L. Niklasson and M. Boden and T. Ziemke (eds.). Proceedings of the 8th International Conference on Artificial Neural Networks, pp. 111 - 116, Springer Verlag, Perspectives in Neural Computing, Berlin.

[P106] *Thushara D. Abhayapala*, Rodney A. Kennedy and Robert C. Williamson, Farfield Array Weight Redesign for Nearfield Beamforming, *Proceedings of 6th IEEE Int. Workshop on Intelligent Sig. Proc. and Comm. Syst. (ISPACS'98)*, Volume 2, pp.537–540.

[P103] Robert C. Williamson, Alex J. Smola and Bernhard Schölkopf, "Entropy Numbers, Operators and Support Vector Kernels," Proceedings of the 4th European Conference on Computational Learning Theory (EUROCOLT'99), 285–300, (1999).

[P112] John Shawe-Taylor and Robert C. Williamson, "Generalization Performance of Classifiers in Terms of Observed Covering Numbers," Proceedings of the 4th European Conference on Computational Learning Theory (EUROCOLT'99), 274–284, (1999).

[P114] Alex J. Smola, Robert C. Williamson, Sebastian Mika and Bernhard Schölkopf, "Regularized Principal Manifolds," Proceedings of the 4th European Conference on Computational Learning Theory (EUROCOLT'99) 214–229, (1999)

[P111] *Thushara D. Abhayapala*, Rodney A. Kennedy and Robert C. Williamson, "Isotropic Noise Modelling for Nearfield Array Processing," *Proceedings of the IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASSPA99)*, pages 873 -876, vol.2 1999.

[P118] Ying Guo, Peter L. Bartlett, John Shawe-Taylor and Robert C. Williamson, "Covering Numbers for Support Vector Machines", Proceedings of the Twelfth Annual Conference on Computational Learning Theory, pages 267–277, 1999.

[P121] *Simon Hill* and Robert C. Williamson, "A Signal Processing Analysis of the Exponentiated Gradient Descent Algorithm," Pages 379–382 in volume 1 of Proceedings of the Fifth International Sympoisium on Signal Processing and its Applications, (ISBN 1 86435 451 8) ISSPA99.

[P124] *Thushara D. Abhayapala*, Rodney A. Kennedy, Robert C. Williamson, and Darren B. Ward, "Nearfield Broadband Adaptive Beamforming," Pages 839–842, volume 2 of Proceedings of the Fifth International Sympoisium on Signal Processing and its Applications, (ISBN 1 86435 451 8) ISSPA99.

[P125] Darren B. Ward and Robert C. Williamson, "Beamforming for a Source Located in the Interior Field of an Array," Pages 873–876 in volume 2 of Proceedings of the Fifth International Sympoisium on Signal Processing and its Applications, (ISBN 1 86435 451 8) ISSPA99.

[P105] Bernhard Schölkopf, Alex J. Smola, Peter L. Bartlett and Robert C. Williamson, Shrinking the Tube: A new Support Vector Regression Algorithm, to appear in M. S. Kearns, S. A. Solla, and D. A. Cohn, editors, Advances in Neural Information Processing Systems 11, MIT Press, Cambridge, MA.

[P130] Paul D. Teal, Robert C. Williamson and Rodney A. Kennedy, "Error Performance of a Channel of Known Impulse Response", Acoustics, Speech, and Signal Processing, 2000. ICASSP '00. Proceedings. 2000 IEEE International Conference on , Volume: 5 , 2000 Page(s): 2733 -2736.

[P143] Marshall Shephard and Robert C. Williamson, "Very Low Voltage Power Conversion," Circuits and Systems, 2001. ISCAS 2001. The 2001 IEEE International Symposium on , Volume: 2 , 2001 Pages 289 -292 vol. 2.

[P123] Bernhard Schölkopf, John Shawe-Taylor, Alex Smola and Robert C. Williamson, "Kernel-Dependent Support Vector Error Bounds," Artificial Neural Networks, 1999. ICANN 99. Ninth International Conference on (Conf. Publ. No. 470) , Volume: 1 , 1999

[P110] *Biljana D. Radlovic*, Robert C. Williamson and Rodney A. Kennedy, "On the Poor Robustness of Sound Equalization in Reverberant Environments," Acoustics, Speech, and Signal Processing, 1999. Proceedings., 1999 IEEE International Conference on , Volume: 2 , 1999 Page(s): 881 -884 vol.2

[P134] Robert E. Mahony and Robert C. Williamson, Riemannian Structure of Some New Gradient Descent Learning Algorithms in Proceedings of the IEEE 2000 Adaptive Systems for Signal Processing, Communication and Control Symposium (AS-SPCC)), S. Haykin and J. Principe (Eds), IEEE Press, New Jersey, ISBN 0-7803-5800-7, pages 197–202.

[P127] Alex Smola, John Shawe-Taylor, Bernhard Schölkopf and Robert C. Williamson, "The Entropy Regularization Information Criterion," Advances in Neural Information processing Systems 12, (NIPS'99), pages 342–348, MIT Press, 2000.

[P135] Robert C. Williamson, Alex J. Smola and Bernhard Schölkopf, Entropy Numbers of Linear Function Classes Proceedings of COLT2000, 309–319, July 2000.

[P126] Bernhard Schölkopf, Robert C. Williamson, Alex Smola, John Shawe-Taylor and John Platt, "Support Vector Method for Novelty Detection," Advances in Neural Information processing Systems 12, (NIPS'99), pages 582–588, MIT Press, 2000.

[P137] Alex J.Smola, Zoltán Óvári and Robert C. Williamson, Regularization with Dot Product Kernels, Advances in neural Information processing Systems 13, (NIPS 2000), pages 308–314, 2001.

[P140] Thore Graepel, Ralf Herbrich and Robert Williamson, From Margin to Sparsity, Advances in neural Information processing Systems 13, (NIPS 2000), pages 210-216, 2001.

[P155] Ralf Herbrich and Robert C. Williamson, "Algorithmic Luckiness", Advances in Neural Information processing Systems 14, T. G. Dietterich, S. Becker and Z. Ghahramani (eds), MIT Press, 2002.

[P157] Darren B. Ward and Robert C. Williamson, Particle Filtering Beamformingfor Acoustic Source Localization in a Reveberant Environment, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP-2002), vol. II, pp.1777–1780, Orlando, FL, USA, May 2002.

[P91] Shahar Mendelson and Robert C. Williamson, "Agnostic Learning Nonconvex Function Classes", pages 1–13, in J. Kivinen and R.H. Sloan (Eds), Computational Learning Theory 15th Annual Conference on Computational Learning Theory, COLT 2002, Sydney, Australia, July 8-10, 2002. Proceedings Lecture Notes in Artificial Intelligence 2375.

[P164] *Eric A. Lehmann*, Darren B. Ward and Robert C. Williamson, Experimental Comparison of Particle Filtering Algorithms for Acoustic Source Localization in a Reverberant Room, ICASSP 2003, vol. 5, pp. 177-180, Hong Kong, China, April 2003

[P149] Jyrki Kivinen, Alex Smola, and Robert C. Williamson, "Online Learning with kernels", in NIPS2001.

[P148] Adam Kowalczyk, Alex Smola and Robert C. Williamson, "Kernel machines and Boolean functions" in NIPS2001.

[P162] Jyrki Kivinen, Alex Smola and Robert C. Williamson, Large Margin Classification for Moving Targets, ALT'02 (13th International Conference on Algorithmic Learning Theory), pages 113-127, Lecture Notes in Artificial Intelligence 2533,November 24–26, 2002.

[P122] Thore Graepel, Ralf Herbrich, Bernhard Schölkopf, Alex Smola, Peter Bartlett, Klaus-Robert Müller, Klaus Obermayer and Robert Williamson, "Classification on Proximity Data with LP-Machines," Ninth International Conference on Artificial Neural Networks, pages 304-309, London 1999.

Refereed Conference Papers (International) (Accepted)

[P150] Richard K. Martin, William A. Sethares, Robert C. Williamson and C. Richard Johnson Jr, Exploiting Sparsity in Adaptive Filters, to appear in Proceedings of 2001 Conference on Information Sciences and Systems, The Johns Hopkins University, March 2001.

[P160] *Cheng Soon Ong*, Alex Smola and Robert C. Williamson, Superkernels, to appear in NIPS 2002.

[P161] *Edward Harrington*, Jyrki Kivinen, Robert C. Williamson, Ralf Herbrich and John Platt, Online Bayes Point Machines, to appear in PAKDD 2003.

[P165] *Edward Harrington*, Jyrki Kivinen and Robert C. Williamson, Channel Equalization and the Bayes Point Machine, to appear in ICASSP 2003.

[P166] *Terence Betlehem* and Robert C. Williamson, Acoustic Beamforming Exploiting Directionality of Human Speech Sources, to appear in ICASSP 2003.

[P169] *James A. McGowan* and Robert C. Williamson, Loop Removal from LDPC Codes, to appear in Proceedings of the IEEE Information Theory Workshop, Paris, Spring 2003.

Refereed Conference Papers (International) (Submitted)

[P146] *Ying Guo,* Peter L. Bartlett, Alex Smola and Robert C. Williamson, "Norm based Regularization of Boosting" submitted to NIPS2001.

[P174] Krzysztof Krakowski, Robert Mahony, Robert Williamson and Manfred Warmuth, Online Learning on Spheres submitted to COLT2005, January 2005.

[P176] Omri Guttman, S.V.N. Vishwanathan and Robert C. Williamson Learnability of Probabilistic Automata via Oracles submitted to ALT2005.

Refereed Conference Papers (National)

[P16] Robert C. Williamson and William A. Sethares, "Learning Hyper-Cubic and Convex Polyhedral Decsion Regions Using Perceptron-Like Algorithms" *Proceedings of the Second Australian Conference on Neural Networks*, pages 126–129, (February 1991)

[P17] Robert C. Williamson, "ε-Entropy, Functional Representation and Feedforward Neural Networks", *Proceedings of the Second Australian Conference on Neural Networks,* pages 155–158, (February 1991)

[P22] Robert C. Williamson and Uwe Helmke, "Approximation Theoretic Results for Neural Networks" *Proceedings of the Australian Conference on Neural Networks,* pages 217–222, (1992)

[P23] Robert C. Williamson and Peter L. Bartlett, "Piecewise Linear Feedforward Neural Networks," *Proceedings of the Australian Conference on Neural Networks,* pages 260–261, (1992)

[P40] *Kim Halliwell,* Iven M.Y. Mareels, and Robert C. Williamson, "Learning of Nonlinearly Parametrized Decision Regions," *Proceedings of the Australian Conference on Neural Networks*, pages 74–77, (1993)

[P51] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "The Vapnik-Chervonenkis Dimension of Neural Networks with Restricted Parameter Ranges", *Proceedings of Australian Conference on Neural Networks*, pages 198–201, (1994)

[P52] *Kim L. Halliwell*, Robert C. Williamson and Iven M.Y. Mareels, "Local Minima and Attractors at Infinity of Gradient Descent Learning Algorithms," *Proceedings of Australian Conference on Neural Networks*, pages 161–164, (1994)

[P58] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "Efficient Agnostic Learning of Neural Networks with Bounded Fan-in" Proceedings of Australian Conference on Neural Networks, pages 201–204, 1995

[P66] *Kim L. Blackmore*, Robert C. Williamson and Iven M.Y. Mareels, "Decision Region Approximation" Proceedings of Australian Conference on Neural Networks, pages 106–109, 1995

[P90] *Kim L. Blackmore*, Robert C. Williamson and Iven M.Y. Mareels, "Decision Region Approximation" (abstract only) Proceedings of the Australian and New Zealand Industrial and Applied Mathematics Conference.

[P60] Peter L. Bartlett and Robert C. Williamson, "The sample complexity of neural network learning with discrete inputs" Proceedings of Australian Conference on Neural Networks, pages 189–192, 1995

[P167] *James A. McGowan* and Robert C. Williamson, Removing Loops for LDPC Codes, to appear in Proceedings of Australian Communications Theory Workshop 2003.

Tutorials

[P131] John Shawe-Taylor and Robert C. Williamson, "Large Margin Classification" Tutorial presented at COLT'99.

Reviews

[P163] Robert C. Williamson, Review of *Learning Kernel Classifiers*, *Neural Networks* 15, p.930, 2002.

Talks

[P136] Robert C. Williamson 'Margins, Sparsity and Perceptrons', talk presented an Neural Networks 2000 (Workshop held in Graz, Austria, May 2000).

[P144] Robert C. Williamson, "Telephones," special invited lecture for ENGN1211 *Discovering Engineering* on the history of the telephone.

[P145] Robert C. Williamson, "Riemannian Structure of Some New Gradient Descent Learning Algorithms", talk given at ANU, 21/9/2000.

[P151] Robert C. Williamson, "SRM and VC Theory", talk presented at Dagstuhl on Inference Principles and Model Selection.

[P154] Robert C. Williamson, Incorporating Priors in Classical Gradient Descent Learning Algorithms talk given at Microsoft Research (Cambridge and Redmond), July/August 2001

[P156] Robert C. Williamson, "Inductive Principles," Talk presented at the Machine Learning Summer School. Canberra, February, 2002.

[P170] Robert C. Williamson, "Machine Learning — A Personal Introduction, presented at the Machine Learning Summer School, Canberra, February 2003.

Workshops (with proceedings)

[P24] Brian D.O. Anderson, *Ben James* and Robert C. Williamson, "Frequency Line Tracking, Extended Kalman Filters and Some HMM Problems," *Proceedings of the Wirrina Cove HMM Workshop,* (11 pages, no page numbers), (1992).

Technical Reports

[P119] Bernhard Schölkopf, John Shawe-Taylor, Alex J. Smola and Robert C. Williamson, "Generalization Bounds via Eigenvalues of the Gram Matrix," Neurocolt TechReport NC2-TR-1999-035.

[P139] Bernhard Scholkopf, Ralf Herbrich, Alex J. Smola and Robert C. Williamson, A Generalized Representer Theorem, NeuroCOLT2 Technical report NC2-TR-2000-81. Submitted to NIPS 2000.

Unpublished Reports

[P79] Peter L. Bartlett and Robert C. Williamson, "Sample Complexity versus Approximation Error" (1993)

[P76] *Jennifer A. Fulton*, Robert R. Bitmead and Robert C. Williamson, "Sampling Below the Nyquist Rate in an ADPCM Speech Coder," submitted to IEEE Conference on Acoustics, Speech and Signal Processing, 1996. (not accepted)

[P26] *Ben James*, Brian D.O. Anderson and Robert C. Williamson, "Characterization of Threshold for Multiharmonic Maximum Likelihood Estimation," submitted to *IEEE Transactions on Signal Processing.*

[P25] Robert C. Williamson and *Andrew D.B. Paice*, "The Number of Nodes Required in a Feed-Forward Neural Network for Functional Representation," submitted to *Neural Networks* (under revision 1990). I never bothered to resubmit in the end; the work was effectively superseded by results published by Barron in 1992. It was an extended version of P11.

[P27] *Ben James*, Brian D.O. Anderson and Robert C. Williamson, "Multiharmonic Frequency Estimation in Noise," submitted to *Signal Processing.* I believe this was rejected, but I can not find the letter...

[P28] *Erik Weyer*, Robert C. Williamson and Iven M.Y. Mareels, "System Identification in the Behavioural Framework. Part I: Philosophy", submitted to *Automatica*, (under revision 1993)

[P29] *Erik Weyer*, Robert C. Williamson and Iven M.Y. Mareels, "System Identification in the Behavioural Framework. Part II: Analysis", submitted to *Automatica*, (under revision 1993) Automatica didn't like this and it has along with P28 since evolved into other papers: P65, P73, P78.

[P62] *Wee Sun Lee*, Peter L. Bartlett and Robert C. Williamson, "On Efficient Agnostic Learning of Linear Combinations of Basis Functions", submitted to *Information and Computation* 1994. For reasons which to us which were very odd, this journal did not like this paper. As a number of the results appeared in the conference proceedings [P68] (albeit without some proofs), we have not resubmitted it.

[P86] *Kim L. Blackmore*, Robert C. Williamson and Iven M.Y. Mareels, Hasty Congregational Gradient Descent,", shortened version submitted to IEEE Conference on Decision and Control, 2000 (invited session) but session was rejected. The link is to the full version which was never actually submitted (if I recall correctly). The work was completed around 1996.

[P104] Alex J. Smola, Robert C. Williamson and Bernhard Schölkopf, "Generalization Bounds for Convex Combinations of Kernel Functions," Submitted to NIPS'98. NIPS did not like it. It has evolved into P120.

[P113] Bernhard Schölkopf, Alex J. Smola and Robert C. Williamson, "A New Parametrization of Support Vector Machines," submitted to the 4th European Conference on Computational Learning Theory (EUROCOLT'99). EUROCOLT did not like this. We turned it into P115.

Papers In Preparation

[P87] Mario Marchand, John Shawe-Taylor and Robert C. Williamson, "Choosing Hyperplanes to Improve Generalization," In Preparation. 1996–7.

[P99] Robert C. Williamson, Bernhard Schölkopf and Alex Smola, "A Maximum Margin Miscellany", February 1999. (35 pages)

[P109] Robert C. Williamson, "Some Results in Statistical learning Theory with Relevance to Nonlinear System Identification," in preparation for submission to *Automatica* August 1998. This paper is based on [P96], and was invited to be submitted to *Automatica*. (Update 2005; I never completed this; you can see an advanced draft.