WILLIAM JOSEPH BYRNE III

Department of Engineering
University of Cambridge
Trumpington Street, Cambridge, UK CB2 1PZ
bill.byrne@eng.cam.ac.uk

16 Water View, Riverside
Cambridge, UK CB5 8JQ
Mobile: +44 (0)7852 910371
https://sites.google.com/view/bill-byrne/

ACADEMIC APPOINTMENTS

2014 - 2019	Head of Information Engineering
2013 - present	Professor of Information Engineering
2008 - 2013	Reader in Information Engineering
2004 - 2008	University Lecturer in Speech Processing, University of Cambridge Department of Engineering University of Cambridge Trumpington Street, Cambridge CB2 1PZ
2005 - present	Fellow, Clare College, Trinity Lane, Cambridge CB2 1TL
2000 - 2009	Research Associate Professor
1994 - 2000	Associate Research Scientist Center for Language and Speech Processing and Department of Electrical and Computer Engineering The Johns Hopkins University, USA
1987 - 1993	Graduate Research Assistant, Neural Systems Laboratory, Institute for Systems Research and Department of Electrical Engineering, University of Maryland, College Park MD, USA
2020 - present	Core Faculty, Cambridge Unit, European Laboratory for Learning and Intelligent Systems
2018 - 2020	Fellow, Allen Turing Institute

RESEARCH ENGINEER AND CONSULTANT

2019 - present	Amazon Scholar, Alexa Search, Alexa AI, Amazon, Cambridge CB1 2GA
2016 - 2019	Scientific Advisory Board, Cytora Limited, London
2012 - 2019	Senior Research Scientist and Director of UK R&D, SDL plc
2014	Scientific Advisory Board, Thought Machine Group Limited, London
2011	Consultant, Winton Capital Management, London
2006 - 2007	Expert Witness, Choate Hall & Stewart LLP, Boston, MA, USA
2000 - 2002	Senior Research Engineer, Voice Signal Technologies, Woburn, MA, USA
1990 - 1994	Signal Processing Engineer, Entropic Research Laboratories, USA
1985	Analyst and Software Developer, Denver Research Group, Denver, CO, USA
1983 - 1984, 1986	Computer Systems Engineer, National Institutes of Health, Bethesda, MD, USA

EDUCATION

Ph.D. 1993	Electrical Engineering, University of Maryland, College Park, Maryland, USA
M.Sc. 1985	Electrical Engineering, Michigan State University, East Lansing, Michigan, USA
B.S. 1982	Electrical Engineering, Cornell University, Ithaca, New York, USA

SPONSORED RESEARCH AS PRINCIPAL OR NAMED INVESTIGATOR **Total Awards of £20M+**

1. Cambridge Service for Data Driven Discovery (CSD3) - A National Data Intensive Science Cloud for Converged Simulation, AI & Analytics, EPSRC EP/T022159/1, 2020-2024.
2. W. BYRNE (PI), I. BUDVYTIS, R. CIPOLLA, C. RASMUSSEN, R. TURNER. Toyota Centre for Next Generation Artificial Intelligence - Capacity Building Award and Framework Agreement, 2019-2024+.
3. A. COPESTAKE (DIRECTOR), W. BYRNE (CO-DIRECTOR), C. RASMUSSEN Huawei HiSilicon Studentships Fund, 2019-2024.
4. Huawei – Cambridge, Joint Lab and Framework Research Agreement, Steering Committee, 2020-2025,
5. I. ROBERTS (PI), W. BYRNE, A. COPESTAKE, M. TOMALIN. Giving Voice to Digital Democracies: The Social Impact of Artificially Intelligent Communications Technology, Humanities and Social Change International Foundation, 2018-2021+.
6. W. BYRNE. Improving Target Language Fluency in Statistical Machine Translation, EPSRC, 2015-2018.
7. S. RENALS (LEAD INVESTIGATOR AT UNIVERSITY OF EDINBURGH), P.C. WOODLAND (LEAD INVESTIGATOR AT CU). NST: Natural Speech Technology, EPSRC Programme Grant, 2011-2016.
8. P.C. WOODLAND (LEAD INVESTIGATOR AT CU), M.J.F. GALES, W. BYRNE. DELPHI: Distributed Empirical Language Processing for Human Interaction, U.S. DARPA, 2011-2013.
9. W. BYRNE. Royal Society Travel Grant. With Prof. K. McKeown, Columbia University, USA. 2011.
10. W. BYRNE. Hierarchical Phrase-Based Translation with WFSTs, Google Inc. Unrestricted gift, 2010.
11. W. BYRNE (TECHNICAL COORDINATOR), A. DE GISPERT, S. CLARK. FAUST - Feedback Analysis for User Adaptive Statistical Translation. EU FP7 (STREP), 2010-2013.
12. S. KING (TECHNICAL COORDINATOR), W. BYRNE (LEAD INVESTIGATOR AT CAMBRIDGE). EMIME - Effective Multilingual Interaction in Mobile Environments. EU FP7 (STREP), 2008-2011.
13. W. BYRNE. Statistical Phrase Based Speech Translation, Microsoft Research Inc. Unrestricted gift, 2005.
14. W. BYRNE. Statistical Phrase Based Speech Translation, Google Inc. Unrestricted gift, 2005.
15. P.C. WOODLAND (LEAD INVESTIGATOR AT CU), M.J.F. GALES, W. BYRNE. AGILE: Autonomous Global Integrated Language Exploitation, U.S. DARPA, 2005-2011.

The Johns Hopkins University **Total Awards of $15M+**

16. W. BYRNE (PI), J. MAYFIELD, P. MCNAMEE. Integrated Cross-Language Spoken Document Retrieval, JHU Whiting School Development Award, 2002-2004.
17. W. BYRNE (PI). ELAN Speech Triage Consultation, Department of Defense, 2002-2003.
18. F. JELINEK (PI), W. BYRNE, J. EISNER, S. KHUDANPUR, D. YAROWSKY. Summer Workshops on Human Language Technology: Integrating Research and Education (WS02-WS06), NSF ITR, 2002-2006.
19. S. GUSTMANN (PI), W. BYRNE (PI AT JHU), D. OARD, B. RHAMABHADRAN, M. PICHENEY. MALACH: Multilingual Access to Large Spoken Archives from the Holocaust, NSF ITR, 2001-2006.
20. F. JELINEK (PI), W. BYRNE, J. EISNER, S. KHUDANPUR, D. YAROWSKY. University Center for Language and Speech Processing, Department of Defense, 2001-2005.
21. D. YAROWSKY (PI), W. BYRNE, S. KHUDANPUR, P. RESNIK. Improving Statistical Translation Models via Text Analyzers Trained from Parallel Corpora, ONR MURI, 2001-2006.
22. F. JELINEK (PI), W. BYRNE, S. KHUDANPUR. Language Engineering Workshop, NSF, 2001-2002.
23. F. JELINEK (PI), W. BYRNE, S. KHUDANPUR. Robust Knowledge Discovery from Parallel Speech and Text Sources, DARPA TIDES, 2000-2003.
24. D. OARD (PI), W. BYRNE (LEAD PI AT JHU), S. KHUDANPUR, PHILIP RESNIK, DAVID YAROWSKY. Translingual Information Detection, Extraction and Summarization, DARPA TIDES, 2000-2005.
25. J. PICONE (PI), W. BYRNE, E. CHARNIAK, F. JELINEK, M. JOHNSON, M. OSTENDORF. Integrating Prosody, Speech Recognition, Parsing in Spoken-Language Information Retrieval, NSF ITR, 2000-2004.

PROFESSIONAL ACTIVITIES AND AFFILIATIONS, from 2000, selected

- IEEE Senior Member, 2007

Cambridge University Service

- Engineering Department: Senior Academic Promotions, Academic Committee, Appointments Committee, Information Engineering Subject Group, Graduate Degree Committee, Examiner (IIB), Chair of Examiners (IA)
- Council of the School of Technology (2014-19)
- Cambridge Language Sciences Interdisciplinary Research Centre, Steering Committee
- Clare College: Fellowship Committee, Junior Research Fellowship Committee, Rooms Tutor, Wine Steward

General Contribution

- Workshop series convener (with A. Copestake, I. Roberts, and M. Tomalin): Mindful of AI: Language,Technology and Mental Health (October 2020); The Future of Artificial Intelligence: Language, Society, Technology (September 2019), Language, Society, Technology (May 2019), Language, Ethics, Technology (March 2019)
- Scientific Advisor, QT21: Quality Translation, EU Horizon 2020, 2015–2018
- Chair (with S. Renals), Understanding Multimodal Data, Alan Turing Institute Scoping Workshop, 2015
- External Advisory Board, LINDAT/CLARIN Centre for Language Research Infrastructure in the Czech Republic, Czech Ministry of Education, 2010 – 2016
- Invited participant, Google Faculty Summits: Mountain View, CA, 2006; Zurich, 2008 and 2010
- Advisory Board, MURI N000140510388: Human-like Speech Processing, U. Washington, 2005–2010
- External Review Panel, NCCR IM2 National Centres of Competence in Research: Interactive Multimodal Information Management, Swiss National Science Foundation, PI, 2005 – 2007
- Advisory Board, Center for Computational Linguistics, Charles University, Czech Republic
- Managing Council, Chinese Corpus Consortium, Beijing, China, 2004
- Invited participant, NSF-ELTE Ithaka Hungarian-US R&D Workshop, Budapest, Hungary, March 2004
- Chair (with J. Bilmes) IEEE Automatic Speech Recognition and Understanding Workshop, St. Thomas, 2003
- Chair (with D. Jurafsky and E. Fosler-Lussier) ISCA ITR-Workshop on Pronunciation modelling and Lexicon Adaptation for Spoken Language Technology, Estes Park, Colorado, USA, September 2002

Editorial

- Editorial Board, Machine Translation Journal, 2011–2020
- Action Editor, Transactions of the Association for Computational Linguistics, 2012–2014
- Associate Editor, Computer Speech and Language, 2011–2016
- Associate Editor, IEEE Transactions on Audio, Speech, and Language Processing, 2006–2008
- Associate Editor, ACM Transactions on Speech and Language Processing, 2005–2007
- IEEE Signal Processing Society Speech Technical Committee, 2004–2006
- Editor (with D. Jurafsky and E. Fosler-Lussier), Special Issue of Speech Communication on Pronunciation modelling and Lexicon Adaptation, June 2005

TEACHING

University of Cambridge, Graduate Teaching in Machine Learning, Speech and Language Processing

- Course Director, MPhil in Machine Learning and Machine Intelligence (2018–2019)
- Course Director, MPhil in Machine Learning, Speech, and Language Technology (2015– 2018)
- Module Leader: Probabilistic Automata; Speech Recognition; Machine Translation
- Module Leader: MPhil in Advanced Computer Science (2011–2012)
- Module Leader: MPhil in Computer Speech, Text and Internet Technology Program (2004-2010)

University of Cambridge, Undergraduate Teaching

- 3F1 Probability and Random Processes, IB Computing, 4F11 Speech and Language Processing

Clare College, Cambridge

- Supervisions in IA and IB Mathematics and Information Engineering; Director of Studies in Engineering

The Johns Hopkins University

- Automatic Speech Processing and Recognition (ECE475/ECE678); Theory and Practice of Large Vocabulary Speech Recognition (ECE478); Advanced Topics in Speech Science and Technology (ECE776)
- Instructor, NSF/NAACL Summer Workshops on Language Engineering (1998–2003)

ACADEMIC RESEARCH SUPERVISION

Postdoctoral Researchers

1. Dr. Adrià de Gispert, Senior Research Associate, September 2011 – June 2018
   Lecturer in Speech and Langauge Technology, September 2009 – September 2011
   Research Associate, January 2007 – September 2009
2. Dr. Marcus Tomalin, Senior Research Associate, September 2010 – present
3. Dr. Aurelien Waite, Research Associate, 2015–2016
4. Dr. Eva Hasler, Research Associate, September 2014 – January 2017
5. Dr. Gonzalo Iglesias, Research Associate, April 2010 – 2012
6. Dr. Graeme Blackwood, Research Associate, March 2010 – September 2011
7. Dr. Matthew Gibson, Research Associate, September 2008 – December 2010
8. Dr. Hichem Sahbi, Research Associate, October 2005 – October 2006
9. Dr. Izhak Shafran, Assistant Research Scientist, JHU, 2004–2006
10. Dr. Shankar Kumar, Postdoctoral Researcher, JHU and Cambridge University Engineering Department, 2005

Ph.D. Students, University of Cambridge

1. H. Mei, Ph.D. Cambridge University Department of Engineering, admitted 2022
   Jointly supervised with Dr Marcus Tomalin
2. Jonghon Chen, Ph.D. Cambridge University Department of Engineering, admitted 2022
3. W. Lin, Ph.D. Cambridge University Department of Engineering, admitted 2021
4. A. Coca, Ph.D. Cambridge University Department of Engineering, admitted 2020
5. B.-H. Tseng, Ph.D. Cambridge University Department of Engineering, 2021
   Natural Language Understanding and Generation for Task-Oriented Dialogue
6. D. Saunders, Ph.D. Cambridge University Department of Engineering, 2021
   Thesis: Domain adaptation for Neural Machine Translation
   Best Thesis Award, European Association for Machine Translation, 2021
7. F. Stahlberg, Ph.D. Cambridge University Department of Engineering, 2019
   Thesis: The Role of Language Models and Hierarchical Models in Neural Sequence-to-Sequence Prediction
   Best Thesis Award, European Association for Machine Translation, 2019
8. M. Horvat, Ph.D. Cambridge Computer Lab, 2017
   Thesis: Hierarchical Statistical Semantic Translation and Realization
   Jointly supervised with Prof. Ann Copestake
9. A. Waite, Ph.D. Cambridge University Department of Engineering, 2015
   Thesis: The Geometry of Statistical Machine Translation
10. J. Pino, Ph.D. Cambridge University Department of Engineering, 2015
    Thesis: Refinements in Hierarchical Phrase-Based Translation Systems
11. M. Shannon, Ph.D. Cambridge University Department of Engineering, 2014
    Thesis: Probabilistic acoustic modelling for parametric speech synthesis
12. G. Blackwood, Ph.D. Cambridge University Department of Engineering, 2010
    Thesis: Lattice Rescoring Methods for Statistical Machine Translation
13. J. Brunning, Ph.D. Cambridge University Department of Engineering, 2010
    Thesis: Alignment Models and Algorithms for Statistical Machine Translation

Ph.D. Students, The Johns Hopkins University

14. Y. Deng, Ph.D. in Electrical and Computer Engineering, 2005
    Thesis: Bitext Chunk Alignment for Statistical Machine Translation
15. S. Tsakalidis, Ph.D. in Electrical and Computer Engineering, 2005
    Thesis: Linear Transforms in Automatic Speech Recognition: Discriminative Estimation Procedures and Integration of Diverse Acoustic Data
16. V. Venkataramani, Ph.D. in Electrical and Computer Engineering, 2005
    Thesis: Support Vector Machines For Segmental Minimum Bayes Risk Decoding Of Continuous Speech

17. V. Doumpiotis, Ph.D. in Electrical and Computer Engineering, 2005
    Thesis: Discriminative Training for Speaker Adaptation and Minimum Risk Estimation in Large Vocabulary Conversational Speech Recognition
18. S. Kumar, Ph.D. in Electrical and Computer Engineering, 2005
    Thesis: Minimum Bayes-Risk Techniques in Automatic Speech Recognition and Machine Translation
19. A. Gunawardana, Ph.D. in Electrical and Computer Engineering, 2001
    Thesis: The Information Geometry of EM Variants for Speech and Image Processing
20. V. Goel, Ph.D. in Biomedical Engineering, 2001
    Thesis: Minimum Bayes-Risk Automatic Speech Recognition
21. J. McDonough, Ph.D. in Electrical and Computer Engineering, 2000
    Thesis: Speaker Compensation with All-Pass Transforms

M.Phil in Machine Learning and Machine Intelligence, University of Cambridge

1. G. Yang. Multilingual Models in Neural Machine Translation, 2023
2. A. Nanu. Improving Schema Generation for Robust Schema-Guided Dialogue State Tracking, 2023
3. K. Nikoić. Incorporating Vision Encoders into Retrieval Augmented Visual Question Answering, 2023
4. X. Li. Incorporating Vision Encoders into Retrieval Augmented Visual Question Answering, 2023
5. R. Anderson. Joint Learning of Practical Dialogue Systems and User Simulators, 2022
6. A. McLeay. Vision Encoders in Question Answering, 2022
7. T. Anders. Natural Language Generation from Structured Data, 2021
8. G. Lau. Mitigating Gender Bias in Dialogue Generation, 2021
9. N. Pezzotti. GPT-3 for Few-Shot Dialogue State Tracking, 2021
10. B. Melman. Fact Checking Fake News, 2019 (with Dr M. Tomalin)

M.Phil in Machine Learning, Speech, and Language Technology, University of Cambridge

11. S. De Jong. Techniques for Compressing Deep Neural Networks, 2018 (with Dr A. Damianou, Amazon Inc)
12. G. Kell. Overcoming Catastrophic Forgetting in Neural Machine Translation, 2018
13. O. Zubair. Neural Network Compression, 2018 (with Dr T. Meeds, Microsoft Research)
14. A. D'Cruz. Tradeoffs in Neural Variational Inference, 2017 (with Dr S. Nowozin, Microsoft Research)
15. J. Rampersad. Learning in Neural Program Lattices Using Only Weak Supervision, 2017 (with Dr N. Kushman, Microsoft Research)
16. S. Wang. Structured Priors for Policy Optimisation, 2017 (with Dr T. Gunter, Apple Inc)
17. J. Gao. Variable Length Word Encodings for Neural Translation Models, 2016
18. K. Tsakalis. Semi-Supervised Training for Historic Handwritten Text Recognition, 2016
19. S.T. Yeo. Bayesian optimisation for machine translation and NLP, 2016
20. M. Tomczak. BachBot, 2016 (with Dr M. Johnson, Microsoft, Cambridge)
21. F. Liang. BachBot, 2016 (with Dr M. Johnson, Microsoft, Cambridge)
22. M. Ahmad. Bayesian Non-parametric Framework for the Analysis of Financial Time Series, 2016 (with Dr T. Fletcher, Thought Machine)

M.Phil in Advanced Computer Science, University of Cambridge

23. Matic Horvat. Lagrangian Relaxation for String Regeneration, 2013

M.Phil in Computer, Speech, and Internet Technology, University of Cambridge

24. T. Foreman. Model extrapolation for HMM-based speech synthesis, 2010
25. Z. Raeesy. Model Interpolation for Speech Synthesis, 2009
26. A. Waite. Hadoop Clusters for Statistical Speech and Language Processing, 2009
27. F. Zuo. An HTK + OpenFst ASR Decoder, 2008 (with Prof. P.C. Woodland)
28. L. Feng. Limited domain synthesis, 2008
29. D. Herath. Lexical Context in HMM Word Alignment, 2008
30. A. Murugesan. Small Language Models for Large Problems, 2007
31. W. Yuan. Small Language Models for Large Problems, 2007

32. D. Sharkov. Phrasal Models in Stochastic Machine Translation, 2006
33. Y.Q. Liu. Phrasal Language Models in Stochastic Machine Translation, 2006
34. J. Smith. Phrasal Language Models in Stochastic Machine Translation, 2005
35. G. Sachdev. Phrase Order and Phrase Translation in Statistical Machine Translation, 2005
36. X. Zhu. Phrase Order and Phrase Translation in Statistical Machine Translation, 2005

Fourth Year Project Supervision, Department of Engineering

1. W. Lin. End-to-end Multi-Domain Task-Oriented Dialogue Systems, 2021
2. J. Wu. Using Training data to Reduce Gender Bias in Neural Machine Translation, 2021
3. R. Sallis. Using Training data to Reduce Gender Bias in Neural Machine Translation, 2021
   Information Engineering Division Prize for Outstanding Fourth Year Project
4. E. Rastorgueva. Neural Hidden Markov Models for Word Alignment, 2019
5. L. Ji. Robust Adaptive Neural Machine Translation, 2019
6. J. Koh. Neural Machine Translation for Grammatical Error Correction, 2019
7. J. Stadnik. Alignment in Neural Machine Translation, 2018
8. Z. Wang. Simultaneous Neural Machine Translation, 2018

LECTURES, SEMINARS, AND PRESENTATIONS – from 2000

[1] Neural machine translation decoding strategies. Amazon Research, June 2019.

[2] Lost in translation? Hay Literary Festival, May 2018. A discussion with Helena Sanson and Marcus Tomalin.

[3] Recent developments in neural machine translation. Cambridge Computational Biology Institute Annual Symposium, May 2018. Invited talk.

[4] Turning NMT research into commercial products. META-FORUM, Brussels, Belgium, November 2017. Invited talk.

[5] Pushdown automata in statistical machine translation, USC Signal Analysis and Interpretation Lab, February 2014. Talk.

[6] Pushdown automata in statistical machine translation, International Conference on Finite-State Methods and Natural Language Processing, FSMNLP, July 2013. Keynote lecture.

[7] Syntax-based statistical machine translation, and evaluation of machine translation systems, Cognition Institute Summer School: Bilingual Minds, Bilingual Machines, June 2013. Three lecture short course.

[8] The CUED OpenMT12 Arabic-English and Chinese-English SMT systems, NIST Open MT Workshop, Washington, DC, July 2012. Talk.

[9] Statistical machine translation, Cambridge Language Sciences Launch Event, Newnham College, Cambridge, May 2012. Talk.

[10] Hierarchical phrase-based translation representations, Workshop on 'More Structure for Better Statistical Machine Translation?', University of Amsterdam, Netherlands, January 2012. Invited lecture.

[11] Weighted finite state transducers in statistical machine translation, International Winter School in Language and Speech Technologies (WSLST 2012), Tarragona, Spain, January 2012. Six lecture short course.

[12] Hierarchical phrase-based translation with weighted finite state transducers, Natural Language Processing Group, Department of Computer Science, University of Sheffield, UK, December 2010. Talk.

[13] Hierarchical phrase-based translation with weighted finite state transducers, 7th International Workshop on Spoken Language Translation, Paris, France, December 2010. Keynote lecture.

[14] Recent research in statistical machine translation, Winton Capital Management Internal Research Conference, November 2010. Invited presentation.

[15] Hierarchical phrase-based translation with weighted finite state transducers, FALA 2010 Conference (VI Jornadas en Tecnologias del Habla and II Iberian Workshop on Speech and Language Technologies for Iberian Languages), Vigo, Spain, November 2010. Keynote lecture.

[16] Hierarchical phrase-based translation with weighted finite state transducers, Dublin Computational Linguistics Research Seminar, Dublin, Ireland, November 2010. Talk.

[17] EMIME project overview, European Commission Information Society Conference (ICT 2010), Brussels, Belgium, September 2010. Presentation.

[18] Fast Hiero grammars, DARPA GALE PI Meeting, Scottsdale, AZ, USA, April 2010. Talk.

[19] Hierarchical phrase-based translation with weighted finite state transducers, Columbia University, New York, NY, USA, April 2010. Talk.

[20] Hierarchical phrase-based translation with weighted finite state transducers, Google, Inc, Mountain View, CA, USA, April 2010. Talk.

[21] FAUST project overview, ICT-FP7 Language Technology Days, Luxembourg, March 2010. Talk.

[22] Hierarchical phrase-based translation with weighted finite state transducers, The Johns Hopkins University Center for Language and Speech Processing, Baltimore, MD, USA, November 2009. Talk.

[23] The CUED NIST 2009 Arabic-English SMT System, NIST Open Machine Translation 2009 Evaluation (MT09) Workshop, Ottowa, Canada, August 2009. Talk.

[24] Context-dependent alignment models and hierarchical phrase-based translation with weighted finite state transducers, GALE PI Meeting, Tampa, FL, USA, May 2009. Talk.

[25] Statistical techniques in machine translation, Google EMEA Faculty Summit, Zurich, Switzerland, February 2008. Keynote lecture.

[26] Phrase-based statistical machine translation with weighted finite state transducers, IRTG Summer School in Computational Linguistics and Psycholinguistics, University of Edinburgh, UK, September 2008. Invited tutorial.

[27] The CUED NIST 2008 Arabic-English SMT System, NIST MT Workshop, Alexandria, VA, USA, March 2008. Talk.

[28] Statistical machine translation, Advanced Machine Learning Tutorial Lectures Series, Cambridge University Engineering Department, UK, February 2008. Talk.

[29] MTTK: An alignment toolkit for statistical machine translation, HLT-NAACL Demonstrations Program, New York, NY, USA, June 2006.

[30] Integrating automatic speech recognition and statistical machine translation, TC-STAR OpenLab on Speech Translation, Trento, Italy, April 2006. Invited tutorial.

[31] Statistical phrase-based speech translation, GALE Mid-Phase PI Meeting, Boston, MA, USA, March 2006. Talk.

[32] Minimum Bayes risk estimation and decoding in large vocabulary continuous speech recognition, University of Sheffield, UK, January 2006. Talk.

[33] Minimum Bayes risk estimation and decoding in large vocabulary continuous speech recognition, Google, Inc, Mountain View, CA, USA, September 2005. Talk.

[34] Johns Hopkins University - Cambridge University Chinese-English and Arabic-English 2005 NIST MT Evaluation Systems, 2005 NIST MT Workshop, Bethesda, MD, USA, June 2005. Talk.

[35] Current Research in Phrase-Based Statistical Machine Translation – and some links to ASR, Kings College London, UK, May 2005. Talk.

[36] Phrase-based statistical machine translation using finite state machines – with some links to ASR, University of Washington, Seattle, WA, USA, May 2005. Talk.

[37] JHU/CUED Chinese-English translation system – 2005 TC-STAR evaluation, TC-STAR Evaluation Meeting, Trento, Italy, April 2005. Talk.

[38] Current research in phrase-based statistical machine translation and some links to ASR, Machine Intelligence Laboratory Speech Seminar, Cambridge University Engineering Department, UK, March 2005. Talk.

[39] Current research in phrase-based statistical machine translation and some links to ASR, Seminar Series, Institute for Collaborative and Communicating Systems and Human Communication Research Centre, University of Edinburgh, UK, January 2005. Talk.

[40] Minimum Bayes risk estimation and decoding in large vocabulary continuous speech recognition, ATR Workshop "Beyond HMMs", Kyoto, Japan, December 2004. Invited paper and lecture.

[41] Current research in statistical machine translation and links with automatic speech recognition, ISM Open Lectures on Statistical Speech Processing, The Institute for Statistical Mathematics, Tokyo, Japan, December 2004. Invited lecture.

[42] The Johns Hopkins University 2004 Chinese-English and Arabic-English MT Evaluation Systems, 2004 NIST MT Workshop, Alexandria, VA, USA, June 2004. Talk.

[43] Minimum Risk Estimation and Decoding for Speech and Language Processing, Microsoft Research, Redmond, Washington, USA, February 2004. Talk.

[44] Minimum Risk Estimation and Decoding for Speech and Language Processing, Signal, Speech and Language Interpretation Lab, University of Washington, Seattle, WA, USA, February 2004. Talk.

[45] Minimum Risk Estimation and Decoding for Speech and Language Processing, Speech Analysis and Interpretation Laboraory, University of Southern California School of Engineering, Los Angeles, CA, USA, February 2004. Talk.

[46] The Johns Hopkins University 2003 Chinese-English machine translation system, 2003 NIST MT Workshop, Gaithersburg, MD, USA, June 2003. Talk.

[47] Minimum Bayes-Risk Estimation and Decoding Procedures for Speech and Language Processing, University of Edinburgh, UK, May 2003. Talk.

[48] The Johns Hopkins University 2002 Large Vocabulary Conversational Speech Recognition System, NIST 2002 Rich Transcription Workshop, Vienna, VA, USA, November 2002. Talk.

[49] MALACH: Multilingual Access to Large Spoken Archives, AT&T Speech Days, Florham Park, NY, USA, October 2002. Invited talk.

[50] Minimum Bayes-Risk Automatic Speech Recognition, University of Colorado, Boulder, CO, USA, November 2001. Talk.

[51] Minimum Bayes-Risk Automatic Speech Recognition, Signal, Speech and Language Interpretation Lab, University of Washington, Seattle, WA, USA, June 2001. Talk.

[52] Discounted likelihood linear regression for rapid speaker adaptation, Tsinghua University, Beijing, China, October 2000. Talk.

PUBLICATIONS – Journal Articles and Book Chapters

[1] M. TOMALIN, B. BYRNE, S. CONCANNON, D. SAUNDERS, AND S. ULLMAN. The practical ethics of bias reduction in machine translation: why domain adaptation is better than data debiasing. *Ethics and Information Technology*, March 2021. Published online 6 March 2021 (15 pages).

[2] E. HASLER, A. DE GISPERT, F. STAHLBERG, A. WAITE, AND W. BYRNE. Source sentence simplification for statistical machine translation. *Computer Speech & Language*, 45:221–235 (15 pages), September 2017.

[3] C. ALLAUZEN, W. BYRNE, A. DE GISPERT, G. IGLESIAS, AND M. RILEY. Pushdown automata in statistical machine translation. *Computational Linguistics*, pages 687–723 (38 pages), 2014.

[4] M. SHANNON, H. ZEN, AND W. BYRNE. Autoregressive models for statistical parametric speech synthesis. *IEEE Transactions on Audio, Speech and Language Processing*, 21(3):587–597 (11 pages), 2012.

[5] J. PINO, A. WAITE, AND W. BYRNE. Simple and efficient model filtering in statistical machine translation. *The Prague Bulletin of Mathematical Linguistics*, (98):5–24 (20 pages), 2012. Published online 6 September 2012.

[6] A. DE GISPERT, G. BLACKWOOD, G. IGLESIAS, AND W. BYRNE. N-gram posterior probability confidence measures for statistical machine translation: an empirical study. *Machine Translation*, pages 1–30 (31 pages), 2012. Published online 1 September 2012.

[7] K. HASHIMOTO, J. YAMAGISHI, W. BYRNE, S. KING, AND K. TOKUDA. Impacts of machine translation and speech synthesis on speech-to-speech translation. *Speech Communication*, 54(7):857–866 (10 pages), September 2012.

[8] J. DINES, H. LIANG, L. SAHEER, M. GIBSON, W. BYRNE, K. OURA, K. TOKUDA, J. YAMAGISHI, S. KING, M. WESTER, T. HIRSIMÄKI, R. KARHILA, AND M. KURIMO. Personalising speech-to-speech translation: Unsupervised cross-lingual speaker adaptation for HMM-based speech synthesis. *Computer Speech and Language*, page (18 pages), 2011. Special Issue on Speech Translation. Published online 17 September 2011.

[9] M. GIBSON AND W. BYRNE. Unsupervised intra-lingual and cross-lingual speaker adaptation for HMM-based speech synthesis using two-pass decision tree construction. *IEEE Transactions on Audio, Speech, and Language Processing*, 19(4):895 – 904 (10 pages), 2011.

[10] A. DE GISPERT, W. BYRNE, J. XU, R. ZBIB, J. MAKHOUL, A. CHALABI, H. NADER, N. HABASH, AND F. SADAT. Preprocessing Arabic for Arabic-English statistical machine translation. In J. Olive, C. Christianson, and J. McCary, editors, *Handbook of natural language processing and machine translation. DARPA Global Autonomous Language Exploitation*, pages 135 – 145 (11 pages). Springer, 2011.

[11] M. KURIMO, S. VIRPIOJA, V.T. TURUNEN, G.W. BLACKWOOD, AND W. BYRNE. Overview and results of Morpho Challenge 2009. In *Multilingual Information Access Evaluation, 10th Workshop of the Cross-Language Evaluation Forum, CLEF 2009*, volume 1 of *Lecture Notes in Computer Science*, pages 578–597 (20 pages). Springer, 2010.

[12] A. DE GISPERT, G. IGLESIAS, G. BLACKWOOD, E. R. BANGA, , AND W. BYRNE. Hierarchical phrase-based translation with weighted finite state transducers and shallow-N grammars. *Computational Linguistics*, 36(3):505—533 (29 pages), September 2010.

[13] Y. DENG AND W. BYRNE. HMM word and phrase alignment for statistical machine translation. *IEEE Transactions on Audio, Speech, and Language Processing*, 16(3):494–507 (14 pages), March 2008.

[14] V. VENKATARAMANI, S. CHAKRABARTTY, AND W. BYRNE. Gini support vector machines for segmental minimum Bayes risk decoding of continuous speech. *Computer Speech and Language*, 21:423–442 (20 pages), 2007.

[15] Y. DENG, S. KUMAR, AND W. BYRNE. Segmentation and alignment of parallel text for statistical machine translation. *Journal of Natural Language Engineering*, 13(3):235–260 (26 pages), 2006.

[16] W. BYRNE. Minimum Bayes risk estimation and decoding in large vocabulary continuous speech recognition. *Proceedings of the Institute of Electronics, Information, and Communication Engineers, Japan – Special Section on Statistical Modeling for Speech Processing*, E89-D(3):900–907 (8 pages), March 2006. Invited paper.

[17] S. KUMAR, Y. DENG, AND W. BYRNE. A weighted finite state transducer translation template model for statistical machine translation. *Journal of Natural Language Engineering*, 12(1):35–75 (41 pages), March 2006.

[18] J. LI, F. ZHENG, W. BYRNE, AND D. JURAFSKY. A dialectal Chinese speech recognition framework. *Journal of Computer Science and Technology (Science Press, Beijing, China)*, (1):106–115 (10 pages), January 2006.

[19] A. GUNAWARDANA AND W. BYRNE. Convergence theorems for generalized alternating minimization procedures. *Journal of Machine Learning Research*, (6):2049–2073 (25 pages), December 2005.

[20] V. DOUMPIOTIS AND W. BYRNE. Lattice segmentation and minimum Bayes risk discriminative training for large vocabulary continuous speech recognition. *Speech Communication*, (2):142–160 (19 pages), 2005.

[21] V. DOUMPIOTIS, S. TSAKALIDIS, AND W. BYRNE. Discriminative linear transforms for feature normalization and speaker adaptation in HMM estimation. *IEEE Transactions on Speech and Audio Processing*, 13(3):367–376 (10 pages), May 2005.

[22] W. BYRNE, D. DOERMANN, M. FRANZ, S. GUSTMAN, J. HAJIČ, D. OARD, M. PICHENY, J. PSUTKA, B. RAMABHADRAN, D. SOERGEL, T. WARD, AND W.-J. ZHU. Automatic recognition of spontaneous speech for access to multilingual oral history archives. *IEEE Transactions on Speech and Audio Processing, Special Issue on Spontaneous Speech Processing*, pages 420–435 (16 pages), July 2004.

[23] V. GOEL, S. KUMAR, AND W. BYRNE. Segmental minimum Bayes-risk decoding for automatic speech recognition. *IEEE Transactions on Speech and Audio Processing*, 12:234–249 (16 pages), May 2004.

[24] V. GOEL AND W. BYRNE. Minimum Bayes-risk automatic speech recognition. In W. Chou and B.-H. Juang, editors, *Pattern Recognition in Speech and Language Processing*, pages 51–77 (27 pages). CRC Press, 2003.

[25] F. ZHENG, Z. SONG, P. FUNG, AND W. BYRNE. Mandarin pronunciation modeling based on the CASS corpus. *Journal of Computer Science and Technology (Science Press, Beijing, China)*, 17(3), May 2002. (16 pages).

[26] A. GUNAWARDANA AND W. BYRNE. Discounted likelihood linear regression for rapid speaker adaptation. *Computer Speech and Language*, 15(1):15–38 (24 pages), Jan 2001.

[27] V. GOEL AND W. BYRNE. Minimum Bayes-Risk automatic speech recognition. *Computer Speech and Language*, 14(2):115–135 (21 pages), 2000.

[28] W. BYRNE AND A. GUNAWARDANA. Comments on 'Efficient training algorithms for HMM's using incremental estimation'. *IEEE Transactions on Speech and Audio Processing*, 8(6):751–754 (4 pages), Nov 2000.

[29] M. RILEY, W. BYRNE, M. FINKE, S. KHUDANPUR, A. LJOLJE, J. MCDONOUGH, H. NOCK, M. SARACLAR, C. WOOTERS, AND G. ZAVALIAGKOS. Stochastic pronunciation modeling from hand-labelled phonetic corpora. *Speech Communication*, pages 109–116 (8 pages), November 1999.

[30] W. BYRNE AND S. SHAMMA. Neurocontrol in sequence recognition. In O. Omidvar and D. Elliott, editors, *Progress in Neural Networks: Neural Networks for Control*, pages 31–56 (26 pages). Academic Press, 1997.

[31] S. YOUNG, P. WOODLAND, AND W. BYRNE. Spontaneous speech recognition for the credit card corpus using the HTK toolkit. *IEEE Transactions on Speech and Audio Processing*, pages 615–621 (6 pages), 1994.

[32] W. BYRNE. Alternating Minimization and Boltzmann Machine learning. *IEEE Transactions on Neural Networks*, 3(4):612–620 (9 pages), 1992.

[33] W. BYRNE, R. ZAPP, P. FLYNN, AND M. SIEGEL. Adaptive filter processing in remote heart monitors. *IEEE Transactions on Biomedical Engineering*, pages 717–722 (6 pages), 1986.

Workshops and Conferences

[1] SVITLANA VAKULENKO, BILL BYRNE, AND ADRIÀ DE GISPERT. Uniform training and marginal decoding for multi-reference question-answer generation. In *26^{th} European Conference on Artificial Intelligence (ECAI 2023)*, October 2023.

[2] WEIZHE LIN, JINGHONG CHEN, JINGBIAO MEI, ALEXANDRU COCA, AND BILL BYRNE. Fine-grained late-interaction multi-modal retrieval for retrieval augmented visual question answering, 2023. To appear at NeurIPS 2023.

[3] ALEXANDRU COCA, BO-HSIANG TSENG, JINGHONG CHEN, WEIZHE LIN, WEIXUAN ZHANG, TISHA ANDERS, AND BILL BYRNE. Grounding description-driven dialogue state trackers with knowledge-seeking turns. In *Proc. Special Interest Group on Discourse and Dialogue (SIGDIAL)*, 444–456. Association for Computational Linguistics, September 2023. **Best Long Paper Award**.

[4] XIAOYU SHEN, AKARI ASAI, BILL BYRNE, AND ADRIA DE GISPERT. xPQA: Cross-lingual product question answering in 12 languages. In *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 5: Industry Track)*, 103–115, Toronto, Canada, July 2023. Association for Computational Linguistics.

[5] WEIZHE LIN, REXHINA BLLOSHMI, BILL BYRNE, ADRIA DE GISPERT, AND GONZALO IGLESIAS. LI-RAGE: Late interaction retrieval augmented generation with explicit signals for open-domain table question answering. In *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 2: Short Papers)*, 1557–1566, Toronto, Canada, July 2023. Association for Computational Linguistics.

[6] WEIZHE LIN, REXHINA BLLOSHMI, BILL BYRNE, ADRIA DE GISPERT, AND GONZALO IGLESIAS. An inner table retriever for robust table question answering. In *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, 9909–9926, Toronto, Canada, July 2023. Association for Computational Linguistics.

[7] WEIZHE LIN, ZHILIN WANG, AND BILL BYRNE. FVQA 2.0: Introducing adversarial samples into fact-based visual question answering. In *Findings of the Association for Computational Linguistics: EACL 2023*, 149–157, Dubrovnik, Croatia, May 2023. Association for Computational Linguistics.

[8] XIAOYU SHEN, SVITLANA VAKULENKO, MARCO DEL TREDICI, GIANNI BARLACCHI, BILL BYRNE, AND ADRIA DE GISPERT. Neural ranking with weak supervision for open-domain question answering : A survey. In *Findings of the Association for Computational Linguistics: EACL 2023*, 1736–1750, Dubrovnik, Croatia, May 2023. Association for Computational Linguistics.

[9] ALEXANDRU COCA, BO-HSIANG TSENG, WEIZHE LIN, AND BILL BYRNE. More robust schema-guided dialogue state tracking via tree-based paraphrase ranking. In *Findings of the Association for Computational Linguistics: EACL 2023*, 1443–1454, Dubrovnik, Croatia, May 2023. Association for Computational Linguistics.

[10] ANDREW CAINES, HELEN YANNAKOUDAKIS, HELEN ALLEN, PASCUAL PREZ-PAREDES, BILL BYRNE, AND PAULA BUTTERY. The teacher-student chatroom corpus version 2: more lessons, new annotation, automatic detection of sequence shifts. In *Proceedings of Natural Language Processing for Computer-Assisted Language Learning (NLP4CALL)*, 2022.

[11] WEIZHE LIN, LINJUN SHOU, MING GONG, JIAN PEI, ZHILIN WANG, BILL BYRNE, AND DAXIN JIANG. Transformer-empowered content-aware collaborative filtering. In *Proceedings of the RecSys 2022: Fourth Knowledge-aware and Conversational Recommender Systems Workshop (KaRS)*, 2022.

[12] WEIZHE LIN, LINJUN SHOU, MING GONG, JIAN PEI, ZHILIN WANG, BILL BYRNE, AND DAXIN JIANG. Combining unstructured content and knowledge graphs into recommendation datasets. In *Proceedings of the RecSys 2022: Fourth Knowledge-aware and Conversational Recommender Systems Workshop (KaRS)*, 2022.

[13] GIANNI BARLACCHI, IVANO LAURIOLA, MARCO DEL TREDICI, XIAOYU SHEN, THUY VU, BILL BYRNE, ADRIÀ DE GISPERT, AND ALESSANDRO MOSCHITTI. FocusQA: Open-domain question answering with a context in focus. In *Findings of EMNLP 2022*, 2022.

[14] WEIZHE LIN AND BILL BYRNE. Retrieval augmented visual question answering with outside knowledge. In *Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing*, 2022.

[15] DANIELLE SAUNDERS, ROSIE SALLIS, AND BILL BYRNE. First the worst: Finding better gender translations during beam search. In *Findings of the Association for Computational Linguistics: ACL 2022*, 3814–3823, Dublin, Ireland, May 2022. Association for Computational Linguistics.

[16] TISHA ANDERS, ALEXANDRU COCA, AND BILL BYRNE. uFACT: Unfaithful alien-corpora training for semantically consistent data-to-text generation. In *Findings of the Association for Computational Linguistics: ACL 2022*, 2836–2841, Dublin, Ireland, May 2022. Association for Computational Linguistics.

[17] TOBIAS DOMHAN, EVA HASLER, KE TRAN, SONY TRENOUS, BILL BYRNE, AND FELIX HIEBER. The devil is in the details: On the pitfalls of vocabulary selection in neural machine translation. In *Proceedings of the 2022 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, 1861–1874, Seattle, United States, July 2022. Association for Computational Linguistics.

[18] XIAOYU SHEN, GIANNI BARLACCHI, MARCO DEL TREDICI, WEIWEI CHENG, BILL BYRNE, AND ADRIÀ DE GISPERT. Product answer generation from heterogeneous sources: A new benchmark and best practices. In *Proceedings of The Fifth Workshop on e-Commerce and NLP (ECNLP 5)*, 99–110, Dublin, Ireland, May 2022. Association for Computational Linguistics.

[19] MARCO DEL TREDICI, XIAOYU SHEN, GIANNI BARLACCHI, BILL BYRNE, AND ADRIÀ DE DE GISPERT. From rewriting to remembering: Common ground for conversational QA models. In *Proceedings of the 4th Workshop on NLP for Conversational AI*, 70–76, Dublin, Ireland, May 2022. Association for Computational Linguistics.

[20] XIAOYU SHEN, GIANNI BARLACCHI, MARCO DEL TREDICI, WEIWEI CHENG, AND ADRIÀ GISPERT. semiPQA: A study on product question answering over semi-structured data. In *Proceedings of The Fifth Workshop on e-Commerce and NLP (ECNLP 5)*, 111–120, Dublin, Ireland, May 2022. Association for Computational Linguistics.

[21] EVA HASLER, TOBIAS DOMHAN, JONAY TRENOUS, KE TRAN, BILL BYRNE, AND FELIX HIEBER. Improving the quality trade-off for neural machine translation multi-domain adaptation. In *Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing*, (9 pages). Association for Computational Linguistics, 2021.

[22] WEIZHE LIN, BO-HSIANG TSENG, AND BILL BYRNE. Knowledge-aware graph-enhanced GPT-2 for dialogue state tracking. In *Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing*, (11 pages), 2021.

[23] ALEXANDRU COCA, BO-HSIANG TSENG, AND BILL BYRNE. GCDF1: A goal- and context- driven F-score for evaluating user models. In *The First Workshop on Evaluations and Assessments of Neural Conversation Systems*, 7–14. Association for Computational Linguistics, November 2021.

[24] BO-HSIANG TSENG, YINPEI DAI, FLORIAN KREYSSIG, AND BILL BYRNE. Transferable dialogue systems and user simulators. In *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, (14 pages), 2021.

[25] D. SAUNDERS, W. FEELY, AND W. BYRNE. Inference-only sub-character decomposition improves translation of unseen logographic characters. In *Proceedings of the 7th Workshop on Asian Translation*, (8 pages), 2020.

[26] D. SAUNDERS AND W. BYRNE. Addressing exposure bias with document minimum risk training: Cambridge at the WMT20 biomedical translation task. In *Proceedings of the Fifth Conference on Machine Translation*, (8 pages), 2020.

[27] A. CAINES, H. YANNAKOUDAKIS, H. EDMONDSON, H. ALLEN, PASCUAL PÉREZ-PAREDES, W. BYRNE, AND P. BUTTERY. The teacher-student chatroom corpus. In *Proceedings of the 9th Workshop on NLP for Computer Assisted Language Learning*, (11 pages), 2020.

[28] D. SAUNDERS, R. SALLIS¡, AND B. BYRNE. Neural machine translation doesn't translate gender coreference right unless you make it. In *Proceedings of the Second Workshop on Gender Bias in Natural Language Processing*, (9 pages), 2020.

[29] T. DOMHAN, J. TRENOUS, AND W. BYRNE. Semi-supervised pre-training and back-translation fine-tuning for translation of formal and informal text. In *Amazon Machine Learning Conference Workshop on Semi-supervised Learning*, (4 pages), 2020.

[30] D. SAUNDERS AND B. BYRNE. Reducing gender bias in neural machine translation as a domain adaptation problem. In *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, (9 pages), 2020.

[31] D. SAUNDERS, F. STAHLBERG, AND B. BYRNE. Using context in neural machine translation training objectives. In *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, (5 pages), 2020.

[32] B.-H. TSENG, M. REI, P. BUDZIANOWSKI, R. TURNER, B. BYRNE, AND A. KORHONEN. Semi-supervised bootstrapping of dialogue state trackers for task-oriented modelling. In *Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and the 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP)*, (8 pages), 2019.

[33] F. STAHLBERG AND W. BYRNE. On NMT search errors and model errors: Cat got your tongue? In *Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and the 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP)*, (7 pages), 2019.

[34] F. STAHLBERG AND W. BYRNE. The CUED's grammatical error correction systems for BEA-2019. In *Proceedings of the Fourteenth Workshop on Innovative Use of NLP for Building Educational Applications*, (8 pages). Association for Computational Linguistics, 2019.

[35] Z. YUAN, F. STAHLBERG, M. REI, W. BYRNE, AND H. YANNAKOUDAKIS. Neural and FST-based approaches to grammatical error correction. In *Proceedings of the Fourteenth Workshop on Innovative Use of NLP for Building Educational Applications*, (11 pages). Association for Computational Linguistics, 2019.

[36] D. SAUNDERS, F. STAHLBERG, A. DE GISPERT, AND W. BYRNE. Domain adaptive inference for neural machine translation. In *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*, (8 pages), 2019.

[37] F. STAHLBERG, D. SAUNDERS, A. DE GISPERT, AND W. BYRNE. CUED@WMT19:EWC&LMs. In *Proceedings of the Fourth Conference on Machine Translation (Volume 2: Shared Task Papers, Day 1)*, (9 pages). Association for Computational Linguistics, 2019.

[38] D. SAUNDERS, F. STAHLBERG, A. DE GISPERT, AND W. BYRNE. UCAM biomedical translation at WMT19: Transfer learning multi-domain ensembles. In *Proceedings of the Fourth Conference on Machine Translation (Volume 3: Shared Task Papers, Day 2)*, (5 pages), 2019.

[39] F. STAHLBERG, C. BRYANT, AND W. BYRNE. Neural grammatical error correction with finite state transducers. In *Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, Volume 1 (Long and Short Papers)*, (5 pages), 2019.

[40] F. STAHLBERG, D. SAUNDERS, AND W. BYRNE. An operation sequence model for explainable neural machine translation. In *Proceedings of the 2018 EMNLP Workshop BlackboxNLP: Analyzing and Interpreting Neural Networks for NLP*, (11 pages), Brussels, Belgium, November 2018. Association for Computational Linguistics.

[41] F. STAHLBERG, A. DE GISPERT, AND W. BYRNE. The University of Cambridge's machine translation systems for WMT18. In *Proceedings of the Third Conference on Machine Translation, Volume 2: Shared Task Papers*, (10 pages), Belgium, Brussels, October 2018. Association for Computational Linguistics.

[42] D. SAUNDERS, F. STAHLBERG, A. DE GISPERT, AND W. BYRNE. Multi-representation ensembles and delayed SGD updates improve syntax-based NMT. In *56th Annual Meeting of the Association for Computational Linguistics*, (7 pages), 2018.

[43] G. IGLESIAS, W. TAMBELLINI, A. DE GISPERT, AND W. BYRNE. Accelerating NMT batched beam decoding with LMBR posteriors for deployment. In *Proceedings of the Conference of the North American Chapter of the Association for Computational Linguistics - Human Language Technologies (NAACL HLT 2018)*, (8 pages), 2018.

[44] E. HASLER, A. DE GISPERT, G. IGLESIAS, AND W. BYRNE. Neural machine translation decoding with terminology constraints. In *Proceedings of the Conference of the North American Chapter of the Association for Computational Linguistics - Human Language Technologies (NAACL HLT 2018)*, (7 pages), 2018.

[45] F. STAHLBERG, D. SAUNDERS, G. IGLESIAS, AND W. BYRNE. Why not be versatile? Applications of the SGNMT decoder for machine translation. In *Proceedings of the Association of Machine Translation in the Americas*, (9 pages), March 2018.

[46] E. HASLER, F. STAHLBERG, M. TOMALIN, A. DE GISPERT, AND W. BYRNE. A comparison of neural models for word ordering. In *Proceedings of the 10th International Conference on Natural Language Generation*, (5 pages), 2017.

[47] L. STERCKX, J. NARADOWSKY, T. DEMEESTER, W. BYRNE, AND C. DEVELDER. Break it down for me: A study in automated lyric annotation. In *Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing*, (7 pages), 2017.

[48] FELIX STAHLBERG, EVA HASLER, DANIELLE SAUNDERS, AND BILL BYRNE. SGNMT – A flexible NMT decoding platform for quick prototyping of new models and search strategies. In *Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing: System Demonstrations*, (6 pages), 2017.

[49] F. STAHLBERG AND W. BYRNE. Unfolding and shrinking neural machine translation ensembles. In *Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing*, (9 pages), 2017.

[50] F. STAHLBERG, A. DE GISPERT, E. HASLER, AND W. BYRNE. Neural machine translation by minimising the Bayes-risk with respect to syntactic translation lattices. In *Proceedings of the 15th Conference of the European Chapter of the Association for Computational Linguistics*, (7 pages), 2017.

[51] F. STAHLBERG, E. HASLER, AND W. BYRNE. The edit distance transducer in action: The University of Cambridge English-German System at WMT16. In *Proceedings of the First Conference on Machine Translation: Volume 2, Shared Task Papers*, 377–384 (8 pages), 2016.

[52] F. STAHLBERG, E. HASLER, AURELIEN WAITE, AND W. BYRNE. Syntactically guided neural machine translation. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (Volume 2: Short Papers)*, 299–305 (7 pages), 2016.

[53] D. BECK, A. DE GISPERT, A. WAITE, AND W. BYRNE. Speed-constrained tuning for statistical machine translation using Bayesian optimization. In *Proceedings of the Conference of the North American Chapter of the Association for Computational Linguistics - Human Language Technologies (NAACL HLT 2016)*, (8 pages), 2016.

[54] G. IGLESIAS, A. DE GISPERT, AND W. BYRNE. Transducer disambiguation with sparse topological features. In *Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing*, (8 pages), September 2015.

[55] A. DE GISPERT, G. IGLESIAS, AND W. BYRNE. Fast and accurate preordering for smt using neural networks. In *Proceedings of the Conference of the North American Chapter of the Association for Computational Linguistics - Human Language Technologies (NAACL HLT 2015)*, (8 pages), June 2015.

[56] A. WAITE AND W. BYRNE. The geometry of statistical machine translation. In *Proceedings of the Conference of the North American Chapter of the Association for Computational Linguistics - Human Language Technologies (NAACL HLT 2015)*, (8 pages), June 2015.

[57] M. HORVAT, A. COPESTAKE, AND W. BYRNE. Hierarchical statistical semantic realization for minimal recursion semantics. In *Proceedings of the International Conference on Computational Semantics (IWCS 2015)*, (11 pages), April 2015.

[58] T. XIAO, A. DE GISPERT, J. ZHU, AND W. BYRNE. Effective incorporation of source syntax into hierarchical phrase-based translation. In *Proceedings of COLING 2014, the 25th International Conference on Computational Linguistics: Technical Papers*, 2064–2074 (11 pages), Dublin, Ireland, August 2014. Dublin City University and Association for Computational Linguistics.

[59] R. DALL, M. TOMALIN, M. WESTER, W. BYRNE, AND S. KING. Investigating automatic and human filled pause insertion for synthetic speech. In *Proceedings of INTERSPEECH*, (4 pages), September 2014.

[60] M. HORVAT AND W. BYRNE. A graph-based approach to string regeneration. In *Proceedings of the Student Research Workshop at the 14th Conference of the European Chapter of the Association for Computational Linguistics*, 85–95 (11 pages), Gothenburg, Sweden, April 2014. Association for Computational Linguistics.

[61] A. DE GISPERT, M. TOMALIN, AND W. BYRNE. Word ordering with phrase-based grammars. In *Proceedings of the 14th Conference of the European Chapter of the Association for Computational Linguistics*, 259–268 (12 pages), Gothenburg, Sweden, April 2014. Association for Computational Linguistics.

[62] L. JEHL, A. DE GISPERT, M. HOPKINS, AND W. BYRNE. Source-side preordering for translation using logistic regression and depth-first branch-and-bound search. In *Proceedings of the 14th Conference of the European Chapter of the Association for Computational Linguistics*, 239–248 (12 pages), Gothenburg, Sweden, April 2014. Association for Computational Linguistics.

[63] J. PINO, A. WAITE, T. XIAO, A. DE GISPERT, F. FLEGO, AND W. BYRNE. The University of Cambridge Russian-English system at WMT13. In *Proceedings of the Eighth Workshop on Statistical Machine Translation*, 200–205 (6 pages), Sofia, Bulgaria, August 2013. Association for Computational Linguistics.

[64] M. SHANNON AND W. BYRNE. Fast, low-artifact speech synthesis considering global variance. In *Proceedings of IEEE Conference on Acoustics, Speech and Signal Processing*, (5 pages), June 2013.

[65] A. WAITE, G. BLACKWOOD, AND W. BYRNE. Lattice-based minimum error rate training using weighted finite-state transducers with tropical polynomial weights. In *Proceedings of the 10^{th} International Workshop on Finite State Methods and Natural Language Processing (FSMNLP 2012)*, (11 pages), Donostia-San Sebastian, Spain, July 2012.

[66] K. HASHIMOTO, J. YAMAGISHI, W. BYRNE, S. KING, AND K. TOKUDA. An analysis of machine translation and speech synthesis in speech-to-speech translation system. In *Proceedings of IEEE Conference on Acoustics, Speech and Signal Processing*, 5108 – 5111 (4 pages), 2011.

[67] M. SHANNON, H. ZEN, AND W. BYRNE. The effect of using normalized models in statistical speech synthesis. In *Proceedings of the 12th Annual Conference of the International Speech Communication Association*, (4 pages), 2011.

[68] G. IGLESIAS, C. ALLAUZEN, W. BYRNE, A. DE GISPERT, AND M. RILEY. Hierarchical phrase-based translation representations. In *Proceedings of the 2011 Conference on Empirical Methods in Natural Language Processing*, 1373–1383 (11 pages), Edinburgh, Scotland, UK., July 2011. Association for Computational Linguistics.

[69] A. DE GISPERT, J. PINO, AND W. BYRNE. Hierarchical phrase-based translation grammars extracted from alignment posterior probabilities. In *Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 545–554 (10 pages), Cambridge, MA, 2010.

[70] M. SHANNON AND W. BYRNE. Autoregressive clustering for HMM speech synthesis. In *Proceedings of INTERSPEECH*, (4 pages), 2010.

[71] G. BLACKWOOD, A. DE GISPERT, AND W. BYRNE. Efficient path counting transducers for minimum Bayes-risk decoding of statistical machine translation lattices. In *Proceedings of the Annual Meeting of the Association for Computational Linguistics – Short Papers*, 27–32 (6 pages), 2010.

[72] M. KURIMO, W. BYRNE, J. DINES, P. GARNER, M. GIBSON, Y. GUAN, T. HIRSIMÄKI, R. KARHILA, S. KING, H. LIANG, K. OURA, L. SAHEER, M. SHANNON, S. SHIOTA, J. TIAN, K. TOKUDA, M. WESTER, Y.-J. WU, AND J. YAMAGISHI. Personalising speech-to-speech translation in the EMIME project. In *Proceedings of the Annual Meeting of the Association for Computational Linguistics – Demonstration Systems*, 48–53 (6 pages), 2010.

[73] G. BLACKWOOD, A. DE GISPERT, AND W. BYRNE. Fluency constraints for minimum Bayes-risk decoding of statistical machine translation lattices. In *Proceedings of the International Conference on Computational Linguistics (COLING)*, 71–79 (9 pages), 2010.

[74] J. PINO, G. IGLESIAS, A. GISPERT, G. BLACKWOOD, J. BRUNNING, AND W. BYRNE. The CUED HiFST system for the WMT10 translation shared task. In *Proceedings of the Joint Fifth Workshop on Statistical Machine Translation and MetricsMATR*, 155–160 (6 pages), 2010.

[75] M. KURIMO, S. VIRPIOJA, V. T. TURUNEN, G. W. BLACKWOOD, AND W. BYRNE. Overview and results of Morpho Challenge 2009. In C. Peters et al., editor, *Multilingual Information Access Evaluation, 10th Workshop of the Cross-Language Evaluation Forum - CLEF 2009*, volume 1 of *Revised Selected Papers, Lecture Notes in Computer Science, LNCS 6241*, 579–598 (20 pages). Springer, 2010.

[76] M. GIBSON, T. HIRSIMAKI, R. KARHILA, M. KURIMO, AND W. BYRNE. Unsupervised cross-lingual speaker adaptation for HMM-based speech synthesis using two-pass decision tree construction. In *Proceedings of IEEE Conference on Acoustics, Speech and Signal Processing*, 4642 – 4645 (4 pages), 2010.

[77] G. IGLESIAS, A. DE GISPERT, E. BANGA, AND W. BYRNE. The HiFST system for the europarl spanish-to-english task. In *Proceedings of SEPLN*, 207–214 (8 pages), 2009.

[78] M. SHANNON AND W. BYRNE. Autoregressive HMMs for speech synthesis. In *Proceedings of INTERSPEECH*, (4 pages), 2009.

[79] A. DE GISPERT, S. VIRPIOJA, M. KURIMO, AND W. BYRNE. Minimum Bayes risk combination of translation hypotheses from alternative morphological decompositions. In *Proceedings of Human Language Technologies: The 2009 Annual Conference of the North American Chapter of the Association for Computational Linguistics, Companion Volume: Short Papers*, 73–76 (4 pages), 2009.

[80] J. BRUNNING, A. DE GISPERT, AND W. BYRNE. Context-dependent alignment models for statistical machine translation. In *Proceedings of Human Language Technologies: The 2009 Annual Conference of the North American Chapter of the Association for Computational Linguistics*, 110–118 (9 pages), 2009.

[81] G. IGLESIAS, A. DE GISPERT, E. R. BANGA, AND W. BYRNE. Hierarchical phrase-based translation with weighted finite state transducers. In *Proceedings of Human Language Technologies: The 2009 Annual Conference of the North American Chapter of the Association for Computational Linguistics*, 433–441 (9 pages), 2009.

[82] G. IGLESIAS, A. DE GISPERT, E. R. BANGA, AND W. BYRNE. Rule filtering by pattern for efficient hierarchical translation. In *Proceedings of the 12th Conference of the European Chapter of the Association for Computational Linguistics (EACL 2009)*, 380–388 (9 pages), 2009.

[83] G. BLACKWOOD, A. DE GISPERT, J. BRUNNING, AND W. BYRNE. Large-scale statistical machine translation with weighted finite state transducers. In *Proceedings of FSMNLP 2008: Finite-State Methods and Natural Language Processing*, (12 pages), Ispra, Lago Maggiore, Italy, September 2008.

[84] G. BLACKWOOD, A. DE GISPERT, AND W. BYRNE. Phrasal segmentation models for statistical machine translation. In *Proceedings of the 22nd International Conference on Computational Linguistics*, 19–22 (4 pages), Manchester, UK, August 2008.

[85] G. BLACKWOOD, A. DE GISPERT, J. BRUNNING, AND W. BYRNE. European language translation with weighted finite state transducers: The CUED MT system for the 2008 ACL workshop on statistical machine translation. In *Proceedings of the ACL 2008 Third Workshop on Statistical Machine Translation*, 131–134 (4 pages), June 2008.

[86] K.-C. SIM, W. BYRNE, M. GALES, H. SAHBI, AND P.C. WOODLAND. Consensus network decoding for statistical machine translation system combination. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages), 2007.

[87] X. A. LIU, W. J. BYRNE, M. J. F. GALES, A. DE GISPERT, M. TOMALIN, P. C. WOODLAND, AND K. YU. Discriminative language model adaptation for mandarin broadcast speech transcription and translation. In *Proc. IEEE Automatic Speech Recognition and Understanding (ASRU)*, 153– 158 (6 pages), Kyoto, Japan, 2007.

[88] L. MATHIAS AND W. BYRNE. Statistical phrase-based speech translation. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages), 2006.

[89] S. KUMAR AND W. BYRNE. Local phrase reordering models for statistical machine translation. In *Proceedings of Human Language Technology Conference and Conference on Empirical Methods in Natural Language Processing*, 161–168 (8 pages), 2005.

[90] Y. DENG AND W. BYRNE. HMM word and phrase alignment for statistical machine translation. In *Proceedings of Human Language Technology Conference and Conference on Empirical Methods in Natural Language Processing*, 169–176 (8 pages), 2005.

[91] J. PSUTKA, P. IRCING, J.V. PSUTKA, J. HAJIC, W. BYRNE, AND J. MIROVSKI. Automatic transcription of Czech, Russian, and Slovak spontaneous speech in the MALACH project. In *Proceedings of EUROSPEECH*, (4 pages), 2005.

[92] V. VENKATARAMANI AND W. BYRNE. Lattice segmentation and support vector machines for large vocabulary continuous speech recognition. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages), 2005.

[93] S. TSAKALIDIS AND W. BYRNE. Acoustic training from heterogeneous data sources: Experiments in Mandarin conversational telephone speech transcription. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages), 2005.

[94] W. BYRNE. Minimum Bayes risk estimation and decoding in large vocabulary continuous speech recognition. In *Proceedings of the ATR Workshop "Beyond HMMs"*, (6 pages), Kyoto, Japan, 2004.

[95] I. SHAFRAN AND W. BYRNE. Task-specific minimum Bayes-risk decoding using learned edit distance. In *Proc. of the International Conference on Spoken Language Processing*, (4 pages), 2004.

[96] V. DOUMPIOTIS AND W. BYRNE. Pinched lattice minimum Bayes risk discriminative training for large vocabulary continuous speech recognition. In *Proc. of the International Conference on Spoken Language Processing*, (4 pages), 2004.

[97] J. PSUTKA, P. IRCING, J. HJIC, V. RADOVA, J.V. PSUTKA, W. BYRNE, AND S. GUSTMAN. Issues in annotation of the Czech spontaneous speech corpus in the MALACH project. In *Proceedings of the International Conference on Language Resources and Evaluation (LREC)*, (4 pages), 2004.

[98] J. PSUTKA, J. HAJIC, AND W. BYRNE. Slavic languages in the MALACH project. In *IEEE Conference on Acoustics, Speech and Signal Processing*. IEEE, 2004. *Invited Paper in Special Session on Multilingual Speech Processing* (4 pages).

[99] S. KUMAR AND W. BYRNE. Minimum Bayes-risk decoding for statistical machine translation. In *Proceedings of HLT-NAACL*, 169–176 (8 pages), 2004.

[100] V. VENKATARAMANI, S. CHAKRABARTTY, AND W. BYRNE. Support vector machines for segmental minimum Bayes risk decoding of continuous speech. In *IEEE Automatic Speech Recognition and Understanding Workshop*, (6 pages), 2003.

[101] W. BYRNE, S. KHUDANPUR, W. KIM, S. KUMAR, P. PECINA, P.VIRGA, P. XU, AND D. YAROWSKY. The Johns Hopkins University 2003 Chinese-English Machine Translation System. In *Machine Translation Summit IX*, (4 pages). The Association for Machine Translation in the Americas, 2003.

[102] J. PSUTKA, I. ILJUCHIN, P. IRCING, J.V. PSUTKA, V. TREJBAL, W. BYRNE, J. HAJIC, AND S. GUSTMAN. Building LVCSR systems for transcription of spontaneously produced Russian witnesses in the MALACH project: initial steps and first results. In *Proceedings of the Text, Speech, and Dialog Workshop*, 214–219 (6 pages), 2003.

[103] J. PSUTKA, P. IRCING, J. V. PSUTKA, V. RADOVA, W. BYRNE, J. HAJIC, AND S. GUSTMAN. Towards automatic transcription of spontaneous Czech speech in the MALACH project. In *Proceedings of the Text, Speech, and Dialog Workshop*, 327–332 (6 pages), 2003.

[104] V. DOUMPIOTIS, S. TSAKALIDIS, AND W. BYRNE. Lattice segmentation and minimum Bayes risk discriminative training. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 2003.

[105] J. PSUTKA, P. IRCING, J.V. PSUTKA, V. RADOVIC, W. BYRNE, J. HAJIC, JIRI MIROVSKY, AND SAMUEL GUSTMAN. Large vocabulary ASR for spontaneous Czech in the MALACH project. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 2003.

[106] A. IKENO, B. PELLOM, D. CER, A. THORNTON, J. M. BRENIER, D. JURAFSKY, W. WARD, AND W. BYRNE. Issues in recognition of Spanish-accented spontaneous English. In *Proceedings of the ISCA and IEEE workshop on Spontaneous Speech Processing and Recognition*, (4 pages), Tokyo Institute of Technology, Tokyo, Japan, 2003. ISCA and IEEE.

[107] V. DOUMPIOTIS, S. TSAKALIDIS, AND W. BYRNE. Discriminative training for segmental minimum Bayes-risk decoding. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages). IEEE, 2003.

[108] D. OARD, D. DOERMANN, B. DORR, D. HE, P. RESNIK, W. BYRNE, S. KHUDANPUR, D. YAROWSKY, A. LEUSKI, P. KOEHN, AND K. KNIGHT. Desperately seeking Cebuano. In *Proceedings of HLT-NAACL*, (3 pages), 2003.

[109] S. KUMAR AND W. BYRNE. A weighted finite state transducer implementation of the alignment template model for statistical machine translation. In *Proceedings of HLT-NAACL*, 63 – 70 (8 pages), 2003.

[110] O. KOLAK, W. BYRNE, AND P. RESNIK. A generative probabilistic OCR model for NLP applications. In *Proceedings of HLT-NAACL*, 55–62 (8 pages), 2003.

[111] S. GUSTMAN, D. SOERGEL, D. OARD, W. BYRNE, M. PICHENY, B. RAMABHADRAN, AND D. GREENBERG. Supporting access to large digital oral history archives. In *Proceedings of the Joint Conference on Digital Libraries*, (10 pages), 2002.

[112] W. WARD, H. KRECH, X. YU, K. HEROLD, G. FIGGS, A. IKENO, D. JURAFSKY, AND W. BYRNE. Lexicon adaptation for LVCSR: speaker idiosyncracies, non-native speakers, and pronunciation choice. In *ISCA ITR Workshop on Pronunciation Modeling and Lexicon Adaptation*, (4 pages), 2002.

[113] D. OARD, D. DEMNER-FUSHMAN, J. HAJIC, B RAMABHADRAN, S GUSTMAN, W BYRNE, D. SOERGEL, B. DORR, P. RESNIK, AND M. PICHENEY. Cross-language access to recorded speech in the MALACH project. In *Proceedings of the Text, Speech, and Dialog Workshop*, (8 pages), 2002.

[114] J. PSUTKA, P. IRCING, J. PSUTKA, V. RADOVA, W. BYRNE, J. HAJIC, S. GUSTMAN, AND B. RAMABHADRAN. Automatic transcription of Czech language oral history in the MALACH project: Resources and initial experiments. In *Proceedings of the Text, Speech, and Dialog Workshop*, (8 pages), 2002.

[115] S. KUMAR AND W. BYRNE. Minimum Bayes-risk alignment of bilingual texts. In *Proceedings of the 2002 Conference on Empirical Methods in Natural Language Processing*, 140–147 (8 pages), Philadelphia, PA, USA, 2002.

[116] S. KUMAR AND W. BYRNE. Risk based lattice cutting for segmental minimum Bayes-risk decoding. In *Proc. of the International Conference on Spoken Language Processing*, (4 pages), Denver, Colorado, USA, 2002.

[117] S. TSAKALIDIS, V. DOUMPIOTIS, AND W. BYRNE. Discriminative linear transforms for feature normalization and speaker adaptation in HMM estimation. In *Proc. of the International Conference on Spoken Language Processing*, (5 pages), Denver, Colorado, USA, 2002.

[118] F. ZHENG, Z. SONG, P. FUNG, AND W. BYRNE. Modeling pronunciaiton variation using context-dependent weighting and B/S refined acoustic modeling. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 2001.

[119] P. IRCING, P. KREBC, J. HAJIC, S. KHUDANPUR, F. JELINEK, J. PSUTKA, AND W. BYRNE. On large vocabulary continuous speech recognition of highly inflectional language - Czech. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 2001.

[120] V. GOEL, S. KUMAR, AND W. BYRNE. Confidence based lattice segmentation and minimum Bayes-risk decoding. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, volume 4, 2569–2572 (4 pages), Aalborg, Denmark, 2001.

[121] A. GUNAWARDANA AND W. BYRNE. Discriminative speaker adaptation with conditional maximum likelihood linear regression. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 2001.

[122] W. BYRNE, V. VENKATARAMANI, T. KAMM, T.F. ZHENG, Z. SONG, P. FUNG, Y. LUI, AND U. RUHI. Automatic generation of pronunciation lexicons for Mandarin casual speech. In *IEEE Conference on Acoustics, Speech and Signal Processing*, volume 1, 569–572 (4 pages), Salt Lake City, Utah, 2001. IEEE.

[123] V. VENKATARAMANI AND W. BYRNE. MLLR adaptation techniques for pronunciation modeling. In *IEEE Workshop on Automatic Speech Recognition and Understanding*, (4 pages), Madonna di Campiglio, Italy, 2001.

[124] A. GUNAWARDANA AND W. BYRNE. Convergence of DLLR rapid speaker adaptation algorithms. In *ISCA ITR-Workshop on Adaptation Methods for Automatic Speech Recognition*, (4 pages), 2001.

[125] A. LI, F. ZHENG, W. BYRNE, P. FUNG, T. KAMM, Y. LIU, Z. SONG, U. RUHI, V. VENKATARAMANI, AND X. CHEN. CASS: A phonetically transcribed corpus of Mandarin spontaneous speech. In *Proc. of the International Conference on Spoken Language Processing*, (4 pages), 2000.

[126] W. BYRNE, P. BEYERLEIN, J. HUERTA, S. KHUDANPUR, B. MARTHI, J. MORGAN, N. PETEREK, J. PICONE, D. VERGYRI, AND W. WANG. Towards language independent acoustic modeling. In *IEEE Conference on Acoustics, Speech and Signal Processing*, 1029–1032 (4 pages), Istanbul, Turkey, 2000. IEEE.

[127] V. GOEL, S. KUMAR, AND W. BYRNE. Segmental minimum Bayes-risk ASR voting strategies. In *Proc. of the International Conference on Spoken Language Processing*, volume 3, 139–142 (4 pages), Beijing, China, 2000.

[128] A. GUNAWARDANA AND W. BYRNE. Robust estimation for rapid adaptation using discounted likelihood techniques. In *International Conference on Acoustics, Speech, and Signal Processing*, (4 pages). IEEE, 2000.

[129] D. VERGYRI, S. TSAKALIDIS, AND W. BYRNE. Minimum risk acoustic clustering for multilingual acoustic model compination. In *International Conference on Spoken Language Processing*, (4 pages), 2000.

[130] J. MCDONOUGH AND W. BYRNE. On the incremental addition of regression classes for speaker adaptation. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages). IEEE, 2000.

[131] W. BYRNE, JAN HAJIC, PAVEL KRBEC, PAVEL IRCING, AND JOSEF PSUTKA. Morpheme based language models for speech recognition of czech. In *TDS '00: Proceedings of the Third International Workshop on Text, Speech and Dialogue*, 211–216 (6 pages), London, UK, 2000. Springer-Verlag.

[132] V. DIGALAKIS, S. BERKOWITZ, E. BOCHIERI, C. BOULIS, W. BYRNE, H. COLLIER, A. CORDUNEANU, A. KANNAN, S. KHUDANPUR, J. MCDONOUGH, AND A. SANKAR. Rapid speech recognizer adaptation to new speakers. In *IEEE Conference on Acoustics, Speech and Signal Processing*, (4 pages). IEEE, 1999.

[133] W. BYRNE, P. BEYERLEIN, J. HUERTA, S. KHUDANPUR, B. MARTHI, J. MORGAN, N. PETEREK, J. PICONE, D. VERGYRI, AND W. WANG. Towards language independent acoustic modeling. In *IEEE Workshop on Automatic Speech Recognition and Understanding*, (4 pages), Keystone, Colorado, 1999.

[134] W. BYRNE AND A. GUNAWARDANA. Convergence of EM variants. In *IEEE Information Theory Workshop on Detection, Estimation, Classification, and Imaging*, 64 (1 page), 1999.

[135] W. BYRNE AND A. GUNAWARDANA. Discounted likelihood linear regression for rapid adaptation. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 1999.

[136] W. BYRNE, J. HAJIC, P. IRCING, F. JELINEK, S. KHUDANPUR, J. MCDONOUGH, N. PETEREK, AND J. PSUTKA. Large vocabulary speech recognition for read and broadcast Czech. In *Proceedings of the Text, Speech, and Dialog Workshop*, (6 pages), 1999.

[137] J. MCDONOUGH AND W. BYRNE. Single-pass adapted training with all-pass transforms. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 1999.

[138] V. GOEL AND W. BYRNE. Task dependent loss functions in speech recognition: A-star search over recognition lattices. In *Proc. of the European Conference on Speech Communication and Technology (EUROSPEECH)*, (4 pages), 1999.

[139] V. GOEL AND W. BYRNE. Task dependent loss functions in speech recognition: Application to named entity extraction. In *ESCA-ETR Workshop on accessing information in spoken audio*, (4 pages), 1999.

[140] J. MCDONOUGH AND W. BYRNE. Speaker adaptation with all-pass transforms. In *International Conference on Acoustics, Speech, and Signal Processing*, (4 pages). IEEE, 1999.

[141] W. BYRNE, M. FINKE, S. KHUDANPUR, J. MCDONOUGH, H. NOCK, M. RILEY, M. SARACLAR, C. WOOTERS, AND G. ZAVALIAGKOS. Pronunciation modelling using a hand-labelled corpus for conversational speech recognition. In *IEEE International Conference on Acoustics, Speech and Signal Processing*, (4 pages). IEEE, 1998.

[142] W. BYRNE, M. FINKE, S. KHUDANPUR, A. LJOLJE, J. MCDONOUGH, H. NOCK H, M. RILEY, M. SARACLAR, C. WOOTERS, AND G. ZAVALIAGKOS. Stochastic pronunciation modeling from hand-labeled phonetic corpora. In *Proceedings of the Workshop on Modeling Pronunciation Variation for Automatic Speech Recognition*, (8 pages), 1998.

[143] J. MCDONOUGH, W. BYRNE, AND X. LUO. Speaker normalization with all-pass transforms. In *International Conference on Spoken Language Processing*, (4 pages), 1998.

[144] V. GOEL, W. BYRNE, AND S. KHUDANPUR. LVCSR rescoring with modified loss functions: a decision theoretic perspective. In *International Conference on Acoustics, Speech, and Signal Processing*, (4 pages). IEEE, 1998.

[145] W. BYRNE, M. FINKE, S. KHUDANPUR, J. MCDONOUGH, H. NOCK H, M. RILEY, M. SARACLAR, C. WOOTERS, AND G. ZAVALIAGKOS. Pronunciation modelling for conversational speech recognition: A status report from WS97. In *IEEE Automatic Speech Recognition and Understanding Workshop*, (8 pages), 1997.

[146] W. BYRNE, S. KHUDANPUR, E. KNODT, AND J. BERNSTEIN. Is automatic speech recognition ready for non-native speech? a data collection effort and initial experiments in modeling conversational Hispanic english. In *ESCA-ITR Workshop on speech technology in language learning*, (4 pages), 1997.

[147] M. OSTENDORF, W. BYRNE, M. BACCHIANI, M. FINKE, A. GUNAWARDANA, K. ROSS, S. ROWEIS, E. SHRIBERG, D. TALKIN, A. WAIBEL, B. WHEATLEY, AND T. ZEPPENFELD. Modeling systematic variations in pronunciation via a language-dependent hiddn speaking mode. In *Proceedings of the International Conference on Spoken Language Processing*, (4 pages), 1996.

[148] W. BYRNE. Information geometry and maximum likelihood criteria. In *Conference on Information Sciences and Systems*, (6 pages), Princeton, NJ, 1996.

[149] W. BYRNE. Generalization and maximum likelihood from small data sets. In *IEEE-SP Workshop on Neural Networks in Signal Processing*, (7 pages), 1993.

[150] K. WANG, S. SHAMMA, AND W. BYRNE. Noise robustness in the auditory representation of speech signals. In *International Conference on Acoustics, Speech, and Signal Processing*, (4 pages). IEEE, 1993.

[151] W. BYRNE, J. ROBINSON, AND S. SHAMMA. The auditory processing and recognition of speech. In *Proceedings of the Speech and Natural Language Workshop*, 325–331 (7 pages), October 1989.

[152] W. BYRNE, R. ZAPP, P. FLYNN, AND M. SIEGEL. Adaptive filtering in microwave remote heart monitors. In *IEEE Engineering in Medicine and Biology Society, Seventh Annual Conference*, (4 pages), 1985.