Greg Kochanski: Publications

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Refereed Publications

(My favorite papers are marked with asterisks.)

*"Rhythm measures and dimensions of durational variation in speech", Anastassia Loukina, Greg Kochanski, Burton Rosner, and Elinor Keane and Chilin Shih (Submitted 2010 to J. Acoustical Society of America). Preprint available at http://kochanski.org/gpk/papers/2010/classifier.pdf.

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"The Law of Categorical Judgement (Corrected) and the Interpretation of Changes in Psychophysical Performance", Burton S. Rosner and Greg Kochanski *Psychological Review* 2009, 116(1) p. 116–128. Doi:10.1037/a0014463.

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"What marks the beat of speech?" Kochanski, G. and Orphanidou, C., *J. Acoustical Society of America*, 2008, 123(5), pp. 2780–2791. doi:10.1121/1.2890742 .

"Connecting Intonation Labels to Mathematical Descriptions of Fundamental Frequency", Grabe, E., Kochanski, G., Coleman, J. *Language and Speech* 2007, 50(3), 281–310.

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"A Micromachined Vacuum Triode Using a Carbon Nanotube Cold Cathode", C. Bower, D. Shalom, Wei Zhu, D. Lopez, G. P. Kochanski, P. L. Gammel and Sungho Jin, IEEE Trans. Electron Devices, 49(8), 1478 (August 2002).

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"Nonlinear alternating-current tunneling microscopy;" G. P. Kochanski, 1989 *Phys. Rev. Lett.* **62**, 2285–2288.

"Evaporative cooling of spin-polarized atomic hydrogen;" N. Masuhara, J. M. Doyle, J. C. Sandberg, D. Kleppner, T. J. Greytak, H. F. Hess, G. P. Kochanski, 1988 *Phys. Rev. Lett.* **61**, 935–938.

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*"Spin-Polarized Hydrogen Maser;" H. F. Hess, G. P. Kochanski, J. M. Doyle, T. J. Greytak, and D. Kleppner, 1986 *Phys. Rev.* **A34**, 1602–1604.

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"Studies of neutron emission during the start-up phase of the Alcator C tokamak;" D. S. Pappas, R. J. Furnstahl, G. P. Kochanski, F. J. Wysocki, 1983 *Nuclear Fusion* **23**, 1285–1291.

Invited Talks

Measuring Phonetic Distance: An example of Monte Carlo Optimization 5 May 2011, at the University of Illinois Speech Production Workshop, University of Illinois, Urbana-Champaign. `http://www.beckman.illinois.edu/events/speechproductionworkshop/index.aspx`.

Experimental tests of Features and Partial Specification. Laboratoire Parole et Langage, Université de Provence, Aix-en-Provence, France, 17 December 2010. `http://kochanski.org/gpk/papers/2010/Aix_underspecification.pdf`.

Discrete linguistic objects in the brain: How do they stay that way? Institute for Research in Cognitive Sciences, University of Pennsylvania, Philadelphia, PA 10/19/2007 *and* McMaster University Department of Linguistics Hamilton, Ontario, Canada, 1/29/2008.

Tutorial on Orthogonal Polynomial Modeling of Intonation Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands, 10/15/2007.

Quantifying Intonational Phonology Max Planck Institute for Psycholinguistics Colloquium, Nijmegen, The Netherlands, 10/15/2007 and University of Pennsylvania Linguistics Department SPLUNCH (Speech Lunch), 10/25/2007.

Acoustics beyond f_0: Prominence and Questions in British English Dialects. Beckman Language and Psychology Lunchtime Seminar Series, Beckman Institute for Advanced Science and Technology, Champaign-Urbana, IL, 4/22/2004.

Mathematical Modeling for Linguistics Linguistics Seminars Series, University of Illinois Champaign-Urbana, IL, 4/22/2004.

Chinese Intonation: Connecting Linguistics to Acoustics Oxford University Graduate Seminar Series, Center for Linguistics and Philology, Oxford, UK, 10/20/2003.

How much of language can we explain from physiology? University of California, San Diego, Department of Cognitive Science, San Diego, CA, 3/21/2003.

Improving intonation modeling with a pinch of psychophysics. University of Connecticut, Department of Speech and Communication Disorders, Storrs, CT, 3/16/2003.

Quantitative tests of an (almost) Autosegmental-Metrical model. University of Edinburgh, Department of Theoretical and Applied Linguistics, Edinburgh, UK, 3/5/2003.

Improving models of intonation with a pinch of psychophysics. Birmingham University, Department of Electronic, Electrical and Computer Engineering, Birmingham, UK, 3/4/2003.

How much of language can we explain from physiology? City University of New York, Department of Biology, New York, NY, 11/11/2002.

Physical Modelling of Linguistic Features. Queen's University Department of Physics Kingston, Ontario, Canada, 9/30/2002. `http://kochanski.org/gpk/papers/2002/Physical_Modelling_of_Linguistic_Features.pdf`

Quantitative techniques for studying human languages; Neuroinformatics 2002, Marine Biological Laboratory, Woods Hole, MA, 8/26/2002.

OTHER

"Data-Driven Approaches to Objective Evaluation of Phoneme Alignment Systems", Ladan Baghai-Ravary, Greg Kochanski, and John Coleman. Accepted 2010 for publication in the proceedings of the Fourth Language & Technology Conference, November 6–8 2009, Pozna, Poland. It is planned to be part of the Springer LNAI (Lecture Notes in Artificial Intelligence) Series.

"Bootstrap Markov chain Monte Carlo and optimal solutions for the Law of Categorical Judgment (Corrected)" Greg Kochanski and Burton S. Rosner (2010), *arXiv:1008.1596* available from `http://arxiv.org/abs/1008.1596`.

"Long-Range Prosody Prediction and Rhythm", Greg Kochanski, Anastassia Loukina, Elinor Keane, Chilin Shih, and Burton Rosner (2010) *Speech Prosody 2010* Volume 100222, pages 1–4, available from `http://kochanski.org/gpk/papers/2010/100222.pdf` and `http://speechprosody2010.illinois.edu/papers/100222.pdf`. Presented at Speech Prosody 2010, Chicago Illinois, 11–13 May 2010. (The presentation itself is available from `http://kochanski.org/gpk/papers/2010/SpeechProsody/`.)

"Science Live: Greg Kochanski on Phonetics", Oxford University podcast: `http://www.sciencelive.org/component/option,com_mediadb/task,view/idstr,OX-podcast-oxitems_generatersstwo2_php_channel_name_humdiv_kochanski_interview_audio/Itemid,96`

*"Prosody Beyond Fundamental Frequency", Kochanski, G., 2006, in *Methods in Empirical Prosody Research*, edited by S. Sudhoff, D. Lenertová, R. Meyer, S. Pappert, P. Augurzky I. Mleinek, N. Richter, and J. Schließer. Published in Berlin, New York by De Gruyter in the Language, Context and Cognition Series, June 2006. ISBN 3-11-018856-2.

"The intonation of native accent varieties in the British Isles — potential for miscommunication?" 2005, Grabe, E., Kochanski, G. and Coleman, J. in Katarzyna Dziubalska-Kolaczyk and Joanna Przedlacka (eds.), English pronunciation models: a changing scene. Linguistic Insights Series 21, Peter Lang (Oxford, Berlin, New York). ISBN 3-03910-662-7 / US-ISBN 0-8204-7173-9.

"Is a Phrase Structure Grammar the Important Difference between Humans and Monkeys?" Kochanski, G, 2004 `http://kochanski.org/gpk/papers/2004/FitchHauser`.

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Kochanski, G. P., Zhu, Wei, Goren, Yehuda, "Technological Overview", Chapter 2, of *Vacuum Microelectronics,* ed. Wei Zhu, John Wiley & Sons, Inc. 2001. ISBN 0-471-32244-X.

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"Well of darkness", editorial, A. E. Evrard, 1998 *Nature* **394**, 9 July, pp. 122–123. As the first reliable experiment, our 1998 gravitational lensing paper has prompted theorists to rethink their assumptions and modeling of the dynamics of clusters of galaxies.

Recent Conference Presentations

(My favorite papers are marked with asterisks.)

"Objective Optimisation of Automatic Speech-to-Phoneme Alignment Systems", L. Baghai-Ravary, G. Kochanski and J. Coleman, in *Human Language Technologies as a Challenge for Computer Science and Linguistics*; Zygmunt Vetulani (ed.); pp. 341–5; 6–8 November, Poznań, Poland 2009; ISBN 978-83-7177-746-2. `http://kochanski.org/gpk/papers/2009/ltc-final-website.pdf`.

"How far can phonological properties explain rhythm measures?", Elinor Keane, Anastassia Loukina, Greg Kochanski, Burton Rosner, and Chilin Shih presented at the British Association of Academic Phoneticians meeting, 28–31 March 2010, London, UK. See `http://kochanski.org/gpk/papers/2010/BAAP/Keane/`.

"Do rhythm measures separate languages or speakers?", Anastassia Loukina, Greg Kochanski, Elinor Keane, Burton Rosner, and Chilin Shih, presented at the British Association of Academic Phoneticians meeting, 28–31 March 2010, London, UK. See `http://kochanski.org/gpk/papers/2010/BAAP/Loukina/`.

"A Phonologically Calibrated Acoustic Dissimilarity Measure", Greg Kochanski, Ladan Baghai-Ravary, and John Coleman, presented at the British Association of Academic Phoneticians meeting, 28–31 March 2010, London, UK. See `http://kochanski.org/gpk/papers/2010/BAAP/distance/`.

"Rhythm measures with language-independent segmentation", Anastassia Loukina, Greg Kochanski, Chilin Shih, Elinor Keane and Ian Watson *Proceedings of the 10th Annual Conference of the International Speech Communication Association* (Interspeech 2009). ISSN 1990–9772 Brighton, UK, 7–10 September 2009, pp 1531–1534.

"Precision of Phoneme Boundaries Derived using Hidden Markov Models", Ladan Baghai-Ravary, Greg Kochanski, and John Coleman *Proceedings of the 10th Annual Conference of the International Speech Communication Association* (Interspeech 2009). ISSN 1990–9772 Brighton, UK, 7–10 September 2009. Pp. 2879–2882.

"Image quality in non-gated versus gated reconstruction of tongue motion using Magnetic Resonance Imaging (MRI): A comparison using automated image processing", Alvey, C., Orphanidou, C., Coleman, J., McIntyre, A., Golding, S., Kochanski, G., presented at CARS 2008 (Computer Assisted Radiology and Surgery), June 25–28, 2008, Barcelona, Spain. (Published as part of doi:10.1007/s11548-008-0167-z, "Magnetic Resonance", in *International Journal of Computer Assisted Radiology and Surgery*, Volume 3, Supplement 1 / June, 2008, pages 17–21.)

*"Testing the Ecological Validity of Repetitive Speech", Kochanski, G. and Orphanidou, C., 10 Aug 2007, *International Congress of Phonetic Sciences (ICPhS XVI)*, Saarbrücken, Germany. `http://kochanski.org/gpk/papers/2007/icphs.pdf`, `http://www.icphs2007.de/conference/Papers/1632/1632.pdf`.

"The missing link between articulatory gestures and sentence planning", Shih, C., and Kochanski, G., and Yoon, S.- Y., 7 Aug 2007, *International Congress of Phonetic Sciences (ICPhS XVI)*, Saarbrücken, Germany. `http://kochanski.org/gpk/papers/2007/ICPhS2007_shih_kochanski.pdf`

*"Discrete Linguistic Objects in the Brain: How do they stay that way?", Kochanski, G., *III Conference of the Association of Latinoamerican Linguistics and Philology of Northwest Europe (ALFAL-NE)*. Oxford 21–22 June 2007.

"Planning Compensates for the Mechanical Limitations of Articulation", Kochanski, G. and Shih, C., 2006 (invited talk, 5 May 2006) *Proceedings of Speech Prosody* 2–5 May 2006, Dresden, Germany.

"Empirical Validation of Hand-labelled Nuclear Accent Patterns", Grabe, E., Kochanski, G., Coleman, J., 2006 Proceedings of Speech Prosody 2–5 May 2006, Dresden, Germany.

"The Difference between a Question and a Statement: A Survey of British English Dialects", Greg Kochanski, Esther Grabe, and John Coleman Acoustical Society of America Meeting, New York, NY, 24–28 May 2004, J. Acoust. Soc. Am. 115(5) p.2398 (May 2004), `http://kochanski.org/gpk/papers/2004/200405ASA/index.htm`.

"Motor Control Strategies for Chinese Intonation", Greg Kochanski, Chilin Shih, and Tan Lee, Cognitive Neuroscience Society Meeting, San Francisco CA, 18–20 April, 2004. (Published as a supplement to J. Cognitive Neuroscience.)

"Modeling Intonation: Asking for Confirmation in English", Chilin Shih and Greg Kochanski Proceedings of the International Congress of Phonetic Sciences, Barcelona, 3–9 August 2003.

"Modeling Tones in Continuous Cantonese Speech", Tan Lee, G. Kochanski, C. Shih and Yujia Li, in the proceedings of ICSLP2002 (Seventh International Conference on Spoken Language Processing), 16–20 September 2002, Denver Colorado, pp. 2401–2404.

*"A Reverse Turing Test Using Speech", G. Kochanski, D. Lopresti and C. Shih, in the proceedings of ICSLP2002 (Seventh International Conference on Spoken Language Processing), 16–20 September 2002, Denver Colorado, pp. 1357–1360.

"Comparison of Declarative and Interrogative Intonation in Chinese", Yuan, Jiahong, Shih, Chilin and Kochanski, Greg P., *Proceedings of the Speech Prosody 2002 Conference,* Aix-en-Provence, Laboratoire Parole et Langage, 11–13 April 2002, pp. 711–714. Bel, B. and Marlien, I., *eds.* ISBN 2-9518233-0-4.

"Human Interactive Proofs for Spoken Language Interfaces", Lopresti, D., Shih, C., and Kochanski, G., in *Proceedings of the Workshop on Human Interactive Proofs*, Palo Alto, CA, January 2002, pp. 30–34.

"Implications of Prosody Modeling for Prosody Recognition", Chilin Shih, Greg Kochanski, Eric Fosler-Lussier, Melody Chan, Jia-Hong Yuan, in Bacchiani, M. and Hirschberg, J. and Litman D. and Ostendorf M. (eds.), *Proceedings of the ISCA Tutorial and Research Workshop on Prosody in Speech Recognition and Understanding,* Red Bank, NJ, October 2001, pp. 133–138. (International Speech Communication Association).

*"Synthesis of prosodic styles", Shih, Chilin and Kochanski, G. P., in *Procedings of the 4th ISCA Tutorial and Research Workshop on Speech Synthesis,* Perthshire, Scotland, August 2001.

*"Hierarchical structure and word strength prediction of Mandarin prosody", Kochanski, G. P. and Shih, Chilin, and Jing, Hongyan, in *Procedings of the 4th ISCA Tutorial and Research Workshop on Speech Synthesis,* Perthshire, Scotland, August 2001.

"Automated modeling of Chinese intonation in continuous speech", Kochanski, G. P. and Shih, Chilin, in *Proceedings of seventh European conference on speech communication and technology* (Eurospeech), pp. 669–672, Aalborg, Denmark, September 2001.

"Prosody control for speaking and singing styles", Shih, Chilin and Kochanski, G. P., in *Proceedings of seventh European conference on speech communication and technology* (Eurospeech), Aalborg, Denmark, September 2001.

"Stem-ML: Language-Independent Prosody Description", Kochanski, G. P., and Shih, Chilin, in *Proceedings of the sixth International Conference on Spoken Language Processing,* Beijing, China, October 2001.

"Chinese Tone Modeling with Stem-ML", Shih, Chilin, and Kochanski, G. P., in *Proceedings of the sixth International Conference on Spoken Language Processing,* Beijing, China, October 2001.

PATENTS

Patent WO/2010/055283: *Acoustic noise prediction and subtraction from intercom audio signal during magnetic resonance imaging*, G. P. Kochanski, D. B. Dobson. Noise cancellation technique that makes use of the signal in the MRI gradient coils to predict and subtract acoustic noise.

U.S. Patent 7,343,397 (2008): *Method and apparatus for performing predictive cacheing of DNS requests by correlating IP addresses*, G. P. Kochanski. Speeding web access by predicting and pre-fetching DNS records that are likely to be useful.

U.S. Patent 7,046,812 (2006) *Acoustic beam forming with robust signal estimation* G. P. Kochanski, Man M. Sondhi. Using medians to form beams from an array of microphones for improved rejection of echoes and other out-of-focus sources.

U.S. Patent 7,826,795 *Methods and apparatus for mitigating the effects of solar noise and the like on a wireless communication system* G. P. Kochanski, L. J. Lanzerotti, G. E. Rittenhouse, D. J. Thomson How to identify situations (such as solar flares) where extra noise sources become important to a cell phone system, and techniques for adjusting the operation of the base stations to minimize the effect of the excess noise.

U.S. Patent 8,900,762 *Methods and Apparatus For Location Determination Based On Dispersed Radio Frequency Tags* M. R. Andrews, T. K. Ho, G. P. Kochanski, L. J. Lanzerotti, and D. J. Thomson. How to find your location electronically in a building using cheap passive RFID tags.

*U.S. Patent 6,625,576: *Method and apparatus for performing text-to-speech conversion in a client/server environment;* G. P. Kochanski, J. P. Olive, C. Shih. How to transport speech efficiently, both in terms of bandwidth and resources in a cell phone or other portable client.

U.S. Patent 6,310,952: *Telephone Access to Overly Popular Services;* Baldwin, M., Jin, S.-H., Kochanski, G. P. Techniques for auctioning access to telephone services, for instance public golf course reservations.

*U.S. Patent 6,219,438: *Produce Identifier using Barcode Scanner and Wavelet Image Processing and having Compensation for Dirt Accumulated on the Viewing Window;* Giordano, D. A., Kochanski, G. P. How can one automatically tell an apple from an orange? Look at the texture.

U. S. Patent 5,854,661: *System and Method for Subtracting Reflection Images from a Display Screen;* Kochanski, G. P. Modeling and removing glare from displays by image processing.

*U.S. Patent 5,483,235: *Stylus-Based Keyboard Arrangement;* G. Kochanski, K. J. Hanson. The sensible way to arrange a keyboard — put common pairs and triplets of letters together, with adjustments for syllable boundaries. We used simulated annealing techniques to optimize the keyboard layout for common messages.

*U.S. Patent 5,512,934: *System and Method for Transmission of Programming on Demand;* G. Kochanski. Describes techniques for distributing video on demand

more efficiently. Hardware and spectrum is shared between users by running some users slightly faster, and some slightly slower until their data streams merge.

U.S. Patent 6,014,124: *Display Means and Methods.* Dickinson, A. G., Kochanski, G. P., Wong, Apollo. Novel exitation scheme for liquid crystal displays.

U. S. Patent 6,097,195: *Methods and Apparatus for Increasing Metal Density in an Integrated Circuit while also Reducing parasitic Capacitance;* Ackland, B. D., Inglis, D. A., Kochanski, G. P. Circuit design for a CMOS fingerprint sensor with general applicability to IC amplifiers. Actively driven guard electrodes.

*U.S. Patent 6,363,606: *Process for forming integrated structures using three dimensional printing techniques;* Johnson, D. W., Kochanski, G. P., Lanzerotti, L. J., Pribble, C. M., and Thomson, D. J. This shows how to build solid objects under computer control that are made from multiple materials and even include enclosed components.

*U.S. Patent 5,838,118: *Display Apparatus with Coated Phosphor and Method for Making Same;* Kochanski, G. P., Murray, C. A., Steigerwald, M. L., Wiltzius, Pierre, van Blaaderen, Alfons. Improving the phosphor lifetime in CRT displays and fluorescent lights by protecting the surface of the phosphor particles.

*U.S. Patent 5,596,634: *Telecommunications system for dynamically selecting conversation topics having an automatic call-back feature;* G. P. Kochanski. This patent allows internet-style chat services to be supported over the telephone network. It has a novel call-back feature that makes it possible to have chat lines on esoteric topics with small communities of interest. One could have chat on town politics or growing Begonias, rather than just topics of universal interest like money. In short, the patent allows the system to call you back, if some one wants to talk about your favorite topic.

U.S. Patent 6,538,367, 6,504,292, 6,297,952, 6,283,812, 5,796,211: Patents relating to field emitters for applications like microwave amplifiers.

U.S. Patents 5,283,500; 5,561,340; 5,598,056; 5,616,368; 5.637,950; 5,623,180; 5,648,699; 5,681,196; 5,690,530; 5,698,934; 5,704,820; 5,709,577; 5,744,195; 5,747,918; 5,977,697; 5,982,095; 6,014,124; 6,250,984; 6,504,292; 6,538,367; 6,741,019; 7,268,475: Patents relating to design and manufacturing of field emission flat panel displays. Better emitter structures, more manufacturable gate electrodes, and spacer designs that will withstand higher voltages. We focussed on display designs that could be manufactured without lithography, using self-aligning masks, random particle masks, and embossed and screen-printed pillar structures.