# Byron C. Wallace

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## Name, Position, Academic Departments

Name    **Byron C. Wallace**

Position    Assistant Professor (Research), Center for Evidence-based Medicine, Program in Public Health, Brown University

## Research Interests

My research is in machine learning/data mining and natural language processing with an emphasis on applications in health informatics. I am particularly interested in using machine learning to mine, organize and filter clinical/biomedical texts, especially in the context of evidence-based medicine. There are too few experts to make sense of the torrents of published clinical data. I am interested in mitigating this problem by developing novel learning algorithms to induce models that semi-automate the clinical evidence synthesis process, thereby reducing workload. More broadly, I am interested in core machine learning issues: e.g., structured and unstructured classification techniques; semi-supervised learning methods; learning with imbalanced data; and learning from alternative forms of supervision. I am also broadly interested in computational methods for evidence-synthesis.

## Education

2012    **Ph.D. Computer Science**, Tufts University, Medford, MA

Advisor    Carla E. Brodley

Ph.D. Thesis    *Machine Learning in Health Informatics: Making Better use of Domain Experts*

Committee Members    Carla Brodley (Tufts), Roni Khardon (Tufts), Anselm Blumer (Tufts), Thomas A. Trikalinos (Brown) and Jaime Carbonell (CMU)

2006    **B.S. Computer Science**, University of Massachusetts at Amherst, Amherst, MA

Minor in Philosophy

Cumulative GPA 3.7 (*Baystate Scholar*)

## Professional Experience

2012–*onwards*    **Assistant Professor (Research)**, Center for Evidence-based Medicine, Brown University Providence, RI

2008–2012    **Research Computer Scientist**, Institute for Clinical Research and Health Policy Studies, Tufts Medical Center, Boston, MA

2007–2008    **Research Assistant (in the *machine learning group*)**, Department of Computer Science, Tufts University, Medford, MA

Summer 2006    **Software Engineer**, IBM, Westford, MA

2002–2006    **Research Assistant (in the *RIPPLEs group*)**, Department of Computer Science, UMass, Amherset, MA

# Publications

## Conference Publications

*A preamble (especially for non-computer scientists): for historical reasons, conferences are the main venue of research dissemination in computer science. Conference proceedings comprise full-length articles and are peer-reviewed (usually by 2-3 reviewers). Acceptance rates for top-tier conference range from 10-25%. In general, these proceedings tend to be more highly read than journals.*

1. Byron C Wallace. Multiple narrative disentanglement: Unraveling infinite jest. In *Proceedings of the 2012 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT)*, pages 1–10. ACL, 2012.

2. Byron C. Wallace and Issa J. Dahabreh. Class probability estimates are biased for imbalanced data (and how to fix them). In *Proceedings of the International Conference on Data Mining (ICDM)*. *Selected as a *best of ICDM* paper for extended publication in *the journal of Knowledge and Information Systems (KAIS)*, 2012.

3. Byron C. Wallace, Kevin Small, Carla E. Brodley, Joseph Lau, and Thomas A. Trikalinos. Deploying an interactive machine learning system in an evidence-based practice center: abstrackr. In *Proceedings of the 2nd ACM SIGHIT International Health Informatics Symposium (IHI)*, pages 819–824. ACM, 2012.

4. Kevin Small, Byron C. Wallace, Carla E. Brodley, and Thomas A. Trikalinos. The constrained weight space SVM: Learning with ranked features. In *Proceedings of the International Conference on Machine Learning (ICML)*, pages 754–763, 2011.

5. Byron C. Wallace, K. Small, C.E. Brodley, and T.A. Trikalinos. Class imbalance, redux. In *IEEE 11th International Conference on Data Mining (ICDM)*, pages 754–763. IEEE, 2011.

6. Byron C. Wallace, Kevin Small, Carla E. Brodley, and Thomas A. Trikalinos. Who should label what? instance allocation in multiple expert active learning. In *Siam International Conference on Data Mining (SDM)*, pages 176–187. SIAM, 2011.

7. Byron C. Wallace, Kevin Small, Carla E. Brodley, Joseph Lau, and Thomas A. Trikalinos. Modeling annotation time to reduce workload in comparative effectiveness reviews. In *Proceedings of the 1st ACM International Health Informatics Symposium (IHI)*, pages 28–35. ACM, 2010.

8. Byron C. Wallace, Kevin Small, Carla E. Brodley, and Thomas A. Trikalinos. Active learning for biomedical citation screening. In *Proceedings of the 16th international conference on Knowledge discovery and data mining (KDD)*, pages 173–182. ACM, 2010.

## Journal Articles

9. Byron C Wallace. Computational irony: A survey and new perspectives. *Artificial Intelligence Review*, 2013 *(forthcoming)*.

10. Carla E. Brodley, Umaa Rebbapragada, Kevin Small, and Byron C. Wallace. Challenges and opportunities in applied machine learning. *Artificial Intelligence Magazine*, 33(1):11–24, 2012.

11. Byron C. Wallace, Issa J. Dahabreh, Thomas A. Trikalinos, Joseph Lau, Paul Trow, and Christopher H. Schmid. Closing the gap between methodologists and end-users: R as a computational back-end. *Journal of Statistical Software*, 49(5):1–15, 6 2012.

12. Byron C Wallace, Kevin Small, Carla E Brodley, Joseph Lau, Christopher H Schmid, Lars Bertram, Christina M Lill, Joshua T Cohen, and Thomas A Trikalinos. Toward modernizing the systematic review pipeline in genetics: efficient updating via data mining. *Genetics in Medicine*, 14(7):663–669, 2012.

13. R.D. Whitaker, S. Pember, B.C. Wallace, C.E. Brodley, and D.R. Walt. Single cell time-resolved quorum responses reveal dependence on cell density and configuration. *Journal of Biological Chemistry*, 286(24):21623–21632, 2011.

14. PJ Castaldi, MH Cho, M Cohn, F Langerman, S Moran, N Tarragona, H Moukhachen, R Venugopal, D Hasimja, E Kao, BC Wallace, CP Hersh, S Bagade, L Bertram, EK Silverman, and TA Trikalinos. The copd genetic association compendium: a comprehensive online database of copd genetic associations. *Human molecular genetics*, 19(3):526–534, 2010.

15. Byron C. Wallace, Thomas A. Trikalinos, Joseph Lau, Carla E. Brodley, and Christopher H. Schmid. Semi-automated screening of biomedical citations for systematic reviews. *BMC Bioinformatics*, 11(1):55+, 2010.

16. Byron C. Wallace, Christopher H. Schmid, Joseph Lau, and Thomas A. Trikalinos. Meta-analyst: software for meta-analysis of binary, continuous and diagnostic data. *BMC medical research methodology*, 9(1):80+, 2009.

## Selected Talks

*Note that this is non-exhaustive and that these are in addition to the talks accompanying the conference publications above.*

1. Byron C. Wallace. Better models, less effort: Active learning and dual supervision. *Department of Computer Science at UMass, Boston*, 03/07/2012.

2. Byron C. Wallace. Machine learning in systematic reviews: Making better use of domain expertise. *Statistical Analysis of "Big Data" Group, Brown University*, 11/09/2012.

3. Byron C. Wallace. Open meta-analyst: open-source, cross-platform software for advanced meta-analysis. *2010 Joint Colloquium of the Cochrane and Campbell Collaborations, Keystone, Colorado*.

4. Byron C. Wallace. Using machine learning to reduce the systematic review workload. *2010 Joint Colloquium of the Cochrane and Campbell Collaborations, Keystone, Colorado*.

5. Byron C. Wallace, Christopher H. Schmid, Joseph Lau, Carla Brodley, and Thomas A. Trikalinos. Semi-automated screening of biomedical citations for systematic reviews. *4th Annual Meeting of the Society for Research Synthesis Methodology, Seattle, WA*, page Oral Presentation, 07/2009.

## Commentaries

1. Byron C. Wallace and Thomas A. Trikalinos. In Response to: Applications of text mining within systematic reviews. *Cochrane Methods*, 2012.

## Peer Reviewing

Conference program committees on which I have served: *2013 Association for the Advancement of Artificial Intelligence (AAAI), 2012 Knowledge Discovery and Databases (SIGKDD) Workshop on Health Informatics, 2012 ACM International Conference on Information and Knowledge Management (CIKM)*

Other conferences for which I have peer-reviewed (as an external reviewer) *2011 Conference of the North American Chapter of the Association for Computational Linguistics (NAACL), 2011 Conference on Empirical Methods in Natural Language Processing (EMNLP)*

Some journals for which I regularly peer-review: *Agency for Healthcare Research and Quality (AHRQ), Bioinformatics, BMC Medical Informatics and Decision Making, BMC Medical Research Methodology, BMC Research Notes, Bioinformatics, Current Bioinformatics, IEEE Transactions on Knowledge and Data Engineering, Research Synthesis Methods (RSM)*

## Academic Honors & Professional Awards

Recipient of the *Outstanding Graduate Researcher at the Doctoral Level* award. Tufts University. 2012.

Recipient of the *Outstanding Student in the Area of Systems in Computer Science* award. UMass, Amherst. 2006.

Recipient of the 2005-2006 *Jonathon Edwards Philosophy Essay Prize*. UMass, Amherst. 2006.

Recipient of the 2005-2006 *Gerald F. Scanlon Student Employee of the Year* Award. UMass, Amherst. 2006.

## Teaching

I was co-head instructor of CS150 AIH: *Artificial Intelligence in Health Informatics* alongside Dr. Kevin Small in the Computer Science department at Tufts University. Fall 2011. http://www.cs.tufts.edu/comp/150AIH/

## Research Grants & Contracts

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|---|---|
| Grant Title | R01: Making Advanced Statistical Tools Accessible for Quantitative Research Synthesis and Discovery in Ecology and Evolutionary Biology. (*pending; recommended for funding*) |
| Funder | National Science Foundation (NSF) |
| Program | Collaborative research: ABI Development: Making Advanced Statistical Tools Accessible for Quantitative Research Synthesis and Discovery in Ecology and Evolutionary Biology. |
| Amount (*pending*) | ∼$500,000 |
| Role | Principal Investigator |
| Collaborators | Co-Principal Investigator Jessica Gurevitch (SUNY), Investigator Thomas Trikalinos, Investigator Christopher H. Schmid |
| | |
| Grant Title | R01 HS 018494: Semi-automating Citation Screening for Systematic Reviews |
| Funder | AHRQ |
| Amount | $1.2 million |
| Period | 12/01/2009–11/30/2012 |
| Role | Key Investigator |
| Collaborators | Principal Investigator Thomas A. Trikalinos, Investigator Joseph Lau |
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| Grant Title | R01 HS 018574: Modernizing Meta-Analysis to Facilitate Comparative Effectiveness Reviews |
| Funder | AHRQ |
| Amount | $1.2 million |
| Period | 12/01/2009–11/30/2012 |
| Role | Key Investigator |
| Collaborators | Principal Investigator Christopher H. Schmid, Investigator Thomas A. Trikalinos, Investigator Joseph Lau |

### Proposals Submitted / Under Review

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|---|---|
| Grant Title | Computational Models of Patient-Provider Communication. Submitted 12/2012. |
| Funder | Brown; this is an internal seed grant proposal. |
| Total funds requested | ∼$60,000 |
| Role | Principal Investigator |
| Collaborators | Co-Principal Investigators: Eugene Charniak, Michael Barton Laws. |

## Skills

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|---|---|
| Fluent (or at least was at one time...) in: | Python, Java, C# |

Experience with:   R,   Matlab/Octave,   JAGS/(Win)BUGS,
                   Scheme, C/C++, javascript