Brent D. Burch
Department of Mathematics and Statistics
Northern Arizona University
Flagstaff, AZ 86011–5717
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EDUCATIONAL BACKGROUND

Ph.D., **Statistics**, Colorado State University 1996
M.S., **Statistics**, Colorado State University 1993
M.S., **Mathematics**, Purdue University 1985
B.S., **Mathematics**, Creighton University 1983

PROFESSIONAL BACKGROUND

Professor, July 2008 – present, **Associate Chair**, July 2015 – June 2017
Department of Mathematics & Statistics, Northern Arizona University, Flagstaff, AZ

Associate Professor, July 2002 – June 2008
Department of Mathematics & Statistics, Northern Arizona University, Flagstaff, AZ

Assistant Professor, August 1996 – June 2002
Department of Mathematics & Statistics, Northern Arizona University, Flagstaff, AZ

Graduate Teaching Assistant, August 1991 – May 1996
Department of Statistics, Colorado State University, Fort Collins, CO

Research Scientist, February 1986 – June 1991
Kaman Sciences Corporation, Colorado Springs, CO

PUBLICATIONS AND PRESENTATIONS

Refereed Publications - Journals

Jesse Egbert and Brent Burch (2022). Which Words Matter Most? Operationalizing Lexical Prevalence for Rank-ordered Word Lists. Under review.

Brent Burch and Jesse Egbert (2022). Interval Estimation Concerning Ratios of Means and Corpus-based Word Frequency Classes. *Journal of Applied Statistics*, https://doi.org/10.1080/02664763.2022.2034759.

Brent Burch (2021). A Family of Unbiased Confidence Intervals for a Ratio of Variance Components. *Statistics & Probability Letters*, 169, https://doi.org/10.1016/j.spl.2020.108965.

Kari Burch and Brent Burch (2021). Activities of Daily Living Performance in Persons with Dementia: Comparing Care Partners' and Clinicians' Appraisal and Associated Factors. *Alzheimer Disease & Associated Disorders*, 35, 153–159.

Jesse Egbert, Brent Burch, and Douglas Biber (2020). Lexical Dispersion and Corpus Design. *International Journal of Corpus Linguistics*, 25, 89-115.

Brent Burch and Jesse Egbert (2020). Zero-inflated Beta Distribution Applied to Word Frequency and Lexical Dispersion in Corpus Linguistics. *Journal of Applied Statistics*, 47, 337-353.

Refereed Publications - Journals (Continued)

Brent D. Burch and Andrew J. Sánchez Meador (2018). Comparison of Forest Age Estimators Using k-tree, Fixed-radius, and Variable-radius Plot Sampling.
Canadian Journal of Forest Research, 48, 942–951.

Brent Burch, Jesse Egbert, and Douglas Biber (2017). Measuring and Interpreting Lexical Dispersion in Corpus Linguistics.
Research Design and Statistics in Linguistics and Communication Science, 3, 189-216.

Brent D. Burch (2017). Distribution-dependent and Distribution-free Confidence Intervals for the Variance. *Statistical Methods and Applications*, 26, 629-648.

Brent D. Burch (2015). Improved Large-Sample Confidence Intervals for Ratios of Variance Components in Nonnormal Distributions.
Communications in Statistics: Theory and Methods, 44, 349–362.

Brent D. Burch (2014). Estimating Kurtosis and Confidence Intervals for the Variance Under Nonnormality. *Journal of Statistical Computation and Simulation*, 84, 2710–2720.

Brent D. Burch (2012). Nonparametric Bootstrap Confidence Intervals for Variance Components Applied to Interlaboratory Comparisons.
Journal of Agricultural, Biological, and Environmental Statistics, 17, 228–245.

Brent D. Burch (2011). Confidence Intervals for Variance Components in Unbalanced One-way Random Effects Model Using Non-normal Distributions.
Journal of Statistical Planning and Inference, 141, 3793–3807.

Brent D. Burch (2011). Assessing the Performance of Normal-based and REML-based Confidence Intervals for the Intraclass Correlation Coefficient.
Computational Statistics and Data Analysis, 55, 1018–1028.

Brent D. Burch (2008). Comparing Equal-tail Probability and Unbiased Confidence Intervals for the Intraclass Correlation Coefficient.
Communications in Statistics: Theory and Methods, 37, 3264–3275.

Brent D. Burch (2007). Comparing Pivotal and REML-Based Confidence Intervals for Heritability. *Journal of Agricultural, Biological, and Environmental Statistics*, 12, 470–484.

Brent D. Burch (2007). Generalized Confidence Intervals for Proportions of Total Variance in Mixed Linear Models. *Journal of Statistical Planning and Inference*, 137, 2394–2404.

Brent D. Burch and Ian R. Harris (2005). Optimal One-way Random Effects Designs for the Intraclass Correlation Coefficient Based on Confidence Intervals.
Communications in Statistics: Theory and Methods, 34, 2009–2023.

Ian R. Harris and Brent D. Burch (2005). Measuring Relative Importance of Sources of Variation Without Using Variance. *The American Statistician*, 59, 217–222.

Nancy Eileen Muleady-Mecham, Martha E. Lee, and Brent D. Burch (2004). A Public Opinion Survey on Wildland Fire in Grand Canyon National Park.
The George Wright Forum, (Volume 21, No. 4), 12–21.

Brent D. Burch and Ian R. Harris (2001). Closed-form Approximations to the REML Estimator of a Variance Ratio (or Heritability) in a Mixed Linear Model.
Biometrics, 57, 1148–1156.

Ian R. Harris, Brent D. Burch, and Roy T. St. Laurent (2001). A Blended Estimator for a Measure of Agreement with a Gold Standard.
Journal of Agricultural, Biological, and Environmental Statistics, 6, 326–339.

Refereed Publications - Journals (Continued)

Ian R. Harris and Brent D. Burch (2000). Pivotal Estimation with Applications for the Intraclass Correlation Coefficient in the Balanced One-way Random Effects Model. *Journal of Statistical Planning and Inference*, 83, 257–276.

Brent D. Burch and Ian R. Harris (1999). Bayesian Estimators of the Intraclass Correlation Coefficient in the One-way Random Effects Model. *Communications in Statistics: Theory and Methods*, 28, 1247–1272.

Brent D. Burch and Hari K. Iyer (1997). Exact Confidence Intervals for a Variance Ratio (or Heritability) in a Mixed Linear Model. *Biometrics*, 53, 1318–1333.

Refereed Publications - Proceedings, Book Chapters

Brent D. Burch (2012). Confidence Intervals for Variance Components Using Non-normal Distributions. *Proceedings of the Twenty Third Annual Conference on Applied Statistics in Agriculture*, 15 pages.

Ian R. Harris and Brent D. Burch (2003). The Probability of Preponderancy: An Alternative to the Intraclass Correlation. *Proceedings of the Fifteenth Annual Conference on Applied Statistics in Agriculture*, pages 137–149.

Brent D. Burch and Ian R. Harris (2003). Analysis of Heritability. *Encyclopedia of Biopharmaceutical Statistics*, pages 36–41.

Brent D. Burch and Ian R. Harris (2002). Estimating Intraclass Correlation: Optimal Results using Limited Resources. *Proceedings of the Fourteenth Annual Conference on Applied Statistics in Agriculture*, pages 49-61.

Brent D. Burch and Ian R. Harris (2001). Assessing the Performance of Closed-form Approximations to the REML Estimator of a Variance Ratio in a Mixed Linear Model. *Proceedings of the Graybill Conference on Linear and Non-linear Generalized Linear Models*, pages 41-57.

Brent D. Burch and Ian R. Harris (2001). Assessing the Performance of Closed-form Approximations to the REML Estimator of Heritability. *Proceedings of the Thirteenth Annual Conference on Applied Statistics in Agriculture*, pages 85–97.

Brent D. Burch and Ian R. Harris (2000). Point Estimators of Heritability Based on Confidence Intervals: A Closed-form Approximation to the REML Estimator. *Proceedings of the Twelfth Annual Conference on Applied Statistics in Agriculture*, pages 95–102.

Brent D. Burch, Ian R. Harris, and Roy St. Laurent (1999). An Improved Estimator for Assessing the Measure of Agreement with a Gold Standard. *Proceedings of the Eleventh Annual Conference on Applied Statistics in Agriculture*, pages 120–129.

Brent D. Burch and Ian R. Harris (1998). Using Confidence Intervals to Obtain a Family of Estimators of the Intraclass Correlation Coefficient (or Heritability). *Proceedings of the Tenth Annual Conference on Applied Statistics in Agriculture*, pages 109-122.

Brent D. Burch and Hari K. Iyer (1997). Confidence Intervals for Heritability in a Mixed Linear Model. *Proceedings of the Ninth Annual Conference on Applied Statistics in Agriculture*, pages 30–40.

Non-refereed Publications

Ian R. Harris and Brent D. Burch (2003). The Probability of Preponderancy: An Alternative to the Intraclass Correlation. *Department of Statistical Science, Southern Methodist University, Technical Report SMU-TR-307.* 23 pages.

Brent D. Burch and Ian R. Harris (2002). Optimal One-way Random Effects Designs for the Intraclass Correlation Coefficient Based on Confidence Intervals. *Department of Statistical Science, Southern Methodist University, Technical Report SMU-TR-302.* 33 pages.

Donald R., Southam G., Foust R., Rottach R., and Burch B. (1998). The Oak Creek Canyon Section 319 (h) National Monitoring Program: Final Report (Draft). *The United States Environmental Protection Agency.* 19 pages plus appendices.

Brent D. Burch and Hari K. Iyer (1997). Confidence Intervals for a Ratio of Variance Components in a Mixed Linear Model. *1997 Proceedings of the Biometrics Section of the American Statistical Association,* pages 176–180.

R. Donald, C. Crabill, B. Burch, R. Foust and G. Southam (1997). The Oak Creek 319 (h) National Monitoring Program. *Proceedings of the National Watershed Water Quality Project Symposium,* pages 67–71.

Author or co-author of eleven chapters in the series of U.S. government classified documents *Evaluation of the Navy Submarine Launched Ballistic Missile (SLBM) Reentry Systems* from 1986 to 1990.

Presentations at National/Local Professional Meetings

From 1996 through 2021, I presented over thirty-five papers at various statistics meetings across the country. Selected presentations are listed below.

Statistical Research from Theoretical Principles to Practical Methods. NAU Department of Mathematics and Statistics. November 12, 2020.

Zero-Inflated Beta Distribution Applied to Word Frequency and Lexical Dispersion in Corpus Linguistics. Joint Statistical Meetings (virtual conference). August 03, 2020.

Measuring Lexical Dispersion in Corpus Linguistics. Joint Statistical Meetings. Vancouver, British Columbia, Canada. August 02, 2018.

Distribution-Dependent and Distribution-Free Confidence Intervals for the Variance. Joint Statistical Meetings. Chicago, IL. August 03, 2016.

Comparing Sampling Strategies for Estimating the Age Characteristics of a Forest. Joint Statistical Meetings. Boston, MA. August 07, 2014

Estimating Kurtosis and Approximate Confidence Intervals for Variance Components. Joint Statistical Meetings. Montréal, Canada. August 04, 2013.

Nonparametric Bootstrap Confidence Intervals for Variance Components in One-way Random Effects Models. Joint Statistical Meetings. San Diego, CA. July 30, 2012.

Confidence Intervals for Variance Components Using Non-normal Distributions. Twenty Third Annual Conference on Applied Statistics in Agriculture. Manhattan, KS. May 02, 2011.

GRANT HISTORY

National Science Foundation proposal submitted January 2016 ($599988 - Not funded)
CEFNS travel grant 2014 ($938)
Participant in the LCE Grant for Education Strategies in Large Enrollment Biology
  Lectures - 2007 ($1537), 2008 ($1630), 2009 ($1452)
College of Engineering and Natural Sciences Faculty Travel Grant - 2006 ($200)
National Science Foundation proposal submitted October 2003 ($123159 - Not funded)
Participant in the Interactive Precalculus Eisenhower Project - 2001 ($200)
Northern Arizona University Intramural Grant Program - 2001 ($4200)
National Science Foundation proposal submitted October 1999 ($134423 - Not funded)
Northern Arizona University Organized Research Grant - 1999 ($6000 - Not funded)
National Science Foundation proposal submitted October 1998 ($116544 - Not funded)
Participant in the The Oak Creek National Monitoring Project - 1998 ($5276)
Northern Arizona University Organized Research Grant - 1998 ($6000)
Northern Arizona University Organized Research Grant - 1997 ($6100)

STATISTICS COURSES TAUGHT AT NAU

STA 270 – Applied Statistics
STA 275 – Statistical Analysis
STA 371 – Intermediate Statistics
STA 471 – Regression Analysis
STA 473 – Mathematical Statistics I
STA 474 – Mathematical Statistics II
STA 477 – Time Series Analysis
STA 570 – Statistical Methods I
STA 570L – Introduction to R
STA 571 – Statistical Methods II
STA 572 – Multivariate Statistical Methods
STA 574 – Categorical Data Analysis
STA 575 – Applied Sampling
STA 585 – Statistical Consulting Practicum
STA 673 – Mathematical Statistics I
STA 674 – Mathematical Statistics II
STA 675 – Theory of Linear Models
STA 676 – Experimental Design
MAT 690 – Advanced Topics in Mathematics: Linear Statistical Models
MATH 403 – Probability and Statistics for Engineers (Saint Louis University - on sabbatical)
MTH 316 – Nonparametric Statistics (Fontbonne University - on sabbatical)

DEPARTMENT SERVICE

Executive Committee Member
Planning and Policy Committee Member
Faculty Status Committee Member and Chair
Graduate Operations Committee Member and Chair
Curriculum Committee Member and Chair
Annual Review Core Committee Member and Chair
Annual Review Committee Member
Statistics Professor Screening Committee Member and Chair
Mathematics Education Screening Committee Member
Statistics Lecturer Screening Committee Member
Mathematics Lecturer Screening Committee Member and Chair
Undergraduate Specialist Screening Committee Member and Chair
Instructor Search Committee Member and Chair

Department Service (Continued)

Chair Screening Committee Member
Department Program Review Committee Member
Assessment Committee Member
STA 270 Course Coordinator
STA 371 Course Developer
Graduate Certificate in Applied Statistics Coordinator
MS in Statistics Development Committee Member
Mentor to Graduate Students and Pretenured Faculty
Technology Committee Member
Society of Actuaries Examination Supervisor
Undergraduate Scholarship Committee Member and Chair
Undergraduate Curriculum and Policy Committee Member
Undergraduate Education Committee Member
Fall Picnic Master Griller

COLLEGE SERVICE

College of Engineering and Natural Sciences Graduate Committee Member
Science Foundation Arizona - Girls in Science Summer Day Camp Presenter
Thesis Committee Member for Martin Mihay (Chemistry)
Dissertation Committee Member for Andrew Sánchez Meador (Forestry)
Dissertation Committee Member for Christine Clark Friedman (Biological Sciences)
Dissertation Committee Member for Seonmin Park (Applied Linguistics)

UNIVERSITY SERVICE

University Graduate Committee Member
University Graduate Committee Representative for Dissertation Defenses

PROFESSIONAL SERVICE

Referee for the *Journal of the American Statistical Association*
Referee for *The American Statistician*
Referee for the *Journal of Statistical Planning and Inference*
Referee for *Communications in Statistics - Simulation and Computation*
Referee for *Statistical Papers*
Referee for *Journal of Statistical Computation and Simulation*
Referee for *BMC Medical Research Methodology*
Referee for *Proceedings of the Applied Statistics in Agriculture Conference*
Member of local organizing committee for ICOTS9, July 13 - 18, 2014, Flagstaff, AZ
   (9th International Conference on Teaching Statistics)
Assisted with the organization of the 2006 WNAR/IMS Meeting, Flagstaff, AZ
   (WNAR is the Western North American Region of the International Biometric
   Society and IMS is the Institute of Mathematical Statistics)

COMMUNITY SERVICE

DeMiguel Elementary School Site Council Member
DeMiguel Elementary School Safe-to-School Program Committee Member and Chair
Northland Preparatory Academy Governing Board Member
Northland Preparatory Academy Fundraising Committee Member and Chair

CONSULTING

Northern Arizona University Statistical Consulting Laboratory Liaison
Numerous additional statistical consulting sessions in the College of Engineering,
   Forestry & Natural Sciences and throughout the University
Flagstaff Medical Center
Kingman Regional Medical Center
U.S. Fish and Wildlife Service
Verde Valley Medical Center
Statistical methodology for 2017 NIH submission by Dr. Natalie Holt (Biological Sciences)
Statistical methodology and data analysis for Memory Care Home Solutions (a company
   providing in-home resources for caregivers of people suffering from dementia)
Statistical methodology and data analysis for Duolingo (a language learning company)

AWARDS

Northern Arizona University Department of Mathematics and Statistics
      Chairman's Award for Scholarly Activity - 2008, 1999
      Chairman's Award for Teaching - 2003

The following awards were presented at Colorado State University:
      College of Natural Sciences Graduate Student Teaching Award - 1996
      Madison Award for Excellence in Graduate Study (Statistics) - 1996
      Boes Award for Excellence in Teaching (Statistics) - 1995
      Graybill Award for Excellence in Linear Models (Statistics) - 1993