

Curriculum Vitae

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EDUCATION

Ph. D., August 2004- Statistics (Specializing in Multivariate Analysis), Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, OH 43403

M.Sc., July 1999 - Statistics Major, Addis Ababa University, Ethiopia

B.Sc., July 1990- Statistics Major and Computer Science Minor, Addis Ababa University, Ethiopia

EXPERIENCE

August 2006-Now, Assistant Professor, Department of Mathematical Sciences, University of Montana, Missoula, MT 59812, USA

August 2004-August 2006, Assistant Professor, Department of Mathematics and Statistics, South Dakota State University, Brookings, SD 57007, USA

August 2000-August 2004, Graduate Assistant, Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, OH 43402, USA

August 1996-August 2000, Lecturer, Department of Statistic, Addis Ababa University, Addis Ababa, Ethiopia

RESEARCH

Areas of Current Research Interest

Multivariate Analysis, Inference under Non-normality, Inference under High Dimensional Parametric Space, Skewed Elliptical Models, Singular Distributions, Matrix Variate Distributions, Asymptotic Expansions, Nonparametric Methods, Gene Expression Data Analysis and Clustered Data Analysis.

Refereed Publications

1. **Harrar, S.W.** and A. K. Gupta (2005). On the Distribution of the LBI criterion in MANOVA under Non-normality. *Statistics* **39**, 405-414.
2. **Harrar, S.W.**, E. Seneta and A. K. Gupta (2006). Duality between Matrix Variate T and Matrix Variate V. G. Distributions. *Journal of Multivariate Analysis* **97**, 1467-1475.

3. Gupta, A. K., **S. W. Harrar** and Y. Fujikoshi (2006). Asymptotics for Testing Hypothesis in Some Variance Components Model Under Non-normality. *Journal of Multivariate Analysis* **97**, 148-178.
4. **Harrar, S. W.** and A. K. Gupta (2007). Asymptotic Expansion for the Null Distribution of the F-Statistic in One-Way ANOVA under Non-normality. *Annals of the Institute of Statistical Mathematics*, 59, 531-556.
5. Gupta, A. K., **S. W. Harrar** and L. Pardo (2007), On Testing Homogeneity of Variance for Non-normal Models Using Entropy, *Statistical Methods and Applications*, 16, 245-261.
6. **Harrar, S.W.** and A. K. Gupta (2008). On Matrix Variate Skew Normal Distributions. *Statistics*, 42, 179-194.
7. Bathke, A. C. and **S. W. Harrar** (2008). Nonparametric Methods in Multivariate Factorial Designs for Large Number of Factor Levels. *Journal of Statistical Planning and Inference*, 138, 588–610.
8. Gupta, A. K., **S. W. Harrar** and Y. Fujikoshi (2008). MANOVA for Large Hypothesis Degrees of Freedom under Non-normality. *Test*, 17, 120-137.
9. Schleicher, H. E., K. J. Harris, D. Catley, D., **S. W. Harrar** & A. L. Golbeck, A.L. (2008). Examination of a Brief Smoking Consequences Questionnaire for College Students. *Nicotine and Tobacco Research* **10**, 1503–1509.
10. Bathke, A. C., **S. W. Harrar**, and L. V. Madden (2008). How to Compare Small Multivariate Samples Using Nonparametric Tests. *Computational Statistics and Data Analysis* **52**, 4951–4965.
11. **Harrar, S. W.** and Bathke, A. C. (2008). Nonparametric Methods for Unbalanced Multivariate Data and Many Factor Levels. *Journal of Multivariate Analysis* **99**, 1635–1664.
12. **Harrar, S. W.** and A. C. Bathke (2008). A Nonparametric Version of the Bartlett-Nanda-Pillai Multivariate Test, Asymptotics, Approximations and Applications. *American Journal of Management and Mathematical Sciences* **28**, 309--335.
13. Bathke, A. C., **S. W. Harrar** and M. R. Ahmad (2009). Some Contributions to the Analysis of Multivariate Data. *Biometrical Journal* **51**, 285–303.
14. **Harrar, S. W.** (2009), Asymptotics for Tests on Mean Profiles, Additional Information and Dimensionality under Non-normality, *Journal of Statistical Planning and Inference* **139**, 2685 – 2705.

15. Harris K. J., J. N. Stearns, R. G. Kovach and **S. W. Harrar** (2009). Enforcing an outdoor smoking ban on a college campus: Effects of a multi-component approach. *Journal of American College Health* **58**, to appear.

Manuscripts under Review or in Preparation

1. **Harrar, S. W.** and J. Xu. A note on the null distributions of some test statistics for profile analysis under general conditions, submitted.
2. Liu, C., A. C. Bathke and **S. W. Harrar**. A Nonparametric Version of Wilks' Lambda -- Asymptotic Results and Small Sample Approximations, submitted.
3. **Harrar, S. W.** and A. C. Bathke. A Modified Robust Two-Factor Multivariate Analysis of Variance: Asymptotics and Small Sample Approximations.
4. Bathke, A. C., **S. W. Harrar**, H. Wang, K. Zhang and H. P. Piepho, Series of Randomized Complete Block Experiments with Non-normal Data
5. Krigel, S. W., D. Catley, **S. W. Harrar**, T. B. Murdock, K. Goggin, K. J. Harris, J. S. Ahluwalia. Factor Analysis of Nicotine Withdrawal Symptoms, submitted.
6. Konietzschke, F., **S. W. Harrar**, L. A. Hothorn and E. Brunner. A New Nonparametric Approach for Confidence Intervals for Relative Effects in Matched Pairs with Missing Data, in preparation to submission.
7. Davidson, M. M. , N. J. Cronk, K. J. Harris, **S. W. Harrar**, D. Catley and G. E. Good. Strategies to Recruit and Retain College Smokers in Cessation Trials, submitted.

Other Non-Refereed Publications

1. Chunxu Liu, Arne C. Bathke and **Solomon W. Harrar** (2008), A Nonparametric Version of Wilks' Lambda – Asymptotic Results and Small Sample Approximations, In: Proceedings of the 2008 Joint Statistical Meetings, Alexandria, VA. American Statistical Association, pp.3244-3252.
2. Arne C. Bathke and **Solomon W. Harrar** (2006), Testing Treatment Effects in Multivariate Factorial Designs with Many Factor Levels, In: Proceedings of the 2006 Joint Statistical Meetings, Alexandria, VA. American Statistical Association, pp.1664-1667.
3. **Solomon W. Harrar** (2004), Linear Model under Nonnormality, Unpublished PhD Thesis, Bowling Green State University, Bowling Green, OH, August 2004.

4. **Solomon W. Harrar** (1999), Two New Methods for Low Dose Risk Extrapolation, Unpublished MS Thesis, Addis Ababa University, Addis Ababa, Ethiopia, May 1999.
5. **Solomon W. Harrar**, Production Function for Meta Abo Brewery, Unpublished BS Project, Addis Ababa University, Addis Ababa, Ethiopia, May 1990.

Colloquia or Conference Presentations

1. Modified Rank-Based MANOVA: Asymptotics and Small Sample Approximations, 2009 Joint Statistical Meeting, Contributed Session in Nonparametric Statistics, Washington, DC, August 2009.
2. Modified Rank-Based MANOVA: Asymptotics and Small Sample Approximations, Nonparametric Statistics, Refined, Redefined, and Renewed (Workshop), Invited Session: Multivariate and Repeated Measurements Designs, Arlington, TX, April 2009.
3. “Asymptotic Expansions for Multivariate Statistics under General Conditions: Applications to the Profile Analysis”, Department of Statistics, Addis Ababa University, Addis Ababa, Ethiopia, July 2008.
4. “Asymptotic Expansion of the Null Distributions of Test Statistics for Profile Analysis under General Conditions”. 2008 Joint Statistical Meeting, Contributed Session in Statistical Testing, Denver, CO, August 2008.
5. “On the Null and Non-null Distributions in Profile Analysis under Nonnormality”. International Conference on Multivariate Statistical Modelling and High Dimensional Data Mining, Invited Session on Multivariate Estimation and Testing, June 19-23, Kayseri, Turkey.
6. “Testing Homogeneity of Variances for Non-normal Models Using Entropy”, 2007 Joint Statistical Meeting, Salt Lake City, Utah, August 2007.
7. “Robustness Study for Tests on Mean Vectors” (invited), Eastern China Normal University, Shanghai, China, June 1, 2007.
8. “Robustness Study of MANOVA Statistics for Profile Analysis and Tests of Dimensionality” (invited), Session on Matrices and Statistics, The 15th International Conference of Forum for Interdisciplinary Mathematics on Interdisciplinary Mathematical & Statistical Techniques, Shanghai, China, May 23, 2007.
9. “Testing Homogeneity of Variance for Non-normal Models Using Entropy”, Annual Meeting of the Montana Chapter of the American Statistical Association, Butte, Montana, September 2006.

10. "Duality Between Matrix Variate t and Matrix Variate V.G. Distributions", Annual Meeting of the Institute of Mathematical Statistics, Rio de Janeiro, Brazil, August 2006.
11. "Nonparametric Methods in Multivariate Factorial Designs when the Number of Factor Levels is Large" (**invited**), Universität Hannover, Hanover, Germany, June 2006.
12. "Duality Between Matrix Variate t and Matrix Variate V.G. Distributions", The fifteenth International Workshop on Matrices and Statistics, Uppsala, Sweden, June 2006.
13. "Multivariate Factorial Designs when The Number of Factor Levels is Large", University of Montana, Missoula, Montana, April 2006.
14. "Asymptotic Expansion for ANOVA and MANOVA under Non-normality", South Dakota State University, Brookings, South Dakota, March 2006.
15. "Asymptotic Expansion for ANOVA and MANOVA under Non-normality", Western Illinois University, Macomb, Illinois, March 2006.
16. "Multivariate Factorial Designs for Large Number of Factor Levels", Texas tech University, Lubbock, Texas, February 2006.
17. "Asymptotic Expansion for Analysis of Variance under Non-normality" (**invited**), University of Kentucky, Lexington, Kentucky, October 2005.
18. "Asymptotics for Multivariate Mixed Models under Non-normality"(**invited**), Conference on Applied Statistics in Agriculture, Kansas State University, Manhattan, Kansas, April 2005.
19. "Asymptotic Expansion for the Null distribution of the ANOVA F-Statistic Under Non-normality", 2005 Joint Statistical Meeting, Minneapolis, Minnesota, August 2005.
20. "Matrix Variate Skew Normal Distributions", Eastern North America Regional Meeting, International Biometric Society, Austin, Texas, March 2005.
21. "Asymptotics for Testing Hypothesis in Some Variance Components Model under Nonnormality", Justus F. Seely Memorial Conference, Oregon State University, Corvallis, Oregon, USA, August 2003.
22. "MANOVA under Nonnormality". 10th Spring Research Conference On Statistics In Industry And Technology, Institute of Mathematical Statistics, Dayton University, Dayton, Ohio, June 2003.
23. "The Problems of Low Dose Extrapolation", Annual Conference of the Ethiopian Statistical Association, Addis Ababa University, Addis Ababa, Ethiopia, January 1998.

Other Conferences and Workshops Participation

1. Session Chair and Judge, The sixth Graduate Student and Faculty Research Conference, The University of Montana, Missoula, Montana, April 2007.
2. Eastern North America Regional Meeting, International Biometric Society, Atlanta, Georgia, March 2007.
3. Short Courses on Design and Analysis of Microarray Experiments and Modern Population Genetics Data, Third Seattle Symposium in Biostatistics: Statistical Genetics and Genomics, November 2005.
4. Third Seattle Symposium in Biostatistics: Statistical Genetics and Genomics, November 2005.
5. Gene Expression Data Analysis Workshop, Johns Hopkins University, June 2005.
6. International Workshop on Information Technology and Ethiopic Computing, UNECA, Addis Ababa, Ethiopia, August 1997.
7. Annual Conferences of the Ethiopian Statistical Association, Addis Ababa University, Ethiopia, 1990 – 1999.

HONORS, GRANTS AND AWARDS

1. Principal Investigator. National Science Foundation (\$269,144). Nonparametric Methods for High-dimensional and Clustered Multivariate Data. Submitted in November 2008, DECLINED.
2. National Institute of Statistical Sciences and the American Statistical Association (\$450). Travel Award to attend a writing workshop and the 2008 Joint Statistical Meeting in Denver, CO. August 3-7, 2008.
3. Pace External Mentor Award (\$2,716). Spring 2008. To support visit of the scholar Dr. Karen Williams from University of Missouri-Kansas City.
4. Principal Investigator. University Research Grant Program (\$3,600). May 2008-August 2009 “A New Multivariate Statistical Method for Detecting Gene Differential Expression Using Oligonucleotide Microarrays”, May 1, 2008-August 31, 2009.

5. Co-investigator, R01 CA107191– National Cancer Institute (\$1,906,267). June 2005 – May 2010. “Smoking Cessation in College Fraternities and Sororities”, (Kari J. Harris, PI).
6. NIH Career Development Grant (\$249,439). To support career transition with the emphasis of acquiring expertise in the application of statistics to Biomedical Sciences, submitted November 2007, DECLINED.
7. Distinguished Dissertation Award for 2006, Graduate College, Bowling Green State University, Bowling Green, Ohio. (Carries \$500 Cash Award)
8. Dr. Sherwood and Elizabeth Berg Faculty Award, April 2006, South Dakota State University, For faculty who is in the first five years of their academic career, and who has “demonstrated commitment and encouraging potential to carry out the land grant philosophy of integrating teaching, research and outreach” (carries \$4000).
9. Travel Award, August 2006, NSF through Cornell University, \$1250 award to travel to the Annual Institute of Mathematical Statistics Meeting in Rio de Janeiro, Brazil.
10. Laha Travel Award for 2006, Institute of Mathematical Statistics, \$500 award to travel to the Annual Institute of Mathematical Statistics Meeting in Rio de Janeiro, Brazil.
11. Mathematics and Statistics Graduate Assistant Excellence in Teaching Award for 2003-2004, Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, OH 43403.
12. Travel Award, August 2003, Department of Statistics, Corvallis, Oregon, \$500 award to travel to the Justus F. Seely Memorial Conference on Linear Models, Oregon State University, Corvallis, Oregon.
13. Eugene and Elizabeth Lukacs Memorial Scholarship, Bowling Green State University, Bowling Green, Ohio, USA, May 2001.
14. DAAD In-country Scholarship, German Academic Exchange Service, Academic and Cultural Department of the German Embassy, Addis Ababa, Ethiopia, September 1997-August 1999
15. Annual Best Students Award for 1990, Addis Ababa University, Addis Ababa, Ethiopia.

GRADUATE WORK DIRECTION

1. Jordan Purdy, “Differential Expression of Genes using Probe Level Data from Oligonucleotide Microarrays”, MS Project in Mathematical Sciences, spring 2008.

2. John Z. Hossler, MS Project in Mathematical Sciences, "Properties of a Skew Variance Gamma Family of Distributions", MS project in Mathematical Sciences, spring 2008.

GRADUATE COMMITTEE MEMBERSHIP

1. Nicholas Wang, MS in Mathematics (Statistics Emphasis) at SDSU, thesis committee, spring 2006.
2. Joe Christensen, MS in Mathematics at SDSU, comprehensive exam committee, fall 2005.
3. Howard Wey, MS in Mathematics at SDSU, thesis committee, spring 2006.
4. John Chandler, PhD in Mathematical Sciences (Statistics Emphasis) at UM, dissertation and comprehensive exam committee, fall 2007-present.
5. Jonathan Spronk, MS in Animal Science at SDSU, thesis committee, fall 2005.
6. Jake Mohrmann, MS in Geosciences at UM, spring 2007.
7. Martha Ellis, PhD in Wild Life Biology at UM, dissertation committee, spring 2007-present.

TEACHING

University of Montana

- [1] Math 442- Mathematical Statistics II, R. V. Hogg, J. W. McKean and A. T. Craig, Textbook: Introduction to Mathematical Statistics, 6th Edition (1 Time)
- [2] Math 441- Mathematical Statistics I, R. V. Hogg, J. W. McKean and A. T. Craig, Textbook: Introduction to Mathematical Statistics, 6th Edition (1 Time)
- [3] Math 544- Applied Time Series, Textbook: R. H. Shmway and D. S. Stoffer, Time Series Analysis and Its Applications with R Examples, 2nd Edition (1 Time)

South Dakota State University

- [1] Stat 281- Introductory Statistics, Textbook: J. C. McClave and T. Sinsich, Statistics, 9th edition (2 Times)
- [2] Stat 545- Nonparametric Statistics, Textbook: W. J. Conover, Practical Nonparametric Statistics, 3rd edition (2 Times)
- [3] Stat 541- Statistical Methods II, Textbook: R. J. Freund and W. J. Wilson, Statistical Methods, 2nd edition (2 Time)
- [4] Stat 792- Tp-Time Series Analysis, P. J. Brockwell and R. A. Davis, Introduction to Time Series and Forecasting, 2nd edition (2 Time)
- [5] Stat 685- Statistical Inference I, G. Cassela and R. L. Burger, Statistical Inference, 2nd edition (1 Time)

- [6] Stat 785- Statistical Inference II, G. Cassela and R. L. Burger, Statistical Inference, 2nd edition (1 Time)

Bowling Green State University

- [1] Math 115- Introductory Statistics, Textbook: N. A. Weiss., Elementary Statistics, 5th edition. (6 Times a total of 10 Sections)
- [2] Math 126- Basic Calculus, Textbook: G. C. Berresford and A. M. Rockett, Applied Calculus, 3rd edition, (4 Times)

Addis Ababa University

- [1] Stat 375- Sample Survey Methods, Textbook: W. G. Cochran, Sampling Techniques, 3rd edition, (1 Time)
- [2] Stat 477- Operations Research, Textbook: Operations Research: An Introduction, H. Taha, 5th Edition (1 Time)
- [3] Stat 271- Statistical Methods I, Textbook: Statistical Methods, G. W. Snedecor and W. G. Cochran (1 Time)
- [4] Stat 272- Statistical Methods II, Textbook: Statistical Methods, Seventh edition, G. W. Snedecor and W. G. Cochran (1 Time)
- [5] Stat 275- Probability and Statistics, Textbook: Introductory Probability and Statistical Applications, P. L. Meyer (1 Time)

PROFESSIONAL ACTIVITIES

1. Offices:

- **President**, Montana Chapter of ASA, November 2007 – October 2008.
- **President**, Statistical Society of Ethiopians in North America, September 2008 – August 2009.
- **Vice President**, Montana Chapter of the American Statistical Association, November 2006-October 2007.

2. Consultancy Service:

- Statistical Consultant, Two Rivers Ranch, Elm Spring, SD 57791, Tel: (605) 798-5599, Ref.: Mr. Ron Ragsdale.
- Statistical Consultant, Rural Technologies, Inc. Research Laboratory, 1008 32nd Ave, Brookings, SD 57007, Tel: (605)692-6953, Ref. Dr. Christopher Mateo (<http://www.ruraltechinc.com/>).
- Coordinator of the Statistical Consulting Service (2005, 2006), Department of Mathematics and Statistics, South Dakota State University, Brookings, SD 57007. (<http://www3.sdstate.edu/UniversityResearch/StatisticsSupportServices605.692.6953>)

3. University Community Service:

- Faculty Advisor, African Student Association, University of Montana, August 2006 – Present.
- Undergraduate Committee (Now), Department of Mathematical Science, University of Montana.
- Biostatistics/Bioinformatics Search Committee (2005), Department of Mathematics and Statistics, South Dakota State University.

- Graduate Committee (2 Masters Students), South Dakota State University, Brookings, SD 56007.
 - Scholarship Committee (2005-2006), Department of Mathematics and Statistics, South Dakota State University.
 - Computer Committee (2004-2006), College of Engineering, South Dakota State University.
4. **Referee for the Journals (# of Times):** Statistica Sinica (1), Biometrics (1), Statistical Methodology (1), Metrika (1), Journal of Multivariate Analysis (5), Test (1), Communication in Statistics: Theory and Methods (2), Applied Computers and Mathematics with Applications (2), Mathematical and Computer Modelling (1), Applied Mathematics Letters (1), Journal of Water Resources Management (1), International Journal of Mathematics and Mathematical Sciences (1), Biometrics (1), Statistica Sinica (1), Journal of Applied Statistics (1).
 5. **Book Reviews:** Springer (2007), Wiley (2007),
 6. **Book Proposal and Prospectus Reviews:** Elsevier (2006), Wiley (2006)
 7. **Member,** Institute of Mathematical Statistics, December 2004-Now.
 8. **Member,** American Mathematical Society, January 2002- Now.
 9. **Member,** American Statistical Association, January 2001 – January 2002
 10. **Member,** Statistical Society of Ethiopians in North America, August 2002-Now.
 11. **Member,** Ethiopian Statistical Association, January 1990-Now,

MATHEMATICAL AND STATISTICAL SOFTWARES

Comfortable with Maple, Matlab, S-plus, R, SAS and SPSS.

REFERENCES

1. Arne C. Bathke, Ph. D., Associate Professor
Department of Statistics
University of Kentucky
875 Patterson Office Tower
Lexington, KY 40506-0027
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2. Hanfeng Chen, Ph. D., Professor,
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3. Arjun K. Gupta, Ph. D. (PhD Advisor)
Distinguished University Professor,
Department of Mathematics and Statistics,

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4. Truc Nguyen, Ph. D., Professor,
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