

# ZHIGUANG (CALEB) HUO

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<https://caleb-huo.github.io>

## EDUCATION

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### University of Pittsburgh,

Pittsburgh, PA, US

- Ph.D. in [Biostatistics](#), *April 2017*
  - Dissertation: *Statistical integrative omics methods for disease subtype discovery*
  - GPA: *3.93/4.00*
  - Advisors: [George C. Tseng, ScD](#) and [Yong Seok Park, PhD](#)
- M.S. in [Physics](#), *Apr 2012*
  - GPA: *3.86/4.00*

### Harbin Institute of Technology,

Harbin, Heilongjiang, China

- B.S. in [Physics](#), *June 2011*
  - GPA: *90.43/100*

## RESEARCH INTEREST

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My research interest lies in the intersection between statistical methodology and its applications to genomics and bioinformatics. I am particularly interested in genomic data integration, models and variable selection in high-dimensional data, graphical models, Bayesian methods, optimization and statistical computing. I have collaborated with biologists in the fields of cancer and psychiatry, analyzing a broad range of genomic data. These experiences motivate me to develop methodology and software that are practical, user-friendly and easy to use.

## PROFESSIONAL EXPERIENCE

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- Director of the Biostatistics Consulting Lab *Sep 2017 ~ Now*
  - Department of Biostatistics, University of Florida
- Assistant Professor *July 2017 ~ Now*
  - Department of Biostatistics, University of Florida

## PUBLICATIONS

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### 2018

1. Cynthia R. Johnson, Kimberly Brown, Susan Hyman, Maria M. Brooks, Courtney Aponte, Lynne Levato, Brianna Schmidt, Victoria Evans, **Zhiguang Huo**, Roxanna Bendixen, Heather Eng, Theresa Sax, Tristram Smith (2018). Parent Training for Feeding Problems in Children with Autism Spectrum Disorder: Initial Randomized Trial. (Submitted)
2. Kelly Cahill<sup>†</sup>, **Zhiguang Huo**<sup>†</sup>, George Tseng, Ryan W. Logan\*, Marianne L. Seney\* (2018), Improved identification of concordant and discordant gene expression signatures using an updated rank-rank hypergeometric overlap approach. (Submitted) (<sup>†</sup>: co-first author, \*: co-corresponding author).
3. Li Zhu, **Zhiguang Huo**, Tianzhou Ma, George Tseng (2018). Bayesian indicator variable selection to incorporate multi-layer overlapping group structure in multi-omics applications. (Submitted)

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<sup>0</sup>Last modified: May 16, 2018

4. **Zhiguang Huo\***, Li Zhu, Tianzhou Ma, Hongcheng Liu, Song Han, Daiqing Liao, Jinying Zhao and George Tseng\* (2018). Two-way Horizontal and Vertical Omics Integration for Disease Subtype Discovery. (Submitted, rejected by *Bioinformatics*, rejected by *Nucleic Acids Research*) (\*: co-corresponding author).
5. Tianzhou Ma<sup>†</sup>, **Zhiguang Huo**<sup>†</sup>, Anche Kuo<sup>†</sup>, Li Zhu, Fang Zhou, Xiangrui Zeng, Chien-Wei Lin, Silvia Liu, Lin Wang, Tanbin Rahman, Lun-Ching Chang, Sunghwan Kim, Jia Li, Yongseok Park, Chi Song and George C. Tseng. (2018). MetaOmics - Comprehensive Analysis Pipeline and Web-based Software Suite for Transcriptomic Meta-Analysis. (Submitted) (<sup>†</sup>: co-first author).
6. **Zhiguang Huo**, Shaowu Tang, Yongseok Park, George Tseng. (2018) P-value evaluation, variability index and biomarker categorization for adaptively weighted Fisher's meta-analysis method in omics applications. (Submitted, rejected by *the Annals of Applied Statistics*, rejected by *Biostatistics*, rejected by *Journal of Computational and Graphical Statistics*)
7. Marianne Seney, **Zhiguang Huo**, Kelly Cahill, Leon French, Rachel Puralowski, Joyce Zhang, Ryan W. Logan, George Tseng, David A Lewis, Etienne Sibille. (2018) Opposite molecular signatures of depression in men and women. *Biological Psychiatry*
8. **Zhiguang Huo**, Chi Song, George C. Tseng. (2018) Bayesian latent hierarchical model for transcriptomic meta-analysis to detect biomarkers with clustered meta-patterns of differential expression signals. Submitted to *Annals of Applied Statistics* (under revision).

## 2017

9. SungHwan Kim, Dongwan Kang, **Zhiguang Huo**, Yongseok Park, George C. Tseng. (2017) Meta-analytic principal component analysis in integrative omics application. *Bioinformatics*, 1, 8.
10. Enwright, John, **Zhiguang Huo**, Dominique Arion, John Corradi, Aiqing He, George Tseng, and David Lewis. (2017) Transcriptome alterations of prefrontal cortical parvalbumin neurons in schizophrenia. *Molecular Psychiatry*.
11. **Zhiguang Huo**, George C. Tseng. (2017) Integrative Sparse  $K$ -means with overlapping group lasso in genomic applications for disease subtype discovery. *The Annals of Applied Statistics*, 11(2), 1011-1039.
12. Dominique Arion, **Zhiguang Huo**, John F. Enwright, John P. Corradi, George Tseng and David A. Lewis. (2017) Transcriptome alterations in prefrontal pyramidal neurons distinguish schizophrenia from bipolar and major depressive disorders. *Biological Psychiatry*.

## 2016

13. **Zhiguang Huo**, Ying Ding, Silvia Liu, Steffi Oesterreich, and George Tseng. Meta-Analytic Framework for Sparse  $K$ -Means to Identify Disease Subtypes in Multiple Transcriptomic Studies. *Journal of the American Statistical Association*, 111, no. 513 (2016): 27-42.
14. Zhu, Li, Ying Ding, Cho-Yi Chen, Lin Wang, **Zhiguang Huo**, SungHwan Kim, Christos Sotiriou, Steffi Oesterreich, and George C. Tseng. "MetaDCN: meta-analysis framework for differential co-expression network detection with an application in breast cancer." *Bioinformatics* (2016): btw788.

## 2015 and before

15. Silvia Liu, Wei-Hsiang Tsai, Ying Ding, Rui Chen, Zhou Fang, **Zhiguang Huo**, SungHwan Kim, Tianzhou Ma, Ting-Yu Chang, Nolan Michael Priedigkeit, Adrian V. Lee, Jianhua Luo, Hsei-Wei Wang, I-Fang Chung, George C. Tseng. (2015). Comprehensive evaluation of fusion transcript detection algorithms and a meta-caller to combine top performing methods in paired-end RNA-seq data. *Nucleic Acids Research*, 10.1093/nar/gkv1234.
16. Tiffany A. Katz, Serena G. Liao, Vincent J. Palmieri, Robert K. Dearth, Thushangi Pathiraja, **Zhiguang Huo**, Patricia Shaw, Sarah Small, Nancy E. Davidson, David G. Peters, George C. Tseng, Steffi Oesterreich, Adrian V. Lee. (2015) Targeted DNA Methylation Screen in the Mouse Mammary Genome Reveals a Parity-Induced Hypermethylation of IGF1R That Persists Long after Parturition. *Cancer Prevention Research* 8, no. 10 (2015): 1000-1009.

17. Yan P. Yu, Silvia Liu, **Zhiguang Huo**, Amantha Martin, Joel B. Nelson, George C. Tseng and Jian-Hua Luo. (2015) Genomic copy number variations in the genomes of leukocytes predict prostate cancer clinical outcomes. *PLoS one*, 10(8):e0135982.
18. SungHwan Kim, **Zhiguang Huo**, YongSeok Park and George Tseng. (2015) MetaOmics: transcriptomic meta-analysis methods for biomarker detection, pathway analysis and other exploratory purposes. Book chapter in Integrating omics data: statistical and computational methods. Edited by George C. Tseng, Debashis Ghosh, Xianghong Jasmine Zhou. *Cambridge University Press*. Page 39-67.
19. Xingbin Wang, Dongwan Kang, Kui Shen, Chi Song, Shuya Lu, Lunching Chang, Serena G. Liao, **Zhiguang Huo**, Naftali Kaminski, Etienne Sibille, Yan Lin, Jia Li and George C. Tseng. (2012) A Suite of R Packages for Quality Control, Differentially Expressed Gene and Enriched Pathway Detection in Microarray Meta-analysis. *Bioinformatics*, 28:2534-2536.

## AWARD

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### Student Awards

- Delta Omega Membership April 2017
- American Statistics Association (ASA) Pittsburgh chapter March 2016
  - Student of the year
- Department of Physics, Harbin Institute of Technology May 2009
  - National Scholarship of P.R. China.
  - (Awarded to the top 2 students in my Bachelors degree.)

### Travel Awards

- 2018 ASA Biometrics Section JSM Travel Award, Vancouver, BC, Canada. Aug 2018
- Objective Bayes meeting 2017 travel award, Austin, TX. Dec 2017
- SAMSI, Research Triangle Park, NC.
  - Interface of Statistics and Optimization Feb 2017
  - Optimization Summer School Aug 2016
  - Epigenetics Workshop Mar 2015
  - Beyond Bioinformatics Workshop June 2014

## TEACHING EXPERIENCE

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### Lecturer, University of Florida

- PHC6937 - Frontiers in Biostatistics Feb 2018
- PHC6068 - Biostatistical computing Fall 2017

### Lecturer, University of Pittsburgh

- BIOST2094 - Advanced R Computing – (with Tianzhou Ma) Spring 2017
- BIOST2025 - Special Studies in Bayesian Data Analysis Fall 2016
  - (with George Tseng, Tianzhou Ma and Li Zhu)

### Guest Lecturer, University of Pittsburgh

- BIOST2055 - Introductory high-throughput genomic data analysis I: data mining and applications Mar 2016
  - Differential and isoform analysis of RNA-seq data
- BIOST2078 - Introductory high-throughput genomic data analysis II: theories and algorithms Dec 2015
  - Reproducible research and parallel computing in R

- BIOST2078 - Introductory high-throughput genomic data analysis II: theories and algorithms Dec 2014  
  - Reproducible research

### Teaching Assistant, University of Pittsburgh

- BIOST 2078 - Introductory high-throughput genomic data analysis II: theories and algorithms Fall 2014
- PHYS 0212 - Introduction to Laboratory Physics Spring 2012
- PHYS 0212 - Introduction to Laboratory Physics Fall 2011

## PRESENTATIONS

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### Poster and Oral Presentation

- Invited talk, IISA, Gainesville, FL May 2018  
  - Two-way Horizontal and Vertical Omics Integration for Disease Subtype Discovery.
- Poster, ENAR conference, Atlanta, GA Mar 2018  
  - p-value evaluation, variability index and biomarker categorization for adaptively weighted Fisher's meta-analysis method in omics applications
- Poster, 2018 UF Stats Winter Workshop, University of Florida, Gainesville, FL Jan 2018  
  - Bayesian latent hierarchical model for transcriptomic meta-analysis to detect biomarkers with clustered meta-patterns of differential expression signals
- Poster, Objective Bayes meeting 2017, University of Texas, Austin, TX Dec 2017  
  - Bayesian latent hierarchical model for transcriptomic meta-analysis to detect biomarkers with clustered meta-patterns of differential expression signals
- Poster, Dean's Day's competition, GSPH, University of Pittsburgh April 2017  
  - Circadian rhythms of gene expression in the human prefrontal cortex reveal distinct pattern between schizophrenia and control subjects
- Oral Presentation, ENAR, Washington, DC Mar 2017  
  - Bayesian latent hierarchical model for transcriptomic meta-analysis to detect biomarkers with clustered meta-patterns of differential expression signals.
- Invited talk, University of Florida, Gainesville, FL Feb 2017  
  - Meta-analytic and integrative framework for sparse  $K$ -means to identify disease subtypes.
- Poster, SAMSI optimization summer school, Research Triangle Park, NC Aug 2016  
  - Integrative Sparse  $K$ -means for disease subtype discovery using multi-level omics data.
- Poster, Pittsburgh ASA banquet, Pittsburgh, PA Mar 2016  
  - Integrative Sparse  $K$ -means for disease subtype discovery using multi-level omics data.
- Department of Biostatistics, University of Pittsburgh Nov 2015  
  - How to use Latex to make slides
- Oral Presentation, JSM, Seattle, WA Aug 2015  
  - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
- Poster, Pittsburgh ASA banquet, Pittsburgh, PA Apr 2015  
  - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
- Oral Presentation, ENAR Conference, Miami, FL Mar 2015  
  - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
- Poster, Dean's Day's competition, GSPH, University of Pittsburgh Mar 2015  
  - Discover and Characterize Invasive Lobular Breast Carcinoma Subtypes.

- Oral Presentation, ENAR Conference, Baltimore, MA Mar 2014
  - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
- Poster, Dean's Day's competition, GSPH, University of Pittsburgh Mar 2014
  - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.

## REVIEWER SERVICE

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- Journal of the Royal Statistical Society Series C (1)
- Bioinformatics (1)
- BMC Bioinformatics (1)
- PLOS ONE (2)
- Scientific Reports (2)

## MEMBERSHIP

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- Member of International Chinese Statistical Association *Mar 2015 ~ Now*
- Member of Eastern North American Region International Biometric Society *Oct 2013 ~ Now*
- Member of American Statistical Association *Nov 2013 ~ Now*

## HOBBIES

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Running, skiing, other endurance activities.

### Running Record

- Dick's Sporting Goods Pittsburgh half Marathon, Pittsburgh, PA. 05/06/2018
- Five Points of Life Race Marathon, Gainesville, FL. 02/18/2018
- Bank of America Chicago Marathon, Chicago, IL. 10/09/2016
- First National Bank Pittsburgh Triathlon (Sprint), Pittsburgh, PA 08/14/2016
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA. 05/01/2016
- First National Bank Pittsburgh Triathlon (Olympic standard), Pittsburgh, PA 08/09/2015
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA 05/03/2015
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA 05/04/2014
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA 05/05/2013