

PSYCHOSTATISTICS

Newsletter of the Quantitative Methods Section of CPA

Message from the Chair

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QUANTITATIVE METHODS SECTION OF CPA

Website:

<http://www.cpa.ca/aboutcpa/cpasections/quantitativemethods/>

Listserv:

qmcpa@yorku.ca

Once again it is my pleasure to serve as Chair of the Quantitative Methods (QM) section of CPA, my third kick at the can. This is the seventh year of existence for the QM section. Last year, CPA's annual national convention was held in conjunction with the International Congress of Applied Psychology (ICAP) at the end of June in Montreal. This year the annual national convention is a few weeks earlier, is being held in Halifax, and is partnered with the 4th North American Correctional and Criminal Justice Psychology Conference.

Last year, we did not have a keynote speaker because of the volume of presentations associated with ICAP. This year we do have again a keynote speaker, Carl Falk from McGill University. Dr. Falk will speak on "Advances in Modeling Response Styles and Aberrant Responding in Survey Data". In addition to Dr. Falk's talk, the QM section will again host numerous posters, workshops, and talks on all things quantitative, as well as our section board meeting and after board meeting social. Details

regarding the social social will be sent via the QM listserv.

In last year's message as Chair, I went on at some length about the replication crisis in psychology. I touched on the history of the crisis and how quantitative methods were implicated in all that. Those issues remain, highlighted recently by a 400 page special issue of the journal *American Statistician* titled "Statistical Inference in the 21st Century: A World Beyond $p < .05$ ". However, the replication crisis is only half the story.

While some might view this as the worst of times for statistical methods, it is in many ways also the best of times. The demand for university graduates with knowledge of data analysis has exploded. To take but one example, my Facebook feed is filled with ads from Harvard University to obtain a degree in data science, with the promise that students will "develop the skills necessary to analyze, discover, and innovate in a data-rich world". These days, one sees *Big Data* being applied in all sorts of ways, both good and

bad, in the financial, political, and social worlds.

Back to psychology and Canada, one finds great demand for new faculty with expertise in QM. A few recent hires at Canadian universities (with apologies to those that I have inadvertently omitted): R. Philip Chalmers (York, IRT); Jessica Flake (McGill, measurement); Alyssa Counsell (Ryerson, equivalence testing); Ji Yeh Choi (York, component analysis); Jason Rights (UBC, multilevel modeling); Milica Miočević (McGill, mediation). Many of the specialties of these new hires would have been unknown a decade ago. It is a great time to be quantitative!

Hope to see and greet many of you at this year's convention or at a future convention!

Don Sharpe
Chair, QM Section.

Message from the Student Rep

“As a group of like-minded researchers who share a common passion for our craft, it feels like a missed opportunity that many of us only connect during annual conferences”

My name is Mark Adkins and I am the Student Representative for the Quantitative Methods (QM) section. I am a PhD student studying QM at York University.

This is my second year serving as the QM Student Rep and, though I met many of you at past conferences, I feel like I have not yet made contact with the majority of students who fall under the QM umbrella. For me to be effective in my role as the Student Rep this must change.

The notion of community building has been on my mind lately. As a group of like-minded researchers who share a common passion for our craft, it feels like a missed opportunity

that many of us only connect during annual conferences. This is especially true for QM students across Canada. I want to encourage you to reach out and contact other students. It can be as quick as a message via Twitter or in more detail via email. Again, the goal here is to establish connections and grow our community on a scale that transcends our institutions and specific research interests.

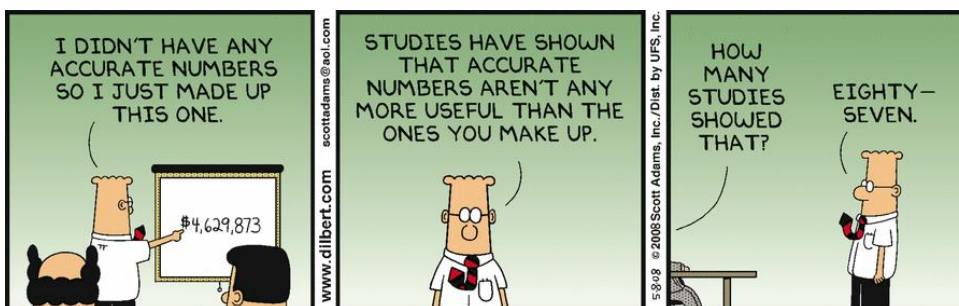
Building further on this notion of community, an idea of starting a blog with rotating authors was discussed during our general meeting last year in Montréal. This is an excellent way for us all to get to know each other and the research we are doing. As students, we

stand to benefit greatly from such exposure. It simultaneously provides us with both a venue for getting our names out there, and it can be an opportunity to disseminate our work to a wider audience than traditional scientific publications can offer. If anyone has further ideas or suggestions about this blog, please contact me so that I can bring forward your suggestions at the QM Business Meeting. Better yet, if you are attending the CPA conference, swing by the meeting and present the ideas yourself.

I look forward to hearing from you and hope to see you in Halifax!

Mark

QM Laugh



Did You Know?

CPA is very interested in increasing the number of QM workshops at the convention? Have an idea for a workshop? Tweet us at @qm_cpa.

Visual Insights



Sabermetrics and Data Visualization

Baseball has always had a special relationship with data. Since its professionalization in the 1870s, baseball players and fans have been collecting performance statistics in order to uncover trends in the game. There are countless statistical questions that might be asked (e.g., *how many home runs did Mike Trout get last year?*), and although some are simple, others are much more complicated (e.g., *what is Mike Trout's wins against replacement (WAR) value compared to other top players of this era?*). Data visualizations can be a perfect way to communicate statistical patterns in baseball and can be especially helpful for those who do not understand all of the finite details of the sport.

Home Runs and Strikeouts: A Crisis, or Business as Usual? To provide an example, let's use visualizations to help us answer this question. Over the years, strikeouts and home runs have gone through fashionable cycles. There have been times in history where players avoided striking out, but more recently, players are demonstrating that an increase in home runs outweighs the costs of more strikeouts. It seems that baseball has truly become a game of heightened reward, but also heightened risk. By watching the game and exploring the resulting statistics, we can tell that players are swinging harder and with less discipline than ever before. We can also see that players are increasingly favouring big hits over smaller base hits. Is this a crisis? Well, part of what makes the game great is the anticipation of a good rally. Since baseball has become increasingly obsessed with power hitting, strikeouts and home runs mean that the ball never gets in play. This makes for a boring game. However, it seems that this is *not* a totally new phenomenon! Every generation of players has been responsible for making this trend increase. We see in the second figure that in consecutive order, each era has produced more strikeouts and home runs than the last. Since baseball rules are flexible (they've changed a lot over the years), baseball will likely do what it always has... *evolve*.

Hits by Type in Major League Baseball

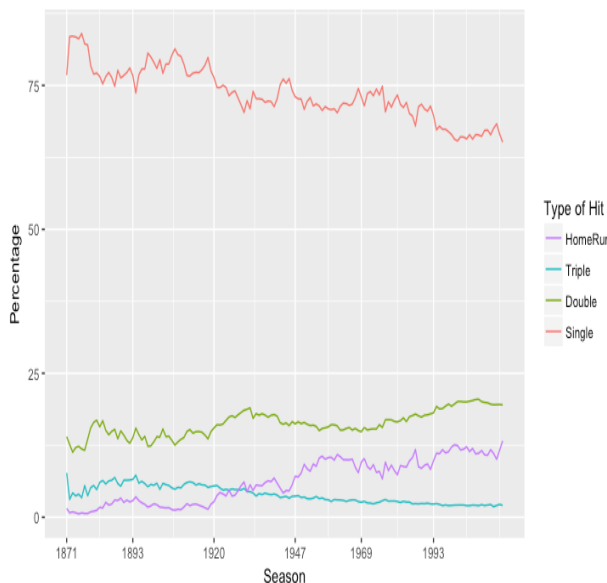


Figure 1. Hits by type in MLB.

Strikeouts and Home Runs, by Era Since 1871

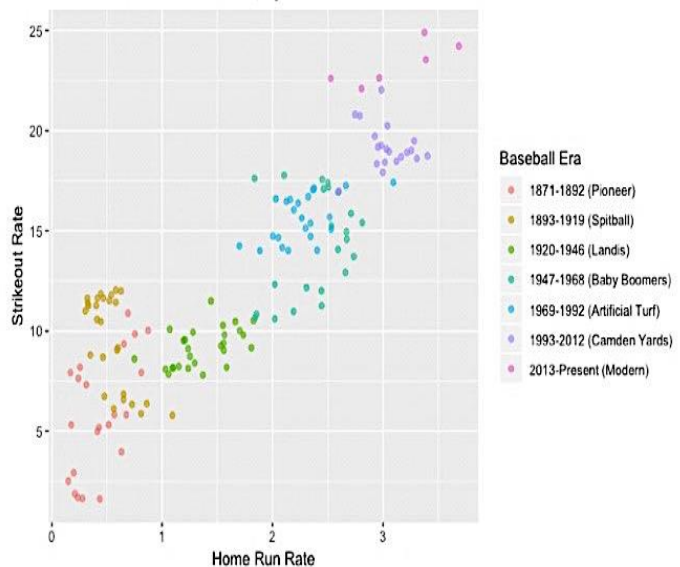


Figure 2. Strikeouts and home runs, by era, since 1871 (rates have been calculated by dividing the value of strikeouts and home runs by number of at bats, for players with a minimum of 100 at bats).

Thank you to Vanessa Foot-Seymour for this issue's *Visual Insight*. Vanessa is a graduate student at York University and big Toronto Blue Jays fan!

Consulting Corner

Dear Consultant,

I am working on a repeated measures analysis with daily diary data, and I'm hoping to test effects of a time-varying covariate on undergraduates' daily mood ratings. I've already learned about how to do "person-mean centering" with a time-varying covariate in a multilevel model to ensure that I properly estimate the within-person effect. However, my time-varying covariate is *categorical* (0=did not drink alcohol today, 1=drank alcohol today). What's the best way to prepare this variable for my analysis?

Sincerely, Mixed Up

...

Dear Mixed Up,

If you're already familiar with multilevel modeling, you know that we can get an estimate of a within-person effect from a time-varying covariate (TVC) by separately calculating the mean of the TVC across all repeated measures (days, in

your case) *for each person*, and then subtracting that person-mean from each instance of the TVC. The result is a variable where a score of 0 represents the person's *own average* on the TVC over time; positive scores represent occasions when a person was *above their own average*, and negative scores represent occasions when a person was *below their own average*. Often, we also include the person means as a separate predictor, allowing us to also estimate a between-person effect of the TVC.

If your TVC is categorical, this strategy still works and you'll get the correct estimate of the within-person effect for your TVC. But, does it make sense conceptually to "center" categorical values around a person mean, when 0 and 1 are already meaningful?

A better choice that preserves interpretability across the model is to use the *raw, uncentered time-varying covariate* as a

predictor as long as you also include the person means of the TVC as a separate predictor (with a binary categorical predictor, the person mean is equal to the *proportion of days* on which the event—drinking alcohol—took place). However, interpret your results with care: For a given person, your within-person effect *B* is the unit change in daily mood associated with drinking alcohol today, *holding constant that person's proportion of drinking days*. The between-person effect has a similar interpretation: it is the difference in overall daily mood for a person who drank alcohol on all the days (proportion score=1) versus on none of the days (proportion score=0), *holding constant today's drinking*.

Good Resource:
Hoffman, L (2015). *Longitudinal analysis: Modeling within-person fluctuation and change*. New York: Routledge.

Sincerely, QM Consultant.



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Thanks to Andrea Howard, Carleton University, for this Consulting Corner.

Have a Consulting Question?
Email Consulting Corner suggestions to Rob Cribbie (cribbie@yorku.ca), Secretary-Treasurer of the QM Section

QM Section's 'Student Presentation Award'

Starting in 2016, the QM Section started awarding the best QM student presentation at each CPA meeting. The first winner was Alyssa Counsell (now an Assistant Professor at Ryerson University) and the 2017 winner was Donna Tafreshi (now a Data Analyst at Providence Health Care).

Winners of the *Student Presentation Award* also receive a special invitation to publish their work in the *The Quantitative Methods for Psychology (TQMP)*.

The 2018 winner of the *Student Presentation Award* was Nataly Beribisky, an MA student in

the Quantitative Methods program at York University. Nataly's presentation was entitled "*Visualizing Associations Between Variables: Equivalence and Difference-Based Perspectives*".

Looking forward to all the great presentations at CPA 2019!



QM at ICAP/CPA 2018 ... Some Fantastic Presentations!

Workshops

- Introduction to Measurement Invariance, *Alyssa Counsell, Ryerson University*

Research Talks

- **What You Need to Know About DIF**, *Agnes Flanagan, University of Alberta; Damien Cormier, University of Alberta*
- **Probability-of-Superiority-Based Statistics (A_h and A_p): A more Sensitive and Appropriate Approach in Detecting Group Differences in Psychological Experiments**, *Johnson Li, University of Manitoba*
- **Visualizing Associations Among Variables: Equivalence and Difference-Based Perspectives**, *Nataly Beribisky, Linda Farmus, Rob Cribbie, York University*
- **Multiplicity Control Vs Replication: Making An Obvious Choice Even More Obvious**, *Linda Farmus, Andrew Hunter, Nataly Beribisky, Rob Cribbie, York University*
- **Effect size reporting and interpretation for original psychological research: Please focus on unstandardized effects and graphs!** *David B. Flora, York University*
- **A Critical Examination of Effects Sizes in Psychological Research**, *Don Sharpe, University of Regina*
- **Data Management Training: Challenges and Solutions**, *Pamela Flattau, Executive Director, PsySip Project*
- **Best Practices: Examining Methodological Issues Coding Participants In Anonymous Psychological Longitudinal Studies**, *Marie Hammond, Natalie Rochester, Lillian Audette, Carin Smith, Tennessee State University*
- **The Data Revolution in Africa: A Role for Citizen-Generated Data**, *Karumuna A. Kajage, Public Policy Consultant, Washington, DC*

Posters

- **Best Practices For Constructing Confidence Intervals For The General Linear Model Under Non-normality**, *Mark Adkins, York University, Jolynn Pek, Ohio State University*
- **From Power To Parameter Estimation: Methods to Calculate Sample Size**, *Brooke Charbonneau, University of Guelph; Parco Sin, University of Guelph; Marian Pitel, University of Guelph*
- **Rethinking Achievement Motivation: Examination of the Achievement Motivation Scale**, *Lauren Goegan, University of Alberta; Amanda Radil, University of Alberta; Lia Daniels, University of Alberta*
- **Evaluating The Completeness of a Literature Search Using Capture Mark Recapture Methodology**, *Joo Ann Lee, York University; Marie-Louise Donohoe, York University*
- **Statistical Power in Meta-Analyzed Studies on Mild Cognitive Impairment**, *Nhu Nguyen, Trent University; Kevin Peters, Trent University*

The program for CPA 2019 in Halifax can be found at:

<https://events.decporate.ca/CPA2019/abstract/event-schedule.php>

QM Invited Speaker at CPA 2019 in Halifax!

Carl Falk, McGill University, is the QM Invited Speaker at the 2019 CPA Convention in Halifax. Carl's research focuses on the development and testing of latent variable models, including item response theory, structural equation modeling, and multilevel modeling. His work has been published in *Psychological Methods*, *Psychometrika*, *Structural Equation Modeling*, *Multivariate Behavioral Research*, etc. The title of Carl's presentation is *Advances in Modeling Response Styles and Aberrant Responding in Survey Data*. Hope to see you at Carl's talk!



QM Graduate Programs in Canada

University of Alberta

Centre for Research in Applied Measurement and Evaluation

<https://sites.google.com/ualberta.ca/crame>

Contact: Dr. Mark Gierl

Email: mark.gierl@ualberta.ca

University of British Columbia

MA/PhD, Quantitative Methods

<https://psych.ubc.ca/graduate/research-areas/quantitative-methods/>

Contact: Jeremy Biesanz

Email: jbiesanz@psych.ubc.ca

MA/PhD, Measurement, Evaluation, and Research Methodology

<http://ecps.educ.ubc.ca/measurement-evaluation-and-research-methodology/>

Contact: Bruno Zumbo

Email: Bruno.zumbo@ubc.ca

Carleton University

MA, Specialization in Data Science

PhD, Concentration in Quantitative Methods

<https://calendar.carleton.ca/grad/gradprograms/psychology/>

Contact: Andrea Howard

Email: andreahoward@cunet.carleton.ca

University of Manitoba

MA/PhD Methodology

<http://home.cc.umanitoba.ca/~psycarea/programs/quantitative/index.html>

Contact: Johnson Li

Email: Johnson.Li@umanitoba.ca

McGill University

PhD, Quantitative Psychology and Modeling

<http://www.mcgill.ca/psychology/research-0/quantitative-modelling>

Contact: Heungsun Hwang

Email: heungsun.hwang@mcgill.ca

Simon Fraser University

MA/PhD, Quantitative Methods

<https://www.sfu.ca/psychology/areas/hqt.html>

Contact: Rachel Fouladi

Email: rfouladi@sfu.ca

Trent University

MSc, Applied Modeling and Quantitative Methods

<https://www.trentu.ca/amod/>

Contact: Dr. James Parker

Email: jparker@trentu.ca

York University

MA/PhD, Quantitative Methods

<http://qm.info.yorku.ca/>

Contact: Rob Cribbie

Email: cribbie@yorku.ca

If there are any programs that we missed that fall under the *Quantitative Methods for Psychology* umbrella please contact any member of the Executive

Numerous resources related to the study of quantitative methods for psychology can be found on the APA Website:

<http://www.apa.org/research/tools/quantitative>

There you will find, among other things, that relative to other areas of psychology there is a much greater chance of getting a job with a PhD in Quantitative Methods.

David Flora: Inaugural Winner of the *Quantitative Methods Research Award*

The QM Section recently began offering an award to recognize an outstanding research contribution on Quantitative Methods for Psychology by a Canadian (or affiliated) researcher for the 2017 calendar year. Specifically (from the by-laws):

This annual (calendar year) award will recognize excellence in a research study focusing on quantitative methods for psychology and published in a refereed scientific journal by a researcher in Canada (i.e., a researcher working at an institution in Canada, or an individual from outside Canada who is a member of the Section). The publication date of the article must match the award year. Nominations for this award can be submitted by any Section member and should be sent to the Chair of the section by April 1 (for the previous calendar year's award). Nominations will be voted on by the executive and the award will be presented at the CPA convention.

The award was handed out for the first time during the QM Business Meeting at the 2018 CPA/ICAP Meeting in Montreal to recognize the best published research article focusing on quantitative methods for psychology in 2017. The inaugural winner was David Flora (York University) for his fantastic research with Jolynn Pek (Ohio State University) on reporting effect sizes:

Pek, J., & Flora, D. B. (2017). Reporting effect sizes in original psychological research: A discussion and tutorial. *Psychological Methods*, 23, 208–225. doi: 10.1037/met0000126

The runners up were Amery Wu (University of British Columbia) and Bruno Zumbo (University of British Columbia) for their research on Pratt Indices:

Wu, A.D., Zumbo, B.D. (2017). Using Pratt's Importance Measures in Confirmatory Factor Analyses. *Journal of Modern Applied Statistical Methods*, 16, 81-98. doi: 10.22237/jmasm/1509494700

The 2018 winner will be announced at the QM Business Meeting at CPA 2019 in Halifax!

QM Laugh x2

One day there was a fire in a wastebasket in the Dean's office and in rushed a physicist, a chemist, and a statistician. The physicist immediately starts to work on how much energy would have to be removed from the fire to stop the combustion. The chemist works on which reagent would have to be added to the fire to prevent oxidation. While they are doing this, the statistician is setting fires to all the other wastebaskets in the office. "What are you doing?" they demanded. "Well, to solve the problem, obviously you need a large sample size" the statistician replies.

QM Section Executive: Elections

Elections for QM Section positions on the Executive will occur at the QM Business Meeting during the CPA Convention. Positions are available for both students and faculty/researchers. If you are interested in running for a position, or if you would like to nominate someone for a position, you can email executive members or nominations will also be accepted during the Business Meeting.

A list of available executive positions in the QM section can be found on pages 8 and 9.

Meet Your 2018–2019 QM Section Executive Team

Chair:

Donald Sharpe
Department of Psychology
University of Regina
sharped@uregina.ca



Chair-Elect:

Andrea Howard
Department of Psychology
Carleton University
andreahoward@cunet.carleton.ca



Past Chair:

David Flora
Department of Psychology
York University
dflora@yorku.ca



Special Points of Interest

The QM Section of CPA was formed in 2013.

CPA 2020 is in Montreal, CPA 2021 is in Ottawa, CPA 2022 is in Calgary.

Want to Get Involved?

Email any of the members of executive - we'd love to have you!

If you are not already a member of our listserv, please send an email to Rob Cribbie (cribbie@yorku.ca) so you don't miss out on future newsletters, convention news, training opportunities and more!



Secretary/Treasurer:

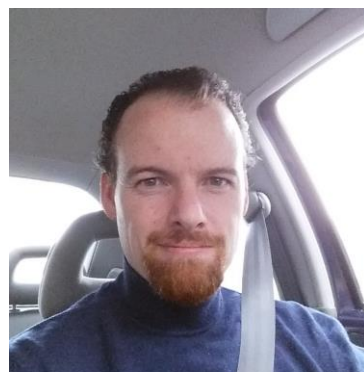
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