

PSYCHOSTATISTICS

Newsletter of the Quantitative Methods Section of CPA

Message from the Chair

In This Issue:

Message from the Chair ... 1
Student Rep Message ... 2
QM Laugh ... 2
Visualization Insights ... 3
Consulting Corner ... 4
2015 Invited Speaker ... 4
2014 Convention ... 5
QM Grad Programs ... 6
Section Elections ... 6
QM Section Executive ... 7

QUANTITATIVE METHODS SECTION OF CPA

Website:

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

Listserv:

qmcpa@yorku.ca

It is hard to believe that it has already been three years since the Quantitative Methods (QM) section of the Canadian Psychological Association (CPA) was formed. However, it is even harder to believe that it took more than 70 years for CPA to get a section related specifically to QM. When you consider the vital role that QM plays in psychology, and the incredible QM researchers from Canada, it really is hard to imagine that the CPA existed for so long without a section dedicated to statistics, psychometric methods, etc.

The 2014 CPA convention in Vancouver was another big success for the QM section, building on the success of the very first convention for the section in Quebec City in 2013. In addition to the well-attended workshops and symposia, the highlight of the convention was the first ever QM invited speaker presentation by Dr. Bruno Zumbo from the University of British Columbia. Dr. Zumbo entertained and enlightened a packed house on the merits of Pratt Indices for exploring the contribution of predictors in linear models. As a new section, it was fantastic to see that a QM focused talk

could draw an audience from not only our section, but also from a broad range of other CPA sections. In addition to the academic portion of CPA, many members of the section also made it out to the QM social/dinner where it was great to mingle with other section members.

I am very excited about the upcoming 2015 CPA convention in Ottawa. Ottawa has historically been a popular CPA location, and we are hoping that means a continuation of the large audiences we have seen for our QM presentations. All CPA members will be delighted to hear that Dr. James Ramsay from McGill University will be giving this year's QM Invited Speaker presentation. Jim will be discussing psychometrics, focusing on the interpretation of latent traits. Also keep your eyes open for the date and time of the QM social.

Although the convention has been the primary focus of the QM section over the past couple years, there are many ways in which we are looking to grow the section. The fact that you are reading the first

ever issue of the QM Newsletter is evidence that some of the goals of the section are becoming realities. We also have an awesome website, which you can view at: <http://www.cpa.ca/aboutcpa/cpasections/quantitativemethods/>.

In addition to these goals, we would also like to find ways to better promote QM workshops, encourage students to study QM in psychology graduate programs, promote discussions on better ways to teach QM, etc. We have started working to these goals via the website, which contains links to many helpful resources. We hope that many of you will become active in the section and help us meet these goals and, more generally, grow the field of QM for psychology in Canada.

I hope to see you in Ottawa!

Rob Cribbie
York University
cribbie@yorku.ca

Message from the Student Rep

"If you are a student with interests in quantitative methods, joining the QM CPA section will connect you with faculty and students with similar research interests"

The QM Section currently has 249 student members ...

Hello current and future quant aficionados!

My name is Alyssa Counsell and I am the student representative for the Quantitative Methods (QM) section. That's right, you heard me...quantitative methods section! This year marks our third birthday since the official section creation at the Quebec City convention in 2013, and this article makes history in our first section newsletter!

Some of you may be thinking that you can't imagine *anyone* wanting to devote themselves to research in statistics, psychometrics, and related topics, but believe it or not, there are many such researchers in psychology departments in Canada. If you are a student with interests in quantitative methods, joining the QM CPA section will connect you with faculty and students with similar research interests or if you are a student who would simply like to learn more about quantitative research or be 'in the know' about up-and-

coming methods, workshops, or learning opportunities in QM, then this section is for you too! We currently have a great base of students from a variety of backgrounds who receive information via our listserv, website and now this newsletter.

One of my favourite features about the QM section is its small size. This means that the convention is a great opportunity to meet like-minded individuals. And let's be honest, everyone wants to have at least one quant friend...At the Vancouver convention last year, I met some great people at our QM social, and I know that others felt the events were wonderful opportunities to network and mingle. This year we will have similar events with details provided closer to the dates of the Ottawa convention. Everyone interested in QM is welcome!

This year's CPA convention will provide many exciting QM sessions: workshops, posters, symposia, and our annual business meeting. We

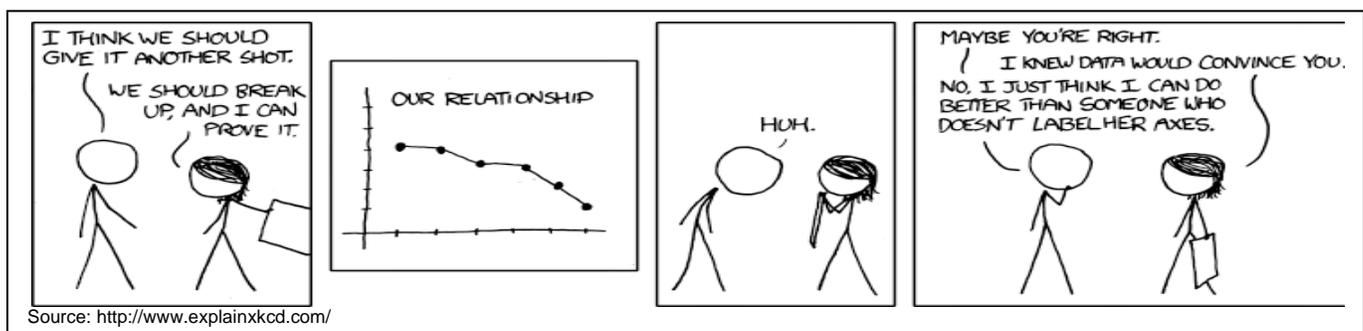
encourage you to attend all of the sessions that you can. Also note that if you are interested in learning more about the area and how to get involved in the QM section, you are welcome to attend our section's business meeting.

I have so much more that I would love to say about CPA's QM section, but I can't put it all into this small section. Instead, I am happy to answer more specific questions about the section, being a student in a QM graduate program, etc. Feedback and suggestions from students about the QM area are also welcome and encouraged!

I'm very much looking forward to reconnecting with QM friends and colleagues at the upcoming CPA convention, but I am especially excited to meet all of the new QM members! See you in Ottawa this June!

Alyssa Counsell
York University
counsela@yorku.ca

QM Laugh

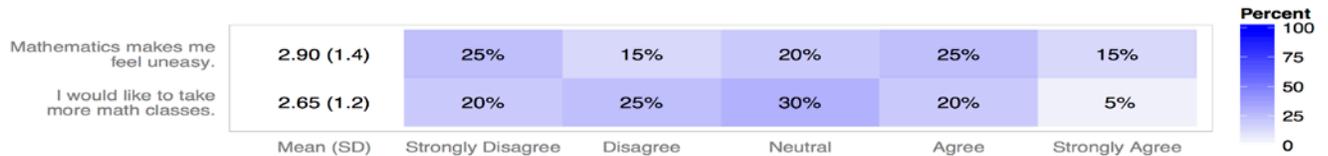


Visual Insights

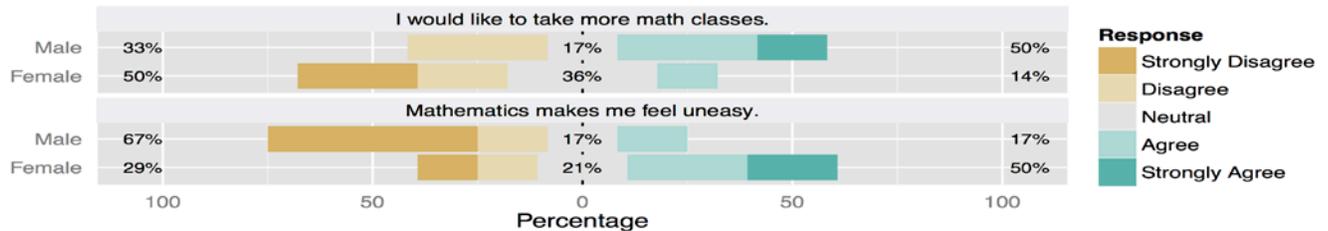


Welcome to the new CPA column *Visual Insights*! Our goal is to highlight new or interesting approaches to data visualization that are useful for quantitative researchers. In this issue, we are reviewing a method for visualizing Likert-type response data, which is often collected during psychological studies. For example, in Bai et al. (2009), the researchers presented students with 14 questions pertaining to their level of math anxiety, which used a 5-point response scale that ranged from Strongly Disagree to Strongly Agree. Jason Bryer and Kim Speerschneider (2014) have put together an R package (*likert*) that makes presenting this type of data easy.

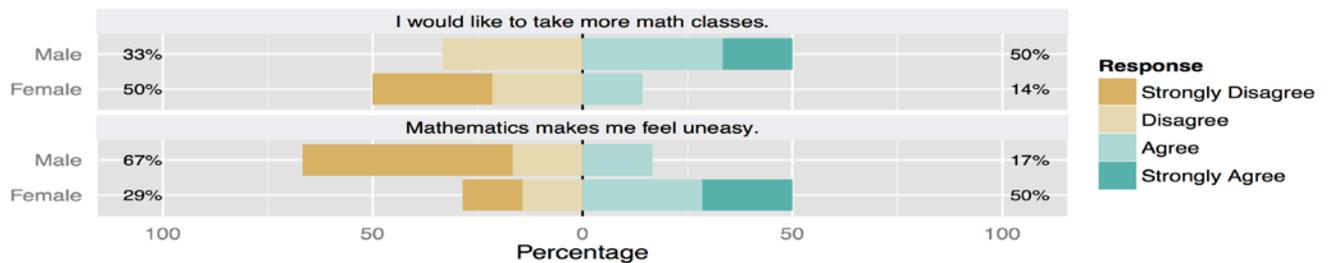
One approach is to utilize a heatmap that encodes frequency for each response option by colour or shade:



With a grouping variable, we can extend this idea to facet the responses, labelling the proportion of individuals on either extreme, as well as in the neutral category:



Often, it is useful to collapse or hide the “neutral” category to place focus on the extremes:



This style of graphic can be extended in other ways: incorporating different “center” points, allowing for more response options, using density plots, or simply by plotting more items or alternate grouping variables. Overall, this new package provides intuitively appealing and flexible methodologies for presenting rating scale data. –Matthew Sigal

References

Bai, H., Wang, L., Pan, W., & Frey, M. (2009). Measuring mathematics anxiety: Psychometric analysis of a bidimensional affective scale. *Journal of Instructional Psychology*, 36(3), 185-193.

Bryer, J., & Speerschneider, K. (2014). *likert*: Functions to analyze and visualize likert type items. R package version 1.2. <http://CRAN.R-project.org/package=likert>

Thank you to Matt Sigal, a QM doctoral student in the Department of Psychology at York University, for this issue's Visual Insight. Matt specializes in, among other things, visualizing psychological data. Send 'Visualization Insights' ideas to Nicole Aitken (naitk050@uottawa.ca), Communications Director of the QM Section

Consulting Corner

Dear Stats Consultant,

I have three subscale scores that I would like to include as predictor variables in a regression model. All of the constructs represented by the subscales are theoretically important. When I run the regression model with all of the subscales in the regression only two of them are significant. However, running separate regression models using one subscale at a time produces significant results for all three subscales. Why does this happen and what is the correct model?

Sincerely,
Jane Tukey

Dear Ms. Tukey,

This is a common problem in regression. You likely have significant predictors in individual models but not in the multiple regression model because the regression coefficients in the full model are partial regression coefficients, whereas in a simple regression they are not. This means that the

coefficients in your full model are only looking at the unique contribution of each predictor. When predictors share a large amount of variance with each other, the shared variance is not taken into account for predicting your outcome variable. It is typical for subscale scores to be related to one another.

It is important for you to determine which variability you are interested in: 1) the shared variability; 2) the unique variability; 3) unique plus shared variability. If you are interested in the shared variability then you could try summing the scores on the three subscales and using those as predictors in your regression model, or run a structural equation model with a latent variable (or variables) representing the shared variability among the predictors. If you are interested in the unique variability, then you will want to leave all predictors in the regression. Be sure to check though that collinearity is not an issue, since highly correlated predictors can lead to inflated error

variances. Also be aware that the relationship between a subscale and the outcome can actually be stronger when controlling for the remaining predictors. Lastly, if you are interested in predicting the outcome from both the unique and shared variability, then you could run separate regression analyses for each predictor. Generally this is not what researchers are interested in, and may provide misleading information about the strength of the relationship between each predictor and the outcome variable (e.g., the sum of the separate R^2 values does not represent the total variability explained by the three predictors). When running regression models, including all theoretically relevant predictors is the best method for obtaining unbiased regression estimates and maximizing the amount of variance accounted for in your outcome variable.

Sincerely,
*Your Friendly Neighbourhood
Stats Consultant*



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*Send consulting
corner suggestions
to Nicole Aitken
(naitk050@uottawa.ca),
Communications
Director of the QM
Section*

QM Section Invited Speaker at CPA 2015

The QM Section's Invited Speaker at this year's CPA Convention is Dr. James Ramsay, Emeritus Professor of Psychology from McGill University. The topic of Dr. Ramsay's presentation is *A Friendlier Psychometric Theory for Tests and Psychological Scales*.

Dr. Ramsay retired from

McGill in 2007 after approximately 40 years of service. Currently, Jim also has affiliations with the Department of Chemical Engineering at Queen's University and the Department of Mathematics and Statistics at the University of Ottawa. He received his PhD from Princeton University in 1966 in Quantitative Psychology.

His research interests include psychometrics, dynamic systems and functional data analysis, of which he is the founder. He also developed much of the statistical theory behind multidimensional scaling. Jim is the author of four influential books and over 100 peer-reviewed articles in statistical and psychometric journals.



2014 CPA Convention: A Great Success for QM!

Section Keynote

An Overview of New Developments in Psychometrics with Implications for Validation Studies: Pratt Indices for Latent Variable Models, Dr. Bruno Zumbo, University of British Columbia

Preconvention Workshop

Introduction to Structural Equation Modeling, Rob Cribbie & Alyssa Counsell, York University

Workshops

Getting Started with R: An Introduction to Data Management and Analysis using Free Software, S. Sampasivam, University of Ottawa; Nicole Aitken, University of Ottawa; Joo Ann Lee, York University; Susanna Cheung, University of Ottawa

Structural Equation Modeling: Made Easy in Free Software, Katherine Collins, University of Ottawa; Susanna Cheung, University of Ottawa; Alyssa Counsell, York University

Analyzing Dyadic Data with the Actor-Partner Interdependence Model (APIM): A Systematic Walkthrough of Recent Applications and Developments, Alexandre Garneau, University of Ottawa; Josée Fitzpatrick, University of Ottawa; Patrick Gaudreau, University of Ottawa; Marie-France Lafontaine, University of Ottawa.

Symposia

Advanced Methods for Longitudinal Data Analysis, Cathy LaBrish, Victoria Ng, David Flora, York University

Posters

Investigating the robustness of the nonparametric Levene test with 3 or more groups, David Nordstokke, University of Calgary; Mitchell Colp, University of Calgary

Power and type I error rates of three robust chi-square difference tests in studies of measurement invariance, Jordan Brace, University of British Columbia; Victoria Savalei, University of British Columbia

Neyman and Pearson versus Fisher controversy is informative of current practice in inferential statistics, Michael T. Bradley, University of New Brunswick; Andrew Brand, King's University College; Luke Macneill, University of New Brunswick

A general approach to combining parallel factor analysis and cluster analysis, Ji Yeh Choi, Heungsun Hwang, McGill University

Comparing pre-post change across groups: Guidelines for choosing between difference scores and ANCOVA, Megan A. Jennings, Robert A. Cribbie, York University

The status of models in construct validity research: Theoretical models or theoretical entities?, Maria Nikol, Kathleen L. Slaney, Simon Fraser University

Apples, file drawers and garbage: Revisiting validity issues in meta-analysis, Sarena Poets, Donald Sharpe, University of Regina

Disparities in the use and interpretation of meta-analysis models: An empirical examination, Kathleen L. Slaney, Simon Fraser University; Ramsay Malange, University of Victoria

How to minimize the impact of reverse-worded items on psychological scales, Xijuan (Cathy) Zhang, Victoria Savalei, University of British Columbia

Demonstrations of the attenuation of effect sizes by fluctuating levels of measurement error, Shawna Zuda, University of British Columbia; Brian P. O'Connor, University of British Columbia

The QM Section Program for 2015 in Ottawa will be available soon. Watch our website for more information.

2015 Pre-Convention Workshop: Dr. Dennis Jackson from the University of Windsor will be giving a pre-convention workshop on factor analysis. Sign up now so you are not "latent"

QM Graduate Programs in Canada

Source: <http://www.apa.org/divisions/div5/docprogs.html#capsydev>

University of British Columbia

MA/PhD, Quantitative Methods
<http://psych.ubc.ca/graduate/research-areas/quantitative-methods/>
 Contact: Jeremy Biesanz
 Email: jbiesanz@psych.ubc.ca

University of Manitoba

MA/PhD Methodology
<http://umanitoba.ca/faculties/arts/departments/psychology/graduate/programs/analysis.html>
 Contact: Johnson Li
 Email: Johnson.Li@umanitoba.ca

McGill University

PhD, Quantitative Psychology and Modeling
<http://www.psych.mcgill.ca/research.html#q>
 Contact: Yoshio Takane
 Email: takane@psych.mcgill.ca

Simon Fraser University

MA/PhD, Quantitative Methods
<http://www.psyc.sfu.ca/index.php?topic=theory>
 Contact: Rachel Fouladi
 Email: rfouladi@sfu.ca

University of Western Ontario

MSc/PhD, Personality and Measurement Program
http://www.psychology.uwo.ca/research/personality_and_measurement/index.html
 Don Saklofske
 Email: dsaklofs@uwo.ca

York University

MA/PhD, Quantitative Methods
<http://qm.info.yorku.ca/>
 Contact: David Flora
 Email: dflora@yorku.ca

2015–2016 QM Section Elections

Elections for QM Section positions will occur at the QM Annual Meeting during the CPA Convention. If you interested in running for a position, or if you would like to nominate someone for a position, you can do so by emailing Rob Cribbie (cribbie@yorku.ca) or nominations will also be accepted during the Annual Meeting.

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

<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.

A list of available executive positions in the QM section can be found on pages 7 and 8

Meet Your 2014–2015 QM Section Executive

Chair:

Rob Cribbie
Quantitative Methods Program
Department of Psychology
York University
cribbie@yorku.ca

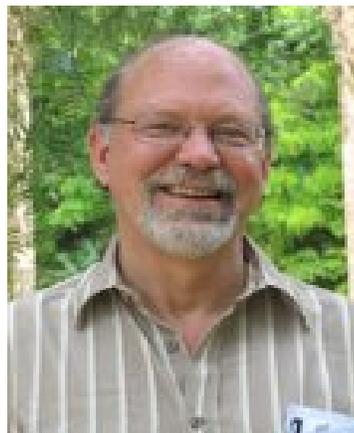


Special points of interest:

- QM Section of CPA was formed in 2013
- Don Sharpe was the first chair of the section
- CPA 2015 is in Ottawa; CPA 2016 is in Victoria

Chair-Elect:

Michael Bradley
Department of Psychology
University of New Brunswick
bradley@unb.ca



Past-Chair:

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



Meet Your 2014–2015 QM Section Executive

Do you want to get involved with the Quantitative Methods Section of CPA?

If so, 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 so you don't miss out on future newsletters, convention news, training opportunities, etc.



Secretary/Treasurer:

R. Nicholas Carleton
Department of Psychology
University of Regina
nick.carleton@uregina.ca



Communications Director:

Nicole Aitken
Department of Psychology
University of Ottawa
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Student Representative:

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