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RMT

RASCH MEASUREMENT TRANSACTIONS

Transactions of the Rasch Measurement SIG
American Educational Research Association

Overview of The Issue

In this issue of RMT, we have included two research notes, an interview, and several announcements that may be of interest to the Rasch community.

First, the issue includes a research note from David Andrich related to a Rasch measurement distribution. The second note is from Kenneth D. Royal and Margaret E. Gruen on measuring pain in animals.

Following the research notes is an interview with Trevor G. Bond about the soon-to-be published fourth edition of *Applying the Rasch model.*

In the SIG news, we thank the outgoing Rasch Measurement SIG officers and introduce the new officers.

The issue rounds out announcements about upcoming Rasch courses at the University of Western Australia.

As always, we welcome your contributions to the next issue for RMT. Please contact us at the email address below if you wish to submit something for inclusion.

Sincerely,

Your RMT Co-editors, Leigh and Stefanie

Rasch Measurement Transactions
www.rasch.org/rmt

Some History and Recent Understandings of a Rasch Measurement Distribution

This note summarizes a culmination of developments of the probabilistic Rasch measurement model for ordered categories in which a measurement is a count of an explicit unit in exactly the way it is in the physical sciences, and in which the random error distribution is a discrete form of the Gauss distribution.

The current form of the model was derived in a sequence of three theoretical papers, with no data analyses, that built directly on each other. These were Rasch (1961), Andersen (1977) and Andrich (1978). In summary, and adopting more common current notation, Rasch showed that the probabilistic model for $m+1$ ordered categories which characterized a unidimensional variable and which satisfied his requirement of invariance of comparisons, was of the form

$$Pr\{X = x; \beta, \psi_x\} = [exp\{\psi_x + \varphi_x(\beta - \delta)\}]/\gamma; x = 0,1,2,\dots,m \qquad (1)$$

where Eq. (1) pertains to the response of one person with a real numbered measure β on a continuum to one instrument (hence no subscripts here for convenience). The integer x characterizes the ordered category with no implications for equidistance, (ψ_x, φ_x) are referred to as category coefficients and scoring functions respectively, and $\gamma = \sum_{x=0}^{m}\sum_{k=0}^{x}\exp\{\psi_k + \varphi_k(\beta-\delta)\}$ is a normalizing factor which ensures that the probabilities sum to 1.

Andersen then showed that if the distribution in Eq. (1) was to have a sufficient statistic for the person parameters, then the condition

$$\varphi_{x+1} - \varphi_x = \varphi_x - \varphi_{x-1},\ x = 1,2,\dots,m \qquad (2)$$

had to hold and that two adjacent categories $x-1, x$ could not be collapsed without destroying the model unless $\varphi_{x-1} = \varphi_x$. In these derivations, (ψ_x, φ_x) were given no substantive interpretation. They arose algebraically from the requirement of invariance realized in a probabilistic context through sufficiency.

Coming from a perspective of physics, where parameters in models and equations have a substantive meaning, I spent considerable time from 1974 when Rasch visited The University of Western Australia for six months till 1977 when I visited Rasch at The University of Copenhagen for a further six months attempting to give substantive meaning to these properties. I was successful in 1977, while in Copenhagen, showing that the unknown parameters could be resolved according to

$$\psi_x = -\alpha_1\tau_1 - \alpha_2\tau_2 - \dots - \alpha_x\tau_x, \qquad (3)$$

$$\varphi_x = \alpha_1 + \alpha_2 + \dots + \alpha_x \qquad (4)$$

where τ_x is a threshold at which probabilities of responses in adjacent categories $x-1$ and x are equal, and α_x is the discrimination at threshold τ_x. These are not only familiar, but standard concepts in psychometrics. Then if discriminations at the thresholds were equal and defined by $\alpha_x = 1$ as in the dichotomous Rasch model, $\varphi_x = x$ satisfying Andersen's constraint in Eq. (2).

Moreover, if a threshold has zero discrimination, $\alpha_x = 0$, then $\varphi_{x-1} = \varphi_x$ and the two adjacent categories can be combined without destroying the model. This condition is intuitively understandable in terms of discrimination, but was only understandable statistically in terms of destroying the model.

This gave the familiar form of the model,

$$Pr\{X = x; \beta, \psi_x\} = [exp\{-\sum_{k=0}^{x} \tau_x + x(\beta - \delta)\}]/\gamma; x = 0,1,2,\ldots,m, \quad (5)$$

where $\tau_0 \equiv 0$ for notational efficiency. In the conclusion in Andrich (1978), and by analogy to a measuring instrument where equidistant *thresholds* define the *unit*, I specialised $\Delta = \tau_{k+1} - \tau_k$ giving

$$P_x = [exp\{(x(m-x)\Delta)/2 + x(\beta - \delta)\}]/\gamma. \quad (6)$$

For any value of the measure β, Eq. (6) defines the probability distribution of a response from an instrument defined by two parameters, (Δ, δ), the unit and origin respectively. This note pertains to further implications of Eq. (6). These implications arose many years later from presentations at meetings of physical scientists (Andrich, 2018, 2019) regarding advances in measurement in the social sciences based on Rasch measurement theory.

For reasons that become clear shortly, Eq. (6) is referred to here as the *Rasch distribution*, rather than simply a *model.* Fig. 1 shows the category probability curves (CPCs) for an instrument with 16 *equidistant* thresholds. Usually the number is smaller, of the order of a single digit, and thresholds are non-equidistant. However, this example is relevant for the point of this note concerned with measuring instruments of the kind used in the physical sciences.

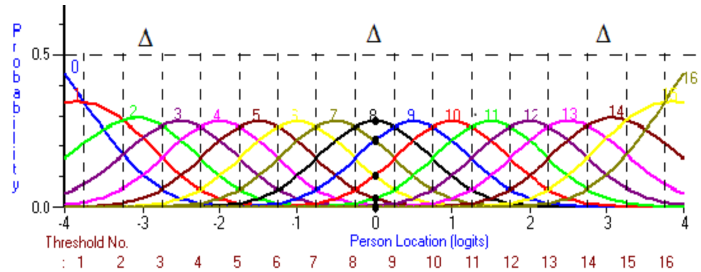

Figure 1. Rasch Distribution CPCs, $\delta = 0$, $m = 16$, $\Delta = 0.50$

It is stressed that for any measure β, Eq. (6) is the *inferred distribution of replicated* responses of a single person to the same instrument under identical conditions, and *not* a distribution *among* persons. Again for reasons that become clear shortly, the responses are referred to as *measurements*.

A particular case of such a distribution, highlighted (●) in Fig. 1, is $\beta = \delta = 0$, where the measure of the object is at the origin of the instrument. This discrete distribution is shown in Fig. 2. Fig. 2 also shows the *interpolation* of this discrete distribution with the *continuous* Gauss Distribution, $N(\mu, \sigma^2)$, which has parameters related to the parameters of the Rasch Distribution. These are (a) consistent with β being at the centre of the thresholds the mean of the Rasch Distribution, $E[X] = m/2 = 8$, is identical to the mean of the Gauss Distribution, $\mu = m/2 = 8$; (b) the variance $V[X]$ of the Rasch Distribution is exactly the inverse of its unit $V[X] = 1/\Delta = 1/0.5 = 2$, and also identical to the variance of the Gauss Distribution, $\sigma^2 = 1/\Delta = 1/0.5 = 2$.

This relationship holds under very general conditions, primarily constrained by a sufficiently large number of thresholds and whether or not the probabilities of extreme measurements vanish, that is, that the object is sufficiently well aligned to the range of the instrument that extreme measurements have zero probability (Andrich, 2019). It is because of its relationship with the Gauss distribution, and by analogy to it, that Eq. (6) is referred to as the Rasch *Distribution* rather than a model.

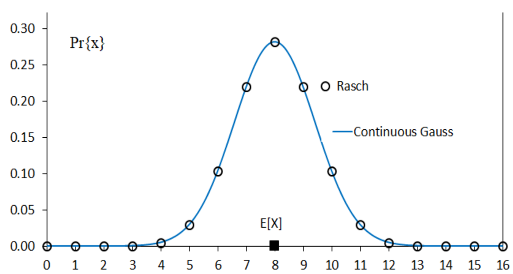

Figure 2. Rasch Distribution O, $E[X]=m/2=8, \; V[X]=2$

Gauss Distribution, $\mu = m/2 = 8$; $\sigma^2 = 1/\Delta = 2$

Fig. 3 shows the linear relationship between measurement x and estimate ($\hat{\beta} \mid x$), and between β and the theoretical mean $E[X \mid \beta]$, for the instrument of Fig. 1 (origin $\delta = 0, \;$ unit $\Delta = 0.50)$. This relationship may be an initial surprise, but it confirms how the common distance, Δ, between the thresholds is identical to the unit of a standard instrument. The linear relationship holds exactly in the range $3 < x < 13$ where the object's alignment to the instrument eliminates floor and ceiling constraints. In physical science, the object is aligned empirically to ensure no floor and ceiling constraints.

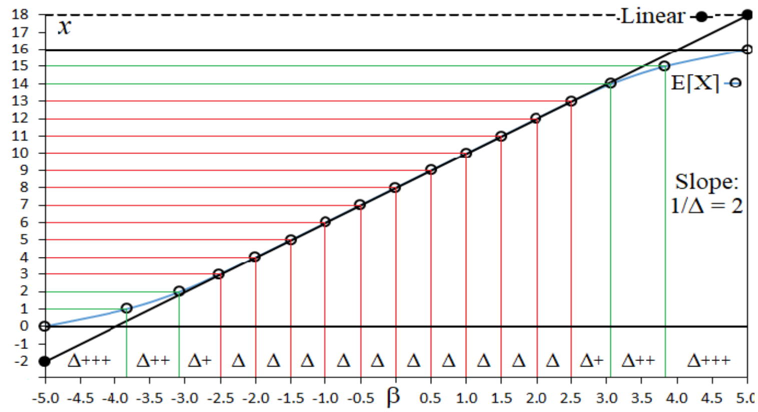

Figure 3. Measurement x in the unit Δ of the instrument of Fig. 1

Table 1 summarizes the relationship in Fig. 2. Columns 1, 2 and 3 show that the distance between successive integer measurements in the range 4 to 12 (shown in bold) is the unit $\Delta = 0.5$. Thus in this range, the response x can be read as a *measurement* in the unit Δ relative to the origin δ of the instrument. This interpretation is exactly the kind made when reading a measurement from an instrument in the physical sciences. It is because of the relationship shown in Fig. 3 and Table 1 that the response x in Eq. (6) is referred to as a *measurement.*

In the same unit and for scores outside this range, namely (0-3) and (13-16), measurement can be extrapolated linearly according to $x_\beta = (1/\Delta)\beta + m/2$, that is $x_\beta = 2\beta + 8$, giving Column x_β. This equation permits *extrapolating* measurements beyond the range where the observed measurements are regressed to the mean because of floor and ceiling effects. Note that the extrapolation is a function of the unit and origin, and not a result of an estimated regression equation. Thus in the unit $\Delta = 0.50$, scores of 0 and 16 have measurements –2 and 18. These measurements, in italics, *undo* the effects of the regressed measurements. In general, if the origin $\delta \neq 0$, the extrapolation is given by $x_\beta = (1/\Delta)\beta + E[X \mid \delta, \beta = 0]$.

Table 1. $E[X \mid \beta]$ and $\hat{\beta} \mid x$ for a test $m = 16$, $\Delta = 0.50$.

$E[X \mid \beta]$ x	$\hat{\beta} \mid x$	$\beta_{x+1} - \beta_x$	x_β
0	-5.00		*-2.0*
1	-3.83	1.17	*0.3*
2	-3.07	0.76	*1.9*
3	*-2.51*	*0.56*	*3.0*
4	**-2.00**	**0.51**	**4.0**
5	**-1.50**	**0.50**	**5.0**
6	**-1.00**	**0.50**	**6.0**
7	**-0.50**	**0.50**	**7.0**
8	**0.00**	**0.50**	**8.0**
9	**0.50**	**0.50**	**9.0**
10	**1.00**	**0.50**	**10.0**
11	**1.50**	**0.50**	**11.0**
12	**2.00**	**0.50**	**12.0**
13	*2.51*	*0.51*	*13.0*
14	3.07	0.56	*14.1*
15	3.83	0.76	*15.7*
16	5.00	1.17	*18.0*

Eisenhart, (1983a, p. 1). states that *discrete laws of error were proposed and studied … culminating in the quadratic exponential law of Gauss, which became almost universally regarded in the nineteenth century as "the law of error"*. Its derivation exercised the minds of the best mathematicians of the time including De Moivre, Lagrange, Laplace and others. The distribution was derived entirely theoretically to justify taking the mean as the estimate of a measure when repeated measurements of the same object with the same instrument gave a distribution of values rather than a single value.

In Gauss's derivation, measurement was taken for granted and an error distribution sought independently. The distribution only applies if the probabilities of extreme measurements, those at the limits of the range of the instrument, *vanish* (Eisenhart, 1983b, p. 2). In Rasch's formulation, measurement and the error distribution are defined simultaneously: measurement is defined as the quantitative comparison between objects that is invariant with respect to instruments, and in a probabilistic context, is realised through statistical sufficiency. It seems impressive that when the general model for ordered categories is specialised to have equidistant thresholds as in measurement in the physical sciences, the Rasch distribution also results in a *quadratic exponential.* However, this distribution is discrete, and explicitly a function of all relevant properties of the instrument, its unit, its origin, and its range. In addition, under special conditions when the Gauss distribution can be applied, that is when object is sufficiently well aligned to the instrument that the probabilities of extreme measurements vanish, the variance of the Rasch distribution is the inverse of its unit, and is also the variance of the commensurate Gauss distribution.

David Andrich
University of Western Australia

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Toward Objective Measurements of Pain in Animals

Pain assessment has a long history of research rooted in measurement. Techniques ranging from self-reported scores on pain scales to behavior-based observations (e.g., facial expressions, crying, body tension, etc.) to various physiologic measures (e.g., blood pressure, heart rate, respiratory rate, pupil dilation, perspiration, etc.) all comprise just some of the many methods clinicians and researchers use to assess pain. While pain assessments are commonplace in human medicine, considerably less attention has been devoted to pain assessment of animals.

Assessing pain in animals, however, presents a number of unique challenges. Perhaps first and foremost is that animals cannot speak so they cannot tell us what hurts and how severe is the pain. Further, some animals try to mask their pain so as to not appear vulnerable to any potential threats. Historically, pain assessment of animals has had to rely largely on behavior-based observations (e.g., lethargy, limp, heightened breathing, etc.) to provide clues about an animal's pain status.

(Photo of Maltese)

Pain assessment of animals is further complicated by the notion that different animals might experience pain differently in much the same way that different people have different thresholds for pain. A recent study from Gruen and colleagues (2020) examined public perceptions of pain sensitivity for various dog breeds. Publicly available data from the study were analyzed via Rasch measurement modeling. Logit values were rescaled to create a metric ranging from 0 to 100 to aid in interpretation. Results are presented in Table 1.

(Photo of Miniature Schnauzer)

A discernible trend among the measures is that the general public tends to perceive smaller dogs as more sensitive to pain, whereas larger dogs are perceived to be less sensitive to pain. Further, dogs with a reputation for being more threatening or aggressive (e.g., Rottweiler, Doberman, PitBull, etc.) were also perceived to be less sensitive to pain. This perception seems based on reputation and phenotype as there is no neurobiological evidence of a difference in pain sensitivity. This may represent perceptions about behavioral reactivity, but remains an open question.

Table 1. Perceived Pain Sensitivity Measures by Dog Breed.

Breed	Pain Sensitivity Measure	Standard Error
Maltese	94.24	2.07
Chihuahua	83.83	2.00
Pomeranian	80.32	1.97
Dachshund	78.53	1.96
Jack Russell Terrier	70.09	1.92
Cavalier King Charles Spaniel	67.61	1.91
Pug	58.06	1.87
Boston Terrier	51.68	1.85
Schnauzer	50.72	1.85
Whippet	42.56	1.83
Border Collie	38.43	1.83
Bulldog	38.00	1.83
Chow Chow	36.38	1.82
Golden Retriever	33.01	1.82
Samoyed	29.87	1.82
Greyhound	29.55	1.82
Gordon Setter	28.61	1.82
Rhodesian Ridgeback	26.57	1.82
Labrador Retriever	21.42	1.82
Weimaraner	19.77	1.83
Husky	16.26	1.83
Boxer	13.41	1.84
PitBull	13.35	1.84
German Shepherd	9.98	1.84
Great Dane	9.60	1.84
Mastiff	7.14	1.85
Doberman	0.65	1.87
Rottweiler	0.34	1.87

As a measurement community, we are curious to know your thoughts about objective measurements of pain in animals. For most measurement experts, this likely isn't something we have thought a great deal about. While NCSU is a leader in the measurement of pain in animals, we are always exploring new collaborations and seeking new ideas. As such, we are curious to know how you might measure pain in animals? Are you aware of any innovative techniques that might lead to more objective measurements of pain? How might you assess the contribution of behavioral reactivity in response to pain? Please contact the authors of this study to discuss further.

(Photo of Rottweiler)

Kenneth D. Royal – *North Carolina State University*

Margaret E. Gruen – *North Carolina State University*

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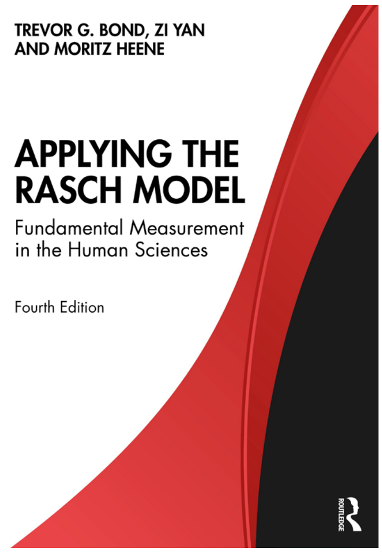
Fourth Edition of Applying the Rasch Model: An Interview with Trevor G. Bond



The following is an interview between the Editors of Rasch Measurement Transactions (RMT) and Trevor G. Bond (TGB), about the soon-to-be published fourth edition of Applying the Rasch Model.

Interested readers may pre-order the book from the following website: [*https://www.routledge.com/Applying-the-Rasch-Model-Fundamental-Measurement-in-the-Human-Sciences/Bond-Yan-Heene/p/book/9780367141424*](https://www.routledge.com/Applying-the-Rasch-Model-Fundamental-Measurement-in-the-Human-Sciences/Bond-Yan-Heene/p/book/9780367141424)

RMT: Will you please tell us a bit about the changes in authorship between the 3rd and 4th editions?

TGB: In this edition I have been joined by two younger colleagues, with a view of passing over the senior authorship of this text to them for ARM5: Prof Moritz Heene of the Ludwig-Maximilians-University in Germany, and Assoc Prof Yan Zi from the Education University of Hong Kong have more youth on their side than I did when ARM1 first hit the shelves in 2001. Moritz did a post-doc with me in Hong Kong immediately after graduating in Germany; Zi was a colleague at HKIEd, whom I supervised for his PhD. The former has a much deeper understanding of theoretical issues in quantitative methods than I could ever acquire; the latter has much broader experience in quantitative methods than I have ever had. Both are committed to the concept that theoretically informed and rigorously applied Rasch Measurement has a positive impact on measurement practice across the human sciences.

RMT: What are the major content changes between the 3rd and 4th editions of ARM?

TGB: ARM4 keeps the two level approach we introduced in ARM3 (base level threaded through chapters 1-13, then a second level "Extended Understanding" in Chapters 4, 6, 7, 8), and augments that with a much more rigorous examination of issues that the Rasch world (including ARM 1-3) have either taken for granted, or to which it seems to have turned a blind eye: the (in)adequacies of residual based fit statistics, the Rasch claim to interval measurement, the assumption of equally discriminating items, the concept of dimensionality and the relationship between RM and other quantitative models (including SEM and FA) more generally.

RMT: What software-related changes should readers be aware of in ARM4?

TGB: Mike Linacre has very cleverly integrated the Winsteps and Facets aspects of his software into a single, bespoke ARMsteps application designed specifically to support readers of ARM4. It is pre-loaded with all the data sets and tutorials needed to emulate the analyses that are the basis of ARM4. Take care, "ARMsteps" is not an acronym; please say it like this: "A, R, Msteps". That harks back to "Msteps" - one of the earliest Rasch applications to come out of Chicago.

RMT: The new edition also includes software examples written for R. Will you please tell us more about what to expect regarding the R components?

TGB: Tara Valladares, a PhD student in the Quantitative Psychology program at the University of Virginia, is working with Moritz to produce parallel versions of the ARMsteps hands-on tutorials using eRm. We also provide illustrations and instructions how to test central key requirements of the Rasch model, and introduce model test procedures which have not been part of ARM previously, implemented in R packages. The corresponding R code and data will be freely available from the companion website.

RMT: Instructors have frequently used previous editions of ARM to teach graduate courses in Rasch measurement. Can you please tell us about features of the 4th edition that will be particularly useful for teaching?

TGB: My background is in psychology: developmental and educational psychology. In 1968, David Ausubel wrote: "If I had to reduce all of educational psychology to just one principle, I would say this. The most important single factor affecting learning is what the learner already knows. Ascertain this and teach him accordingly." You can apply that exact principle if you take a Behaviourist or cognitive approach to learning (Skinner, Piaget, Vygotsky all start there). Instructors who start with that precept in mind will find suitable starting points for all their grad students in ARM4: the math-phobic beginner won't be overwhelmed; the most experienced student will still find new content. Moreover, every theoretical proposition in the book has an accompanying practical, software-based application.

RMT: Do you have any suggestions for instructors who are using this book to teach a course on Rasch?

TGB: There are two basic paths through the book: one for RM neophytes, and another for readers who already have some relevant background. Teachers might decide which path is better for their cohorts of students (base or extended), but could consider running both modes in parallel in the same Rasch course. I would encourage more experienced colleagues to pick and choose a bespoke pathway through ARM4 which is more appropriate to their own strengths and their students' needs. First thing I would do as a course teacher would be to ask my RA / TA / librarian to ensure that my grad students had direct and ready access to electronic copies of exemplar articles. This is more difficult to arrange on some applied areas than others.

RMT: What do you see as the major role of this book?

TGB: When I was asked to explain why "[t]wo notable …works by TG Bond were not only highly influential but had greatly contributed to the development of Rasch measurement" (Aryadoust et al, 2019), my thoughts ran to the following: Many experts regard the mathematics as some sort of secret handshake between the true disciples of the model. But the Aryadoust finding suggests that ARM has succeeded in doing what others could not, or would not do: democratise the Rasch model, by revealing that secret handshake as merely important for, but not central to the proactive use of Rasch measurement in human science research. The ARM difference has been to focus on the conceptual model, rather than the mathematical model; so, we start where the newcomer is, not where we want them to be. As a result, thousands of researchers have been enfranchised, and thousands of papers published.

RMT: What is the most important thing that you would like people to take away from reading this book?

TGB: The most convincing case for adopting Rasch measurement for instrument construction, quality assurance and data analysis is that which is the result of a potential adoptee's guided analysis and interpretation of data to which that person

has a meaningful personal commitment; nothing is as convincing as seeing your own data come to life under the Rasch spotlight. While researchers might cite ARM4 as a reference, and grad students might be required to use it in class, the original reason for writing ARM1 still persists: The tyro can sit down, armed with ARM4 and ARMsteps, and learn the what, the how, and the why of Rasch measurement.
It will take you from scratch to just about as far as you need to go to produce the analyses for your own journal article or thesis, or to have a critical understanding of the Rasch based journal articles or theses of others.

RMT: This edition is dedicated to WANG Wen Chung. Could you tell us about this dedication?

TGB: At the PROMS 2018 Symposium in Shanghai, Prof Rob Cavanagh (PROMS Chair) presented daughter, Janice, with its first Life-time Achievement Award in acknowledgment of Prof Wang's sustained effort made over many years as a theoretician, researcher and teacher, noting his highly original and cutting-edge contributions to Rasch Measurement world-wide. When I advised Wang that he had been listed for the PROMS award, he responded, "I am very surprised and grateful to find your nominating me as a recipient of Life-time Achievement Award. I am deeply honoured and appreciate you and the board."
I had been on the appointment committee when Prof Wang was interviewed for the position he occupied as Chair Professor at the Education University of Hong Kong until his untimely death just a decade later. Wen- Chung really stunned that panel with his erudition, his obvious status in the field, his ability to communicate, his modesty and collegial disposition, attributes prized by those who have been fortunate enough to fall inside Prof Wang's sphere of influence. The panel had unanimously endorsed Wang's appointment before he had reached the lift outside the interview room.
Wang Wen-Chung's achievements are best summarized in the Obituary listed below, but, more than all that, ARM4 is dedicated to our memory of him as an outstanding colleague and friend.

RMT: Is there anything else you'd like to share about the new edition?

TGB: By some marvelous serendipity, ARM1 just happened to be the right book which appeared at the right time at the turn of the millennium. Larry Erlbaum agreed to move us up a notch on the royalty levels for ARM2, but confided that many successful first editions flop at edition two. Well, here we are at ARM4. I would have been absolutely delighted if the Scientometric review of Rasch measurement had found a top ten spot for ARM (123, taken together). So, you can be sure that I popped the cork on a bottle of Bond's favourite – Bollinger – when the results of that research were published.

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News from the Rasch Measurement SIG

Winter 2020 signaled an election cycle for the Rasch SIG officers. We'd like to take a moment to thank the outgoing officers for their two years of service:
Hong Jiao, Chair
E. Matthew Schulz, Treasurer
Cari Hermann-Abell, Secretary

The program co-chair position is filled by appointment with a two-year commitment. The co-chair appointments are staggered, so that each year, the more senior co-chair is ending their term, a new co-chair is starting their term, and someone remains to mentor the new co-chair. This spring, Trent Haines completed his second year with the conclusion of his duties for AERA 2020 programming. Courtney (Vidacovich) Donovan and Manqian Lia are the 2021 AERA Rasch Measurement SIG Program Co-chairs.

Leadership positions that are voted on by the SIG membership in an AERA-organized election are the SIG chair, treasurer, and secretary, as AERA regulations require three elected officers. These three individuals serve a two-year term. The results of this Spring's elections were:

Chair: Jue Wang, Ph.D.
Dr. Jue Wang is an assistant professor in the Research, Measurement & Evaluation Program at the University of Miami. She received her Ph.D. from the University of Georgia (UGA) in Quantitative Methodology (QM) under the Department of Educational Psychology. She has also obtained a M.S. degree in Statistics at UGA. Jue has developed her program of research based on Rasch measurement theory. Her research focuses on examining rating quality and rater effects in rater-mediated assessments using Rasch measurement models, unfolding models, and multilevel Rasch models. Jue has just completed a book with Professor George Engelhard entitled "Rasch models for solving measurement problems: Invariant measurement in the social sciences" that is currently in press by Sage as part of their Quantitative Applications in the Social Sciences (QASS) series. Meanwhile, she and Professor George Engelhard have developed a digital ITEMS module introducing Rasch measurement theory. Jue has served as an editorial assistant for the Journal of Educational Measurement from 2016 to 2018. She has reviewed for leading journals including *Applied Psychological Measurement, Journal of Educational and Behavioral Statistics, International Journal of Testing, Language Testing, Assessing Writing,* and *TESOL Quarterly*.

Treasurer: Dandan Liao, Ph.D.
Dr. Dandan Liao is a psychometrician at Cambium Assessment, Inc., formerly AIR Assessment. Under the supervision of Dr. Hong Jiao, she obtained her Ph.D. and M.A.

degrees in Measurement, Statistics, and Evaluation program from the University of Maryland. Before that, she received her bachelor's degree in statistics from Beijing Normal University in China. Her research interests include standard and extended item response theory models, local dependency, and process data. Her work in the multigroup cross-classified Rasch model won her the Best Graduate Student Paper Award in the 18th International Objective Measurement Workshop in 2016. Built on the Rasch model, her dissertation focuses on the speed-accuracy-difficulty interaction in the joint modeling of responses and response times. As a psychometrician, she provides psychometric support for the Next Generation Science Standards Assessments, which utilize the multigroup Rasch testlet model. She has developed methods for item fit, reliability, linking, and scoring in the multigroup Rasch testlet model. As the treasurer of the Rasch SIG, she hopes to contribute to the Rasch community by bringing in more research and application of the Rasch model.

Secretary: Eli Jones, Ph.D.
Dr. Eli Jones is an assistant professor in the Educational Psychology and Research department at the University of Memphis. He received his Ph.D. from Brigham Young University (BYU) from the Educational Inquiry, Measurement, and Evaluation department. He has also served as a postdoctoral researcher for the Network for Educator Effectiveness at the University of Missouri, as an assistant professor of research at Columbus State University (Georgia), and as a second-grade public school teacher. His area of research is currently focused on the measurement properties of rater-mediated assessments in education. Specifically, his research focuses on the application of many-facet Rasch models to educator evaluation (including teacher evaluation, principal evaluation, and evaluation of teacher candidates). His research has explored the psychometric properties of observational instruments, as well as the implications of sparse rating designs on model-data fit, rater error, and stability of rater severity estimates.

Upcoming Rasch Measurement Courses and Workshops

Rasch Measurement Courses at the University of Western Australia: July – November 2020

In view of the disruption to due to COVID-19 in the first half of the year, both the Introductory and Advanced units of study below will be offered in the second half of the year. For more details, please see:

Introduction to Classical and Rasch Measurement Theories EDU5638

Advanced course in Rasch Measurement Theory EDUC5606