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## A short history of the International Workshop on Matrices and Statistics (IWMS)

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### Abstract

We present a short history of the International Workshop on Matrices and Statistics (IWMS). The first IWMS was held in Tampere, Finland, in 1990, and the Workshop in 2013, the 22nd IWMS, will be hosted at the University of Toronto by the Fields Institute, Toronto, Ontario, Canada, 12–15 August 2013. We have established an open-access website for the IWMS at the University of Tampere: <http://www.sis.uta.fi/tilasto/iwms/> where we plan to put all associated reports and photographs of the IWMS from 1990 onwards, including those published in *Image: The Bulletin of the International Linear Algebra Society*.

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The first workshop in the “International Workshop on Matrices and Statistics” (IWMS) series took place at the University of Tampere in Tampere, Finland, 6–8 August 1990. This workshop was organized by a local committee from the Statistics Unit of the Department of Mathematical Sciences at the University of Tampere. The key persons in the organizing committee were Pentti Huuhtanen, Erkki Liski, Tapio Nummi, Tarmo Pukkila, Simo Puntanen, and George P. H. Styan. There was no idea at that time that this would be the beginning of an almost annual series of meetings. This first IWMS was actually called “The International Workshop on Linear Models, Experimental Designs, and Related Matrix Theory”. Since 1990 the name has changed twice, and in 1998 the IWMS became the “International Workshop on Matrices and Statistics”, following a suggestion by C. Radhakrishna Rao.

In 1990 in Tampere there were 98 participants from 18 different countries. The Keynote Address in 1990 was given by C. Radhakrishna Rao. The invited speakers were

Jerzy K. Baksalary	Sujit Kumar Mitra	Friedrich Pukelsheim
R. Dennis Cook	Seppo Mustonen	Jagdish N. Srivastava
Yadolah Dodge	Heinz Neudecker	George P. H. Styan
Shanti S. Gupta	Ingram Olkin	

The organizers of the group meetings were

Jerzy K. Baksalary	Sanpei Kageyama	Kirti R. Shah
Tadeusz Caliński	Jürgen Kleffe	George P. H. Styan
R. Dennis Cook,	Sujit Kumar Mitra	Götz Trenkler
R. William Farebrother	Seppo Mustonen	Song-Gui Wang
Yasunori Fujikoshi	Friedrich Pukelsheim	Haruo Yanai
T. P. Hettmansperger	Jorma Rissanen	

Many of these persons have also been active participants in later workshops. George P. H. Styan has missed only one IWMS in 1990–2010 and thereby has the highest score in the attended IWMSs.

The following is an up-to-date version of the aims of the IWMS:

The purpose of the IWMS is to stimulate research and, in an informal setting, to foster the interaction of researchers in the interface between statistics and matrix theory. The Workshop will provide a forum through which statisticians may be better informed of the latest developments and newest techniques in linear algebra and matrix theory and may exchange ideas with researchers from a wide variety of countries.

Quite soon after the 2nd IWMS in Auckland, New Zealand, in 1992, the organizing system for the IWMS found its form as two committees: International and Local. The International Organizing Committee (IOC) for several years comprised R. William Farebrother (UK), Simo Puntanen (Finland), George P. H. Styan (Canada), Hans Joachim Werner (Germany). Recently, also S. Ejaz Ahmed (Canada), Jeffrey J. Hunter (New Zealand), Augustyn Markiewicz (Poland), Götz Trenkler (Germany), Júlia Volaufová (USA), and Dietrich von Rosen (Sweden), have joined the IOC; in 2008 George P. H. Styan was named Honorary Chair of the IOC of the IWMS. It is of course worth emphasizing that a most demanding task and responsibility for the meeting arrangements belongs to the local organizing committee.

The IWMS series has had three *ILAS Lecturers*: Gene H. Golub (1999), Jerzy K. Baksalary (2003), and Ravindra B. Bapat (2008), and two *Nokia Lecturers*: Ingram Olkin (2004) and C. Radhakrishna Rao (2005). As the IWMS Birthday Boys have been celebrated T. W. Anderson (80, 90), Ingram Olkin (80), C. Radhakrishna Rao (80), George P. H. Styan (60, 65), and a Special Session for Tarmo Pukkila (60) was held in 2006. Memorial Sessions have been held for Bernhard Flury (1999), Sujit Kumar Mitra (2004), and Jerzy K. Baksalary (2005).

We now present a list of the 19 Workshops that have been held from 1990 to 2010, as well as the 2011 Workshop in Tartu, Estonia. The photographs 1, 6, 7, 9 and 12 are taken by the University of Tampere photographer, photograph 4 by Hazel Hunter and the others by Simo Puntanen.



PHOTO 1: Group of participants in IWMS-1990, Tampere; C. Radhakrishna Rao inviting more people to the picture.

- 1990/1:** International Workshop on Linear Models, Experimental Designs, and Related Matrix Theory Tampere, Finland, 6–8 August 1990,  $n = 98$ .  
Chair of the Organizing Committee: Erkki Liski. Programme.
- 1992/2:** [2nd] International Workshop on Matrix Methods for Statistics, Auckland, New Zealand, 4–5 December 1992,  $n = 23$ .  
Chair of the Organizing Committee: Alastair J. Scott. Report in *Image*.
- 1994/3:** Tartu Satellite Workshop on Matrices in Statistics, Tartu, Estonia, 28 May 1994.  
Local Chairs: Ene-Margit Tiit & Hannu Niemi, IOC Chair: George P. H. Styan.
- 1995/4:** 4th International Workshop on Matrix Methods for Statistics, Montréal, Québec, Canada, 15–16 July 1995,  $n = 70$ .  
Local and IOC Chair: George P. H. Styan. Report in *Image*.
- 1996/5:** 5th International Workshop on Matrix Methods for Statistics, Shrewsbury, England, 18–19 July 1996,  $n = 28$ .  
Local and IOC Chair: R. William Farebrother. Programme. Report in *Image*.
- 1997/6:** 6th International Workshop on Matrix Methods for Statistics, Istanbul, Turkey, 16–17 August 1997,  $n = 40$ .  
Local Chair: Fikri Akdeniz, IOC Chair: Hans Joachim Werner. Report in *Image*.
- 1998/7:** 7th International Workshop on Matrices and Statistics, Fort Lauderdale, Florida, USA, 11–14 December 1998,  $n = 78$ ,  
in celebration of *T. W. Anderson's 80th birthday*. Programme.  
Local Chair: Fuzhen Zhang, IOC Chair: George P. H. Styan. Report in *Image*.



PHOTO 2: IWMS-4, Montréal, 15–16 July 1995.



PHOTO 3: George P. H. Styan, T. W. Anderson, Fuzhen Zhang; Fort Lauderdale, December 1998.

- 1999/8:** 8th International Workshop on Matrices and Statistics, Tampere, Finland, 7–8 August 1999,  $n = 95$ .  
 □ The ILAS Lecturer: *Gene H. Golub*.  
 Memorial Session: *Bernhard Flury (1951–1999)*.  
 Local and IOC Chair: Simo Puntanen. Programme.  
<http://www.uta.fi/laitokset/mattiet/workshop99/>, Report in *Image*.
- 2000/9:** 9th International Workshop on Matrices and Statistics, Hyderabad, India, 9–13 December 2000,  $n = 100$ ,  
 in celebration of *C. Radhakrishna Rao's* 80th birthday.  
 Local Chairs: S. B. Rao, P. Bhimasankaram, IOC Chair: Hans Joachim Werner.  
 Programme. Report in *Image*.
- 2001/10:** 10th International Workshop on Matrices and Statistics, Voorburg, The Netherlands, 2–3 August 2001,  $n = 54$ . Report in *Image*.  
 Local Chair: Patrick J. F. Groenen, IOC Chair: George P. H. Styan.
- 2002/11:** 11th International Workshop on Matrices and Statistics, Lyngby, Denmark, 29–31 August 2002,  $n = 65$ ,  
 in celebration of *George P. H. Styan's* 65th birthday. Report in *Image*.  
 Local Chair: Knut Conradsen, IOC Chair: Hans Joachim Werner.
- 2003/12:** 12th International Workshop on Matrices and Statistics, Dortmund, Germany, 5–8 August 2003,  $n = 45$ .  
 □ The ILAS Lecturer: *Jerzy K. Baksalary*.  
 Programme. Report in *Image*.  
 Local Chair: Götz Trenkler, IOC Chair: Hans Joachim Werner.
- 2004/13:** 13th International Workshop on Matrices and Statistics, Będlewo, Poznań, Poland, 18–21 August 2004,  $n = 82$ ,  
 in celebration of *Ingram Olkin's* 80th birthday,  
 □ The Nokia Lecturer: *Ingram Olkin*.  
 Memorial Session: *Sujit Kumar Mitra (1932–2004)*.  
 Local Chair: Augustyn Markiewicz, IOC Chair: Simo Puntanen.  
<http://matrix04.amu.edu.pl/>, Programme. Report in *Image*. Poster.



PHOTO 4: IWMS-13, Będlewo, Poznań, Poland, 18–21 August 2004.

- 2005/14:** 14th International Workshop on Matrices and Statistics, Massey University, Albany Campus, Auckland, New Zealand, 30 March – 1 April 2005,  $n = 50$ .

□ The Nokia Lecturer: *C. Radhakrishna Rao*.  
 Memorial Session: *Jerzy K. Baksalary* (1944–2005).  
 Local Chair: Jeffrey J. Hunter, IOC Chair: George P. H. Styan.  
<http://iwms2005.massey.ac.nz/>, Announcement. Programme. Report in *Image*.  
 Flyer.

**2006/15:** 15th International Workshop on Matrices and Statistics, Uppsala, Sweden, 13–17 June 2006,  $n = 68$ .  
 Special Session for *Tarmo Pukkila's* 60th birthday.  
 Local Chair: Dietrich von Rosen, IOC Chair: Hans Joachim Werner.  
<http://www.bt.slu.se/iwms2006/iwms06.html>, Programme. Report in *Image*.



PHOTO 5: IWMS-15, Uppsala, Sweden, 13–17 June 2006.

**2007/16:** 16th International Workshop on Matrices and Statistics, Windsor, Ontario, Canada, 1–3 June 2007,  $n = 74$ ,  
 in celebration of *George P. H. Styan's* 70th birthday,  
 Local Chair: S. Ejaz Ahmed, IOC Chair: George P. H. Styan.  
<http://www.uwindsor.ca/units/iwms/main.nsf>, Programme. Poster.

**2008/17:** 17th International Workshop on Matrices and Statistics, Tomar, Portugal, 22–26 July 2008,  $n = 80$ ,  
 in celebration of *T. W. Anderson's* 90th birthday.  
 □ The ILAS Lecturer: *Ravindra B. Bapat*.  
 Local Chair: João T. Mexia, IOC Chair: Simo Puntanen.  
<http://www.iwms08.ipt.pt/>, Programme. Report in *Image*. Poster.

**2009/18:** 18th International Workshop on Matrices and Statistics, Smolenice Castle, Slovakia, 23–27 June 2009,  $n = 67$ .  
 Local Chair: Viktor Witkovský, IOC Chair: Júlia Volaufová.  
<http://www.um.sav.sk/en/iwms2009.html>, Programme. Poster.

**2010/19:** 19th International Workshop on Matrices and Statistics, Shanghai, China, 5–8 June 2010,  $n = 186$ .  
 Local Chair: Yonghui Liu, IOC Chair: Jeffrey J. Hunter.  
<http://www1.shfc.edu.cn/iwms/index.asp>, Programme. Report in *Image*.

**2011/20:** 20th International Workshop on Matrices and Statistics, with the Tartu 9th Conference on Multivariate Statistics, Tartu, Estonia, 27–30 June 2011,  
 Special Session for *Muni S. Srivastava's* 75th birthday.  
 Local Chair: Kalev Pärna, Programme Committee Chair: Dietrich von Rosen,  
 Vice-Chair: Tõnu Kollo.  
<http://www.ms.ut.ee/tartu11/>

**2012/21:** 21st International Workshop on Matrices and Statistics, with the LinStat-2012, Będlewo, Poznań, Poland, 16–20 July 2012,

Special Session for *George P. H. Styan's* 75th birthday.  
 Local Chair: Katarzyna Filipiak, LinStat Chair: Augustyn Markiewicz,  
 IWMS Chair: Simo Puntanen.  
 Programme. Report in *Image*.  
<http://linstat2012.au.poznan.pl/index.html>.

- 2013/22:** 22nd International Workshop on Matrices and Statistics, hosted at the University of Toronto by the Fields Institute, Toronto, Ontario, Canada, 12–15 August 2013, in connection with the Joint Statistical Meetings, 3–8 August 2013, Montréal. Chair: S. Ejaz Ahmed.  
 Special Sessions for *Lynn Roy LaMotte's* and *Götz Trenkler's* 70th birthdays.  
<http://www.fields.utoronto.ca/programs/scientific/13-14/IWMS/>.

Selected refereed papers presented at the IWMS have been (or are about to be) published in the following journal special issues:

- 1992: Third Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, vol. 176 (1992), viii + 289 pp. (Includes 8 research papers presented at the Workshop held in Tampere, Finland, 6–8 August 1990.) Preface. DOI.  
 Jerzy K. Baksalary & George P. H. Styan, eds.
- 1993: *Journal of Statistical Planning and Inference*, vol. 36, no. 2–3 (1993), pp. 127–432. (24 research papers presented at the Workshop held in Tampere, Finland, 6–8 August 1990.) Preface. Author index. DOI.  
 Jerzy K. Baksalary & George P. H. Styan, eds.
- 1994: Fourth Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, vol. 210 (1994), 273 pp. Preface. DOI.  
 Jeffrey J. Hunter, Simo Puntanen & George P. H. Styan, eds.
- 1996: Fifth Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, In Celebration of C. Radhakrishna Rao's 75th Birthday. vol. 237/238 (1996), vii + 273 pp. Author index.  
 Ravindra B. Bapat, George P. H. Styan & Hans Joachim Werner, eds.
- 1997: Sixth Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, vol. 264 (1997), ix + 506 pp. Preface. DOI.  
 R. William Farebrother, Simo Puntanen, George P. H. Styan & Hans Joachim Werner, eds.
- 1999: Seventh Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, vol. 289 (1999), iv + 344 pp. Preface. DOI.  
 R. William Farebrother, Simo Puntanen, George P. H. Styan & Hans Joachim Werner, eds.
- 2000: Eighth Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, vol. 321 (2000), xi + 412 pp. Preface. DOI.  
 Simo Puntanen, George P. H. Styan & Hans Joachim Werner, eds.
- 2002: Ninth Special Issue on Linear Algebra and Statistics: *Linear Algebra and its Applications*, vol. 354 (2002), xii + 291 pp. Preface. DOI.  
 Simo Puntanen, George P. H. Styan & Hans Joachim Werner, eds.
- 2004: Tenth Special Issue on Linear Algebra and Statistics, Part 1: *Linear Algebra and its Applications*, vol. 388 (2004), 400 pp. Preface. DOI.  
 Simo Puntanen, George P. H. Styan & Hans Joachim Werner, eds.
- 2005: Tenth Special Issue on Linear Algebra and Statistics, Part 2: *Linear Algebra and its Applications*, vol. 410 (2005), 290 pp. Preface. DOI.  
 Simo Puntanen, George P. H. Styan & Hans Joachim Werner, eds.

- 2005: *Research Letters in the Information and Mathematical Sciences*, vol. 8 (2005), v + 228 pp. Special Issue: Proceedings of the 14th International Workshop on Matrices and Statistics, Auckland, New Zealand, 30 March–1 April 2005. Foreword. Available online.  
Jeffrey J. Hunter & George P. H. Styan, eds.
- 2006: *Linear Algebra and its Applications*, vol. 417 (2006), Proceedings of the 13th International Workshop on Matrices and Statistics, Będlewo, Poznań, Poland, 18–21 August 2004. Preface. DOI.  
Ludwig Elsner, Augustyn Markiewicz & Tomasz Szulc, eds.
- 2009: *Linear Algebra and its Applications*, vol. 430, no. 10 (2009), pp. 2563–2834, Proceedings of the 16th International Workshop on Matrices and Statistics, Windsor, Ontario, Canada, 1–3 June 2007. Preface. DOI.  
S. Ejaz Ahmed, Jeffrey J. Hunter, George P. H. Styan & Götz Trenkler, eds.
- 2010: *Acta et Commentationes Universitatis Tartuensis de Mathematica*, vol. 14, 2010. Proceedings of the 18th International Workshop on Matrices and Statistics, Smolenice Castle, Slovakia, 23–27 June 2009.  
Tõnu Kollo, Dietrich von Rosen, Viktor Witkovský & Júlia Volaufová, eds.
- 2011: *Numerical Linear Algebra with Applications* will publish a special issue as the Proceedings of the 19th International Workshop on Matrices and Statistics, Shanghai, China, 5–8 June 2010. Shanghai IWMS.  
Åke Björck, Maya Neytcheva, Musheng Wei & Yonghui Liu, eds.
- 2011: *Acta et Commentationes Universitatis Tartuensis de Mathematica*, vol. 15, nr. 1, 2011. Proceedings of the 19th International Workshop on Matrices and Statistics. Shanghai, China, 5–8 June 2010. Shanghai IWMS.  
Tõnu Kollo & Dietrich von Rosen, eds.
- 2012: IWMS-20 with the Tartu 9th Conference on Multivariate Statistics, Tartu, Estonia, 27–30 June 2011. Special volume by World Scientific from selected papers of the Conference, <http://www.ms.ut.ee/tartu11/>
- 2012: Special volume of *Acta et Commentationes Universitatis Tartuensis de Mathematica*, vol. 16, 2012. Proceedings of the IWMS-20 with the Tartu 9th Conference on Multivariate Statistics. Tartu, Estonia, 27–30 June 2011. <http://www.ms.ut.ee/tartu11/>  
Simo Puntanen, ed.
- 2013: IWMS-2012 and LinStat-2012: *Communications in Statistics - Theory and Methods*. Special Issue: Advances on Linear Models and Inference. Guest editors: Júlia Volaufová and Augustyn Markiewicz. Call for Papers.
- 2013: IWMS-2012 and LinStat-2012: *Communications in Statistics - Simulation and Computation*, Special Issue: Advances on Linear Models and Inference – Computational Aspects. Guest editors: Katarzyna Filipiak and Simo Puntanen. Call for Papers.
- 2013: IWMS-2012 and LinStat-2012: *Discussiones Mathematicae - Probability and Statistics*, Special Issue, Coordinating Editor: Roman Zmyslony, Guest editors: Carlos A. Coelho and Simo Puntanen. Call for Papers.



PHOTO 6: Jerzy K. Baksalary giving a talk in Tampere, August 1990.



PHOTO 7: R. Dennis Cook, Norman Draper, Nye John, George P. H. Styan; Tampere, August 1990.



PHOTO 8: Ravindra B. Bapat, Tomar, July 2008.

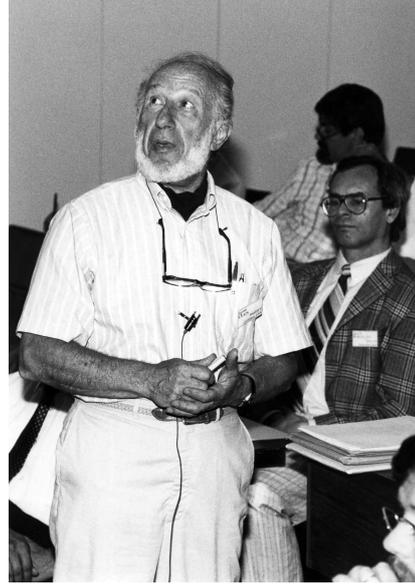


PHOTO 9: Ingram Olkin, Tampere, August 1990.



PHOTO 10: C. Radhakrishna Rao, Hyderabad, December 2000.



PHOTO 11: C. Radhakrishna Rao and Bhargavi Rao, Hyderabad, December 2000.



PHOTO 12: Jerzy K. Baksalary, Tadeusz Caliński, Sujit Kumar Mitra; Tampere, August 1990.

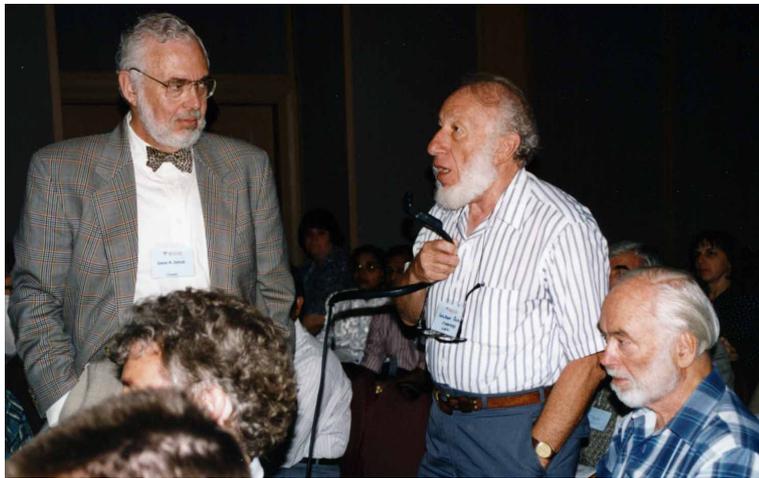


PHOTO 13: Gene H. Golub, Ingram Olkin, T. W. Anderson; Montréal, July 1995.



PHOTO 14: Group of participants in Będlewo, August 2004.



PHOTO 15: Enjoying the conference banquet (and the view to Detroit) in Windsor, June 2007.



PHOTO 16: In an after-dinner session in Smolenice Castle in July 2009, Tõnu Kollo (smiling in the picture) tentatively agreed to organize the IWMS-2011 in Tartu. Left: Soile Puntanen, right: Miroslav Fiedler.