

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

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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 27th IWMS was held in Shanghai, in Shanghai University of International Business and Economics, China, 6–9 June 2019; see the IWMS-2019 website. The next one, the 28th IWMS, will be held in MAHE, Manipal Academy of Higher Education, formerly known as Manipal University, Karnataka State, South India, 13–15 December 2021.

We have established an open-access website for the IWMS at the Tampere University: www.iwms.fi, where we intend to put all associated reports and photographs of the IWMS series from 1990 onwards, including those published in *Image: The Bulletin of the International Linear Algebra Society*. Complete videos, prepared by Jarmo Niemelä and Reijo Sund, of the talks at two pre-IWMS Tampere conferences in statistics in 1987 and 1990 are on YouTube.

Contents

1	Background	2
2	The first IWMS ...	2
3	Specific glimpses, over the years, ...	4
4	List of the 27 workshops	8
5	Some “sister-workshops”	16
6	Special issues of journals devoted to the IWMS	16
7	Acknowledgements	18
8	More photographs ...	19

1 Background

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. George was from McGill University, Montréal, but his efforts and connections were instrumental due to his active collaboration with the Tampere Team.

In passing we may mention that over the years the name as well as the structure of the Department of Mathematical Sciences at the University of Tampere has changed several times, the name Statistics slowly fading towards the horizon, so to say. Since 1 January 2019, the official English name of the university has been Tampere University.

In 1980s, the Tampere Statistics Group had organized two international events:

- the First International Tampere Seminar on Linear Statistical Models and their Applications, from 30 August to 2 September 1983, C. Radhakrishna Rao & George P. H. Styan providing lecture series. Program. Proceedings Preface. Rao's paper. Styan's paper.
- the Second International Tampere Conference in Statistics, 1–4 June 1987. Videos from 1987 and 1990. Poster. Proceedings Preface. Program.

Thus those days our team had some inspiring steam in our engines. The next meeting was the first IWMS in August 1990 but at that time there was no idea that this would be the beginning of an almost annual series of meetings.

2 The first IWMS ...

This first IWMS was actually called *The International Workshop on Linear Models, Experimental Designs, and Related Matrix Theory*. Since 1990 the name has been changed twice, and in 1998 the IWMS became the *International Workshop on Matrices and Statistics*, following a suggestion by Professor C. Radhakrishna Rao.

In 1990 in Tampere there were 98 participants from 18 different countries. The Keynote Address 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. For the schedule of the first IWMS see page 35 of this article.

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 December 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 Richard William Farebrother, Simo Puntanen, George P. H. Styan, and Hans Joachim Werner. Later on, the IOC was extended (new fresh blood, of course!) and George P. H. Styan was named Honorary Chair of the IOC of the IWMS. It is of course worth emphasizing that the most demanding task and responsibility for the meeting arrangements belong to the local organizing committee (LOC). The current IOC comprises the following members:

S. Ejaz Ahmed (Canada)	Simo Puntanen (Finland)
Francisco Carvalho (Portugal)	Martin Singull (Sweden)
Katarzyna Filipiak (Poland)	George P. H. Styan (Canada)
Jeffrey J. Hunter (New Zealand)	Júlia Volaufová (USA)
Daniel Klein (Slovakia)	Dietrich von Rosen (Sweden)
Augustyn Markiewicz (Poland)	Hans Joachim Werner (Germany)

Jeffrey J. Hunter has announced his intention to resign from the IOC. . He has several IOC Chairs on his belt and the bottomline is: how do we survive without Jeff!

The IWMS series has had four **ILAS Lecturers**:

- ◆ Gene H. Golub (1999), Tampere, Finland,
- ◆ Jerzy K. Baksalary (2003), Dortmund, Germany,

♦ Ravindra B. Bapat (2008), Tomar, Portugal,

♦ Karl Gustafson (2015), Haikou, China;

two **Nokia Lecturers**:

♦ Ingram Olkin (2004), Będlewo/Poznań, Poland,

♦ C. Radhakrishna Rao (2005), Auckland, New Zealand;

and one **SAS Lecturer**:

♦ Chris Gotwalt (2015), Haikou, China.

As the **IWMS Birthday Boys**, the following have been celebrated:

♦ T.W. Anderson (80, 90), Fort Lauderdale 1998, Tomar 2008,

♦ Jerzy K. Baksalary (60), Będlewo/Poznań 2004,

♦ Kai-Tai Fang (75), Haikou 2010,

♦ Lynn Roy LaMotte (70), Toronto 2013,

♦ Jeffrey J. Hunter (75), Funchal,

♦ Ingram Olkin (80, 90), Będlewo/Poznań 2004, Ljubljana 2014,

♦ Tarmo Pukkila (60), Uppsala 2006,

♦ Simo Puntanen (70), Haikou 2015,

♦ C. Radhakrishna Rao (80), Hyderabad 2000,

♦ Muni S. Srivastava (75), Tartu 2011,

♦ George P. H. Styan (65, 70, 75, 80), Lyngby, Windsor, Będlewo, Montréal.

Memorial Sessions have been held for

Bernhard Flury (1999), Tampere

Sujit Kumar Mitra (2004), Będlewo

Jerzy K. Baksalary (2005), Auckland

Shayle R. Searle (2013), Toronto

Haruo Yanai (2014), Ljubljana

Ingram Olkin (2016), Funchal

T.W. Anderson (2018), Montréal

3 Specific glimpses, over the years, ...

As mentioned earlier, Professor **C. Radhakrishna Rao** was the Keynote Speaker in Tampere in the first IWMS in 1990. He gave a talk on “Uncertainty, statistics and creation of new knowledge”, available in YouTube-1990. Before that, Professor Rao visited Tampere in 1983, 1985 (Honorary Doctorate; George received this in 2000), and twice in 1987. His conference talk in 1987 can be watched from YouTube-1987. Professor Rao has been an active attendant of the IWMS meetings: Tampere (1990), Montréal (1995), Istanbul (1997), Fort Lauderdale (1998), Hyderabad (2000), and Auckland (2005). Professor Rao’s contributions on building up the IWMS series have been instrumental.

In this context we may shortly tell an interesting saga related to **Jerzy K. Baksalary** (1944–2005). To begin with, it’s worth mentioning that Jerzy spent



Figure 1: Group of participants in IWMS-1990, Tampere; C. Radhakrishna Rao inviting more people to the picture. He's been already able to catch, among others, Tarmo & Helena Pukkila, Yadolah Dodge, Monika Pukelsheim, Evelyn M. Styan, Julie Bérubé, ...

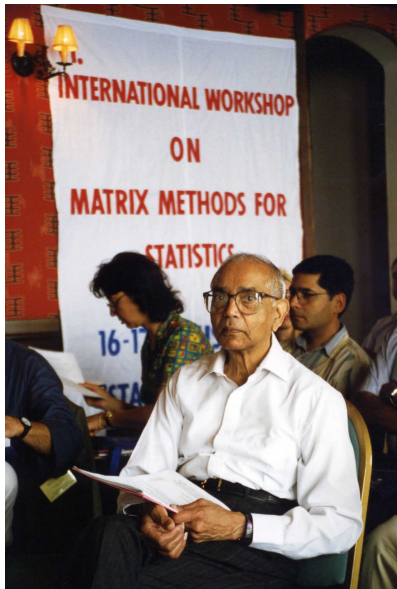


Figure 2: C. R. Rao, Istanbul, 16 August 1997.



Figure 3: Bedcover for the Istanbul Workshop (1997) with the Styan's cat Tiger photographed in Montréal (21 March 2009).

the period of September 1989 to September 1990 in Tampere as a Visiting Finnish Academy Professor. It was partly due to his visit that the idea of the first IWMS became real. Anyway, it so happened that after returning back to Poland, Jerzy soon started a full-time administrative career for many years as a Rector and Dean of the Tadeusz Kotarbiński Pedagogical University in Zielona Góra. But then, in the IWMS-Hyderabad in December 2000, Jerzy was back in real old good business (with his son Oskar Maria)—first put accidentally into George’s room in the Secunderabad Club! That was quite a reunion, after ten years.

Jerzy described his comeback in email:

“After nine years spent on administrating the university, first as the Rector and later as a Dean, I decided to come back to my first and permanent love: linear algebra and its statistical applications.”

The career of Jerzy is described by Oskar Maria Baksalary and George P. H. Styan in their article in the *LAA* (2005).

The 9th IWMS was held in Hyderabad in 9–13 December 2000, in celebration for C. R. Rao’s 80th birthday. The program started with a two-day course on recent advances in matrix theory with special reference to applications to statistics. The topics of Professor Rao’s talks were “Statistical proofs of some matrix inequalities” and “Antieigen and singular values of a matrix and their applications to statistics”.

Professor Rao was born on 10 September 1920, and his 100th birthday was celebrated worldwide. On 9 September 2020, the Department of Science and Technology, Government of India, organized a Symposium to Celebrate the 100th Birthday of Professor Rao. The talks are available in YouTube. Download the Poster, Program.

On 17–18 December 2020, ALAPS, International Conference on Applied Linear Algebra, Probability and Statistics, in honor of C.R. Rao’s 100th birthday, was held in Manipal; see the brochure, flyer, and the invitation. All Manipal talks are available in YouTube. In 2021, Springer has published two Festschrifts for Professor Rao, see Chaudhuri et al., eds and Arnold et al., eds.

In autumn 2016 we learnt that Professor **T.W. Anderson** of Stanford University passed away on 17 September 2016. The IWMS-1998 and IWMS-2008 celebrated his 80th and 90th birthdays in Fort Lauderdale (USA) and Tomar (Portugal), respectively. On his 98th birthday on 5 June 2016 we sent Ted congratulations just before the IWMS-2016 to be held in Madeira. He immediately replied and asked us to convey his greetings to the participants. He reminded us that he had spent a 9-months sabbatical leave in Madeira in the 1960s, working on his book *The Statistical Analysis of Time Series* (Wiley 1971).

On 10 October 2016, *The New York Times* published an obituary about T. W. Anderson, see the online version with the headline *Theodore Anderson, Mathematician Who Advanced Data Analysis, Dies at 98*. A version of this obituary appeared in print on 10 October 2016, on page B5 of the New England edition with the headline: *Theodore Anderson, 98; Paved Way for Modern Data Analysis*. The printed copy is downloadable from here: PDF, JPG.

One more detail: In 1995 after the 4th IWMS in Montréal, Simo Puntanen had a sore throat (possibly due to the air-conditioning in the Sheraton Centre where the IWMS was held). At a hospital in Tampere, Simo met Dr. Martin Rasmussen, who asked Simo what he did for a living. Simo told him, and Dr. Rasmussen replied that Harald Cramér (1893–1985) was his grandfather. He added that after telling this to statisticians they start kissing his toes. As a result Simo invited Martin

Rasmussen to the 8th IWMS in 1999 in Tampere, where he gave a very nice talk in the reception before the IWMS got going. Thus Rasmussen met T.W. Anderson who visited Cramér in Sweden from August of 1947 till April of 1948. This was Anderson's first visit outside the USA.

In addition to T.W. Anderson, the IWMS has had a pleasure to host two other Stanford Kings: **Gene H. Golub** (1932–2007) and **Ingram Olkin** (1924–2016). In the first IWMS in Tampere in 1990, Ingram gave an invited talk entitled *Interface between statistics and linear algebra*, which was one of his favorite topics. In Tampere, Ingram also gave a talk about Gustav Elfving (1908–1984), a famous Finnish statistician, probabilist and mathematician who was a frequent visitor to Stanford. For the IWMS-2013 in Toronto Ingram prepared “a linear algebra biography” (presented there by George); see also his article in the *LAA*, online at ScienceDirect.

In the IWMS-2013 in Toronto, Ingram was supposed to be the first speaker on Monday, 12 August. However, on Saturday, 10 August, we received the following email from him [Ingram usually used only lower-case letters in his e-mails]:

“...it is now 4 p.m. in california and it is evident that i am not in condition to travel. i don't have a life threatening problem, but i do have a problem ...
i apologize for all the trouble this will cause you. if you do decide to have someone read the talk and i can help, please do let me know.
please convey my regrets to all my friends ... i had looked forward to once again seeing everyone.
my best, ingram”

As said, George presented Ingram's talk in Toronto. When Ingram learnt that the IWMS-2014 was to be held in Ljubljana, he immediately, on 22 October 2013, sent this e-mail:

“... in any case next year is my 90th and what better than to visit ljubljana ... so i do hope to attend. as i see my strength at this point i should be in good shape by then. so please include me in the program.”

Some personal memories of Ingram and memorable experiences shared with him are described in “Ingram Olkin (1924–2016): An appreciation for a people person”, an article by Simo & George, appeared in August 2019, in the Springer's Madeira Proceedings.

Ingram, being a Real Cosmopolitan, had a number of Chinese connections, among them was **Kai-Tai Fang** who in IWMS-Haikou-2015-Souvenir tells about Ingram's organizational generosity. As a further interesting link between Ingram Olkin and Kai-Tai Fang we wish to mention Pao-Lu Hsu, a UK-educated Chinese mathematician. Hsu was employed at the University of North Carolina at Chapel Hill in 1946–1947, then returned to China. In 1948–1951 Ingram was working for his Ph.D. at Chapel Hill. His supervisors were S.N. Roy and Harold Hotelling. Ingram told Hotelling that he wanted to take multivariate analysis, and Hotelling simply said “Well, why don't you get Pao-Lu Hsu's notes from last year, and study them on your own”. Interestingly, Pao-Lu Hsu was a supervisor of Kai-Tai Fang in Beijing in the early 1960s.

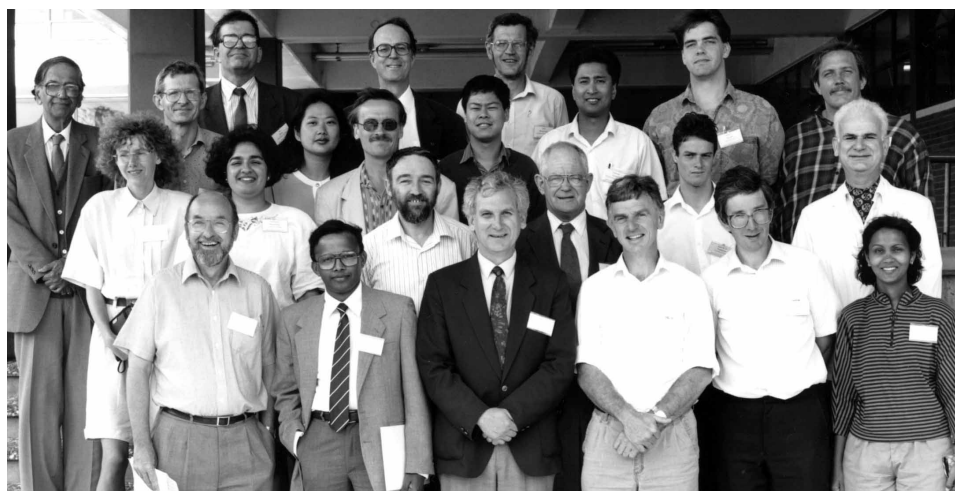


Figure 4: Group of participants in IWMS-1992, Auckland, New Zealand, 4–5 December 1992. Front two rows: Renate Meyer, Alastair Scott, Snehalata Euzurbazar, Thomas Mathew, Andrew Gilmour, Jeffrey Hunter, Shayle Searle, Graham Wood, John Thompson, Bill Farebrother, George Styan, Gita Mishra. Catch Ronald Christensen, George Seber, Alain Vandal, Simo Puntanen, . . . !

When talking about the Chapel Hill, we may add some words about **Sujit Kumar Mitra** (1932–2004) and **Jeffrey J. Hunter**. Namely Mitra, who attended the IWMS in Tampere 1990 and Montréal 1995, did his Ph.D. studies in North Carolina at Chapel Hill 1954–1956, supervisor being S.N. Roy. There is more about Mitra in *Conversation with Sujit Kumar Mitra in 1993*, available from here, reprinted in 2012 in the *Lectures on Matrix and Graph Methods*, Manipal Universal Press. Jeff was working for his Ph.D. in Chapel Hill in 1964–1968.

In the IWMS-2015 in Haikou, **Karl Gustafson** (University of Colorado, Boulder) was the ILAS Lecturer. After the IWMS, on 1 June 2015, Shanghai University of International Business and Economics, SUIBE, organized the Second Shanghai Forum of Trade and Financial Statistics, Program and Abstract Bookl. On Sunday, 31 May 2015, Karl with seven of us, took a flight from Haikou to Shanghai Pudong. For this flight and consequent matters, see the Foreword of *Reverberations of a Stroke: A Memoir*, by Karl Gustafson.

4 List of the 27 workshops

We now present a list of the 27 Workshops that have been held from 1990 to 2019, leading up to the 2021 Workshop to be held in Manipal, South India.

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. Program.
 Videos from the conferences in statistics in Tampere in 1987 and 1990, prepared by Jarmo Niemelä and Reijo Sund.

- 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.
Program. 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.
Report in *Image*.
 - A Warm-Up Mini-Workshop “Matrices in May: an Afternoon Full of Matrices” was organized by Simo Puntanen in Tampere, Finland, 20 May 1994. Program.
- 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*. Group photo.
- 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.
Program. Abstract Book. Group photo. 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, in celebration of *T. W. Anderson’s 80th birthday*, $n = 78$.
Local Chair: Fuzhen Zhang, IOC Chair: George P. H. Styan.
Program. Report in *Image*.
- 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.
Website. Program. Report in *Image*.
- 2000/9:** 9th International Workshop on Matrices and Statistics, Hyderabad, India, 9–13 December 2000, in celebration of *C. Radhakrishna Rao’s 80th birthday*, $n = 100$.
Local Chairs: S. B. Rao, P. Bhimasankaram, IOC Chair: Hans Joachim Werner.
Program. Report in *Image*.
- 2001/10:** 10th International Workshop on Matrices and Statistics, Voorburg, The Netherlands, 2–3 August 2001, $n = 54$.
Local Chair: Patrick J. F. Groenen, IOC Chair: George P. H. Styan.
Report in *Image*.
- 2002/11:** 11th International Workshop on Matrices and Statistics, Lyngby, Denmark, 29–31 August 2002, in celebration of *George P. H. Styan’s 65th birthday*, $n = 65$.
Local Chair: Knut Conradsen, IOC Chair: Hans Joachim Werner.
Report in *Image*.
- 2003/12:** 12th International Workshop on Matrices and Statistics, Dortmund, Germany, 5–8 August 2003, $n = 45$.
 - The ILAS Lecturer: *Jerzy K. Baksalary*.
Local Chair: Götz Trenkler, IOC Chair: Hans Joachim Werner.
Report in *Image*.
- 2004/13:** 13th International Workshop on Matrices and Statistics, Będlewo, Poznań, Poland, 18–21 August 2004, in celebration of *Ingram Olkin’s 80th birthday*, $n = 82$.



Figure 5: IWMS-4, Montréal, 15–16 July 1995.



Figure 6: George P.H. Styan, T. W. Anderson, Fuzhen Zhang; Fort Lauderdale, Florida, 12 December 1998. Celebrating T. W. Anderson's 80th birthday.

■ The Nokia Lecturer: *Ingram Olkin*.

Memorial Session: *Sujit Kumar Mitra* (1932–2004).

Special Session for Jerzy K. Baksalary's 60th Birthday.

Local Chair: Augustyn Markiewicz, IOC Chair: Simo Puntanen.

Website (not working). Program. Abstract Book. Report in *Image*. Poster.

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.

Website. Announcement. Program. Report in *Image*. Flyer. Poster.

- As an after-workshop some participants attended the *University of Canberra Workshop on Statistics and Applications*, Canberra, Australia, 4–5 April 2005. Organizers: Shuangzhe Liu, Dharmendra Sharma & Peter Brown. Front matter of the Proceedings.

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.

Website, not working. Program. Abstracts. Report in *Image*.

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.

Website. Program. Poster.



Figure 7: IWMS-13, Będlewo, Poznań, Poland, 18-21 August 2004.



Figure 8: IWMS-15, Uppsala, Sweden, 13–17 June 2006.

- A Warm-Up Mini-Workshop “McGill Matrix Wednesday”, was organized by George P. H. Styan at McGill University, Montréal, Canada, 30 May 2007. Program.
- 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.
 Website. Program. Report in *Image*. Poster. A special stamp.
- 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.
 Website. Program. Poster. Flyer.
- 2010/19:** 19th International Workshop on Matrices and Statistics, Shanghai University of Finance and Economics, China, 5–8 June 2010, $n = 186$.
 Local Chair: Yonghui Liu, IOC Chair: Jeffrey J. Hunter.
 Website. Program. Preface of the Abstract Book. 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, $n = 100$.
 Special Session for *Muni S. Srivastava’s* 75th birthday.
 Local Chair: Kalev Pärna, Program Committee Chair: Dietrich von Rosen,
 Vice-Chair: Tõnu Kollo.
 Website. Poster. Abstracts. *It had to be U*—the SVD song by Michael Greenacre.
- 2012/21:** 21st International Workshop on Matrices and Statistics, with the LinStat-2012, Będlewo, Poznań, Poland, 16–20 July 2012, $n \approx 100$
 Special Session for *George P. H. Styan’s* 75th birthday: website.
 Local Chair: Katarzyna Filipiak, LinStat Chair: Augustyn Markiewicz
 IWMS Chair: Simo Puntanen.
 Website. Abstract Book. Poster. Program. Report in *Image*.
 - Jeffrey J. Hunter’s article on George P. H. Styan.
 - Carlos A. Coelho’s article on George P. H. Styan.
- 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, $n \approx 70$.
 IWMS Chair and Local Chair: S. Ejaz Ahmed.
 Memorial Session: *Shayle R. Searle* (1928–2013)
 Special Session for *Lynn Roy LaMotte’s* 70th birthday.
 Website. Program. Report in *Image*. Poster.
 - “Shayle R. Searle: Pioneer in Linear Modelling.” Article by Jeffrey J. Hunter (2015), in *Australian & New Zealand Journal of Statistics*.
- 2014/23:** 23rd International Workshop on Matrices and Statistics, Department of Mathematics, University of Ljubljana, Ljubljana, Slovenia, 9–12 June 2014, $n \approx 60$.
 IWMS Chair: Hans Joachim Werner, Local Chair: Matjaž Omladič.
 Special Session for *Ingram Olkin’s* 90th birthday.
 Memorial Session: *Haruo Yanai* (1940–2013).
 Website. Program. Abstracts. Report.
 A Linear Algebra Workshop (LAW) organized by Matjaž Omladič preceded the IWMS in Ljubljana from June 4 to June 12.
- 2015/24:** 24th International Workshop on Matrices and Statistics, Haikou City, Hainan Province, China, 25–28 May 2015, $n \approx 133$.

■ The ILAS Lecturer: *Karl Gustafson*

■ The SAS Lecturer: *Chris Gotwalt*

Special Sessions for *Kai-Tai Fang's* 75th birthday and for *Simo Puntanen's* 70th birthday.

IWMS Chair: Jeffrey J. Hunter, Local Chair: Chuanzhong Chen.

Website. IWMS-2015-Hainan-Announcement. Souvenir-Booklet. Program and Abstract Book. Group photo. Report in *Image*.

- The Souvenir-Booklet includes *A Conversation with Kai-Tai Fang*.
- After the IWMS, on 1 June 2015, Shanghai University of International Business and Economics organized the *Second Shanghai Forum of Trade and Financial Statistics*, Abstract Book. See also the last paragraph of Section 3 regarding Karl Gustafson on page 8.

2016/25: 25th International Workshop on Matrices and Statistics, Funchal, Madeira Island, Portugal, 6–9 June 2016, $n \approx 45$.

Special Session for *Jeffrey J. Hunter's* 75th birthday.

Memorial Session: *Ingram Olkin* (1924–2016).

IWMS Chair: Simo Puntanen, Local Chair: Francisco Carvalho.

Website. Book of Abstracts. Program. Report in *Image*. Preface of Springer Proceedings. Springer's website for the Madeira Proceedings.

- The Abstract Book includes *Many happy returns, Jeffrey Joseph Hunter! Personal Glimpses for your 75th Birthday*, by Simo Puntanen.

2017: **Notice:** There was no IWMS in 2017. However, on 9–10 September 2017, the Second International Minisymposium on Magic Squares, Prime Numbers and Postage Stamps, and on some related topics, in celebration of Professor George P. H. Styan's 80th birthday, took place in Multimedia Centre at Dawson College, Westmount (Montréal), Québec, Canada. —Organized by S. Ejaz Ahmed, Ka Lok Chu, Abbas Khalili & Simo Puntanen. Program.

2018/26: 26th International Workshop on Matrices and Statistics, Montréal, Dawson College, 5–7 June 2018.

IWMS Co-chairs: S. Ejaz Ahmed and Hans Joachim Werner

Local Chair: Ka Lok Chu

Memorial Session: Celebrating the 100th birth anniversary of Theodore Wilbur Anderson, Jr., born on 5 June 1918, passing away on 17 September 2016.

Program. Group photo. IWMS-2018 website. Report in *Image*.

2019/27: 27th International Workshop on Matrices and Statistics, Shanghai University of International Business and Economics, 6–9 June 2019, $n = 70$.

IWMS Chair: Jeffrey J. Hunter, Local Chair: Yonghui Liu

IWMS-2019 website. Poster. Book of Abstracts & Program. Group photo. Report in *Image*.

- As an after-workshop to the IWMS-2020, on 12 June 2019, some participants attended the *Workshop on Advanced Multivariate Analysis*, Centre for Statistical Sciences and College of Mathematics, Sichuan University, Chengdu, China. Organizers: Jianxin Pan & Jie Zhou. Program. Group photo.

2021/28: 28th International Workshop on Matrices and Statistics, Manipal Academy of Higher Education, MAHE, formerly known as the Manipal University, Karnataka State, South India, 13–15 December 2021. In hybrid form.

IWMS Chair: Simo Puntanen, Local Chair: K.M. Prasad

Website of IWMS-2021. Brochure.

- Note 1.* ALAPS: International Conference on Applied Linear Algebra, Probability and Statistics, was held in MAHE, on 17–18 December 2020. This is a virtual conference in honor of Professor C.R. Rao on his birth centenary year. See the brochure, flyer, and the invitation. All Manipal talks are available in YouTube.
- Note 2.* ICLAA-2021: International Conference on Linear Algebra and its Applications, will be held in MAHE on 15–17 December 2021. Brochure as May 2020.

5 Some “sister-workshops”

Here are the latest editions of some sister-workshops of the IWMS series.

- LinStat: High Tatras, Slovakia, 28 June – 2 July 2021. Abstract Book 2018.
- ICLAA: Manipal, India, 15–17 December 2021. ICLAA-2017-Souvenir.
- ALAPS International Conference on Applied Linear Algebra, Probability and Statistics, Manipal, India, 17–18 December 2020.
- MatTriad: Liblice, Czech Republic, 8–13 September 2019. Abstract Book.
- MMLM: Będlewo, Poznań, 28 April - 5 May 2019.
- Tartu Multivariate: Tartu, Estonia, 28 June – 1 July 2016. 15–18 June 2021.
- ProbaStat: Smolenice Castle, Slovakia, 29 June – 3 July 2015. ProbaStat-2015.

6 Special issues of journals devoted to the IWMS

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

- 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: *Acta et Commentationes Universitatis Tartuensis de Mathematica*, vol. 15, nr. 1, 2011. Proceedings of the 19th International Workshop on Matrices and Statistics. Shanghai University of Finance and Economics, China, 5–8 June 2010. Shanghai IWMS.
Tõnu Kollo & Dietrich von Rosen, eds.
- 2012: Special volume of *Acta et Commentationes Universitatis Tartuensis de Mathematica*, vol. 16, 2012. Proceedings of The 9th Tartu Conference on Multivariate Statistics & IWMS-2011. Simo Puntanen, ed.
- 2013: *Multivariate Statistics: Theory and Applications*, World Scientific, devoted to The 9th Tartu Conference on Multivariate Statistics & IWMS-2011. ISBN: 978-981-4449-39-7 (hardcover). Tõnu Kollo, ed.
- 2013: IWMS-2012 and LinStat-2012: A special issue of *Discussiones Mathematicae - Probability and Statistics*, vol. 33, 2013, Devoted to IWMS-2012 and LinStat-2012. Preface. Coordinating Editor: Roman Zmyślony, Guest Editors: Carlos A. Coelho & Simo Puntanen.
- 2014: IWMS-2012 and LinStat-2012: *Communications in Statistics - Theory and Methods*, Volume 43, Issue 5, 2014. Special Issue: Advances on Linear Models and Inference. Devoted to IWMS-2012 and LinStat-2012. Preface. Guest Editors: Júlia Volaufová & Augustyn Markiewicz.

- 2014: IWMS-2012 and LinStat-2012: *Communications in Statistics - Simulation and Computation*, Volume 43, Issue 9, 2014. Special Issue: Advances on Linear Models and Inference – Computational Aspects. Devoted to IWMS-2012 and LinStat-2012. Preface. Guest Editors: Katarzyna Filipiak & Simo Puntanen.
- 2015: IWMS-2013: A special issue of *Journal of Statistical Computation and Simulation*. Editor: S. Ejaz Ahmed. Volume 85, Issue 13, 2015. Preface.
- 2015: IWMS-2015: *Souvenir Booklet of the 24th International Workshop on Matrices and Statistics* (25–28 May 2015), Haikou City, Hainan Island, China. Editor: Jeffrey J. Hunter. Souvenir-Booklet.
- 2016: IWMS-2015: Special Issue of *Special Matrices*. Proceedings of the 24th International Workshop on Matrices and Statistics. Table of contents. Preface. Editors: Jeffrey J. Hunter, Simo Puntanen & Dietrich von Rosen.
- 2019: IWMS-2016: *Matrices, Statistics and Big Data*. Editors: S. Ejaz Ahmed, Francisco Carvalho and Simo Puntanen. Springer, August 2019. Book's DOI. Book's website. Cover. Product Flyer. Conference website.

7 Acknowledgements

The photographs 1, 7, 8, 10 and 13 are taken by the the University of Tampere photographer; the photograph 2 by the University of Auckland photographer; the photographs 18–19 by the Shanghai University of Finance and Economics photographer; the photograph 5 by Hazel Hunter; the photograph 21 by the University of Ljubljana photographer; the rest of the photographs are taken by Simo Puntanen.

8 More photographs ...

...on the next pages!

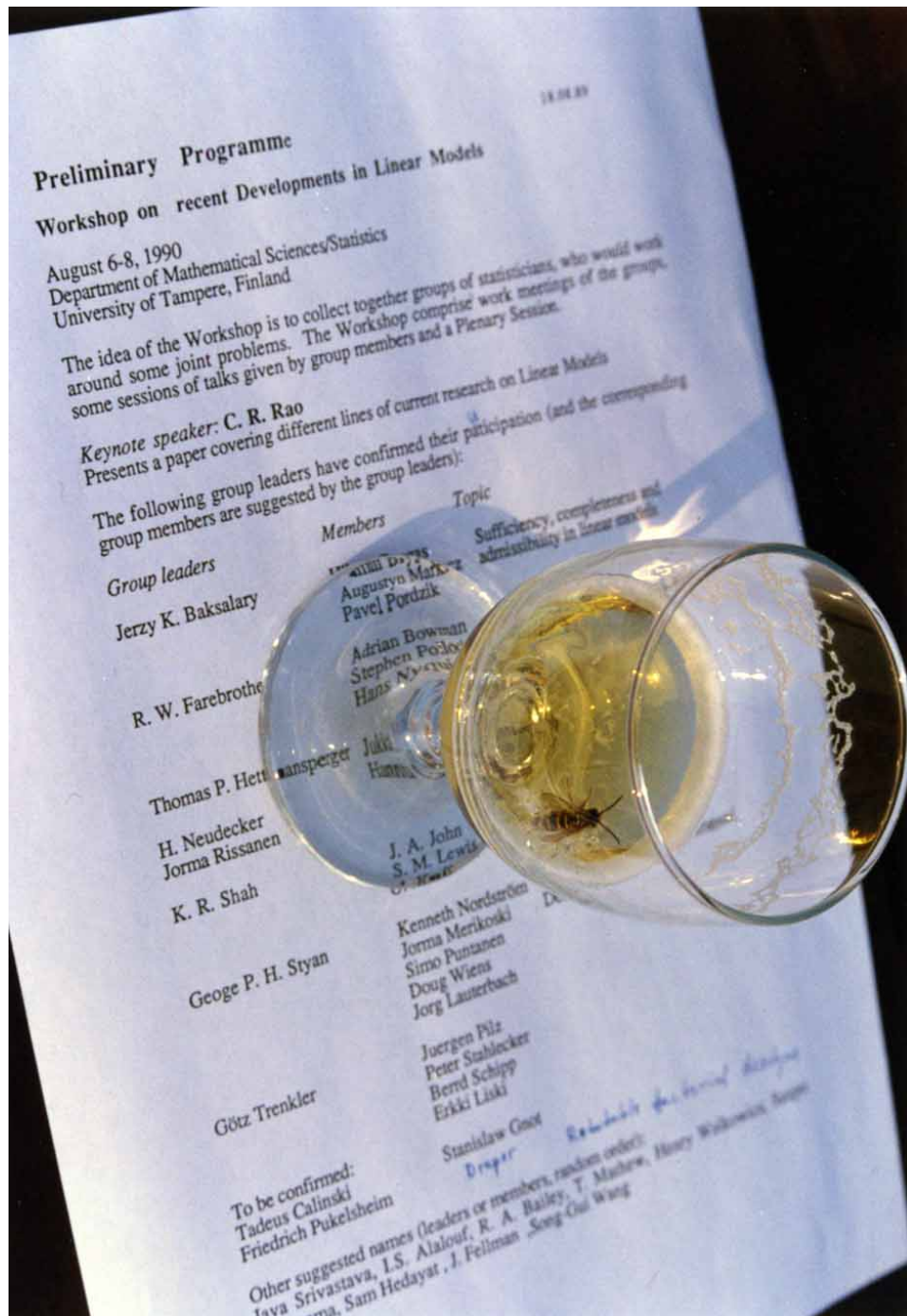


Figure 9: Preliminary program of the first IWMS, Tampere, August 1990. This draft was prepared in August 1989, and discussed in the *International Conference on Recent Developments in Statistical Data Analysis and Inference in Honor of C. R. Rao*, Neuchâtel, Switzerland, 21–24 August 1989. The poor bee in glass was seen flying later, suffering from minor hangover.



Figure 10: Excursion in Neuchâtel Conference in August 1989: George P.H. Styan, Jerzy K. Baksalary & Friedrich Pukelsheim, discussing the plans for the first IWMS, Tampere, August 1990.



Figure 11: Jerzy K. Baksalary giving a talk in Tampere, August 1990. Front row: Shanti S. Gupta, J.N. Srivastava, Song-Gui Wang, Götz Trenkler, Stanisław Gnot. 2nd & 3rd row: Jürgen Kleffe, Roman Zmysłony, Augustyn Markiewicz, Jan Hauke, Tõnu Kollo.



Figure 12: R. Dennis Cook, Norman Draper, Nye John, George P. H. Styan; Tampere, August 1990.



Figure 13: Ravindra B. Bapat, New Delhi, 4 January 2013. ILAS Lecturer in Tomar, July 2008.

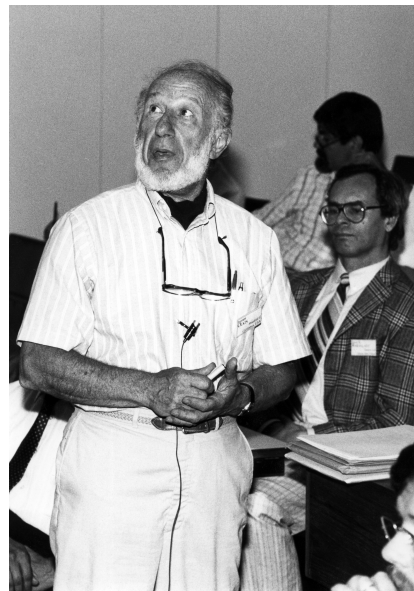


Figure 14: Ingram Olkin, Tampere, August 1990, with Jerzy K. Baksalary and Yadolah Dodge.



Figure 15: C. Radhakrishna Rao, Istanbul, August 1997.



Figure 16: C. Radhakrishna Rao and Bhargavi Rao, Hyderabad, December 2000.



Figure 17: Jerzy K. Baksalary, Tadeusz Caliński, Sujit Kumar Mitra; Tampere, August 1990.

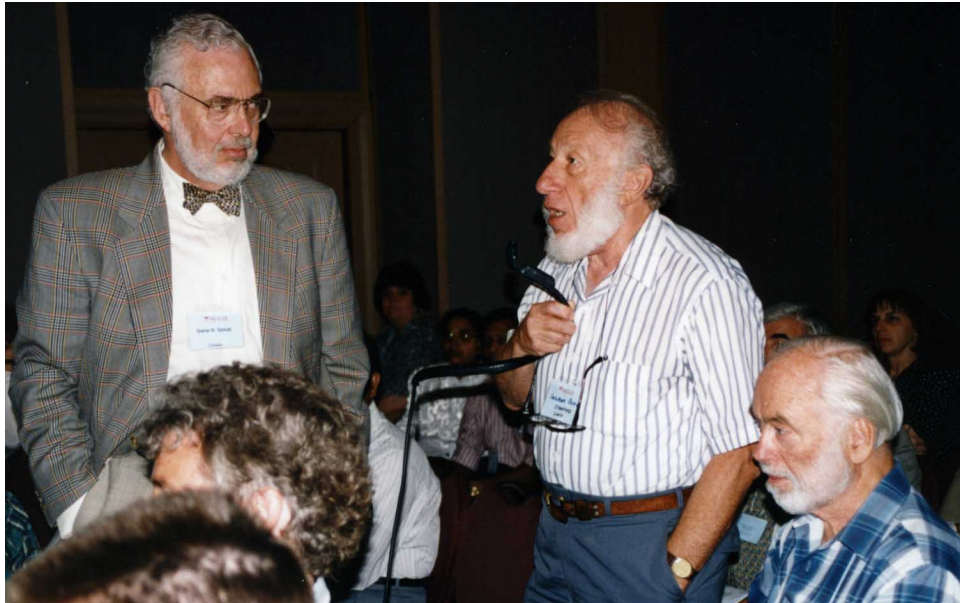


Figure 18: Gene H. Golub, Ingram Olkin, T. W. Anderson; Montréal, July 1995.



Figure 19: Gene H. Golub, X.X., Bikas K. Sinha, Ingram Olkin, Augustyn Markiewicz, Ludvig Elsner, Yongge Tian; Będlewo, Poznań, August 2004.



Figure 20: Enjoying the IWMS banquet (and the view to Detroit) in Windsor, Canada, 2 June 2007: Ka-Lok Chu, Jarkko Isotalo, Kimmo Vehkalahti, Frank J. Hall, Yongge Tian, X.X., K.P.S. Bhaskara Rao, Yonghui Liu.



Figure 21: Karl Gustafson: ILAS-Lecturer in Haikou, 26 May 2015.



Figure 22: Jeffrey J. Hunter: 75-Session in Madeira, 8 June 2016.



Figure 23: Kai-Tai Fang & Simo Puntanen, surrounded by Tingmei & Soile: Haikou, 25 May 2015. Session chair Jianxin Pan on the right, with a microphone.



Figure 24: Opening the IWMS-Haikou, 25 May 2015.



Figure 25: Group of participants in IWMS-2010, Shanghai.



Figure 26: More participants in IWMS-2010, Shanghai.



Figure 27: Group of participants in IWMS-2013, Toronto.



Figure 28: Group of participants in IWMS-2014, Ljubljana.



Figure 29: Group of participants in IWMS-2015, Haikou, Hainan Island, China.



Figure 30: Participants in IWMS-2005, Auckland, 29 March–1 April 2005.



Figure 31: Participants in IWMS-2019, Shanghai, 6–9 June 2019. (Ph. Hazel Hunter.)



Figure 32: Fuzhen Zhang, giving his talk in Shanghai, 8 June 2019, showing a photo that he took during the IWMS Opening Session on 6 June 2019. Around the table, sitting Julia Volaufova, Yonglin Xu (Vice President of SUIBE), Jeffrey J. Hunter, and Yonghui Liu. Simo Puntanen, standing, showing a picture of GPHS, TWA and Fuzhen Zhang (Figure 6, page 11), taken on 12 December 1998 in Fort Lauderdale.



Figure 33: Fuzhen Zhang, Shuangzhe Liu and George Styan's poster. Shanghai, 7 June 2019.

12

13

International Workshop on Linear Models, Experimental Designs & Related Matrix Theory
6–8 August 1990, University of Tampere, Tampere, Finland

Monday, 6 August	Tuesday, 7 August	Wednesday, 8 August
10:00–10:45 <i>Opening Session:</i> Tarmo PUKKILA Chair: E.P. Liski C. Radhakrishna RAO Chair: G.P.H. Styan <i>Invited Talk:</i> 10:45–11:30 Ingram OLKIN Chair: J.K. Baksalary 11:30–12:45 <i>Lunch</i> <i>Invited Talks:</i> 12:45–13:30 Sujit Kumar MITRA 13:30–14:15 R. Dennis COOK Chair: F. Pukelsheim 14:15–14:45 <i>Coffee</i> <i>Group Meetings:</i> 14:45–15:45 Gustav Elfving: 1908–1984 16:15–17:45 Mustonen Calinski Farebrother-1 17:45–19:15 Rissanen Kageyama Farebrother-2 20:00–... <i>Reception</i>	<i>Group Meetings:</i> 8:00–9:30 Trenkler-1 Wang Hettmansperger 9:30–11:30 Cook Baksalary 11:30–12:45 <i>Lunch</i> <i>Group Meetings:</i> 12:45–14:15 Mitra Farebrother-3 14:15–15:45 Srivastava Yanai Farebrother-4 15:45–16:15 <i>Coffee</i> <i>Group Meetings:</i> 16:15–17:45 Fujikoshi Pukelsheim Trenkler-2 17:45–19:15 Styan Kleffe Neudecker 20:30–... <i>Sauna Party</i>	<i>Group Meetings:</i> 8:00–9:30 Shah Farebrother-5 9:30–11:00 Editorial Policy in Statistical Journals 11:00–11:30 <i>Coffee</i> 11:30–12:15 <i>Keynote Address:</i> C. Radhakrishna RAO Chair: T. Calinski 12:15–13:30 <i>Lunch</i> <i>Invited Talks:</i> 13:30–14:00 Jagdish N. SRIVASTAVA 14:00–14:30 Shanti S. GUPTA 14:30–15:00 Yadolah DODGE Chair: T.P. Hettmansperger 15:00–15:30 <i>Coffee</i> 15:30–16:00 Heinz NEUDECKER 16:00–16:30 Friedrich PUKELSHEIM Chair: N.R. Draper 16:30–17:00 <i>Coffee</i> 17:00–17:30 George P. H. STYAN 17:30–18:00 Jerzy K. BAKSALARY Chair: T. Pukkila

The first-mentioned groups meet in Room A I, the second in C IX (except on Monday in the Main Auditorium), and the third in A III.

Figure 34: Schedule of the first IWMS; Tampere, 6–8 August 1990.

The Eighth International Workshop on Matrices and Statistics

Friday, 6 August – Saturday, 7 August 1999

Statistics Unit, Dept. of Mathematics, Statistics & Philosophy, University of Tampere, Finland

Friday, 6 August	Saturday, 7 August
09:00–09:20 <i>Opening Remarks:</i> Chair: S. Puntanen Kari-Jouko RÄIHÄ, Vice Rector: U of Tampere Tapio NUMMI, Head of the Department <i>In Memoriam:</i> Bernhard FLURY (1951–1999)	09:00–09:30 T. ANDO Chair: G. H. Golub 09:30–10:00 Ronald CHRISTENSEN 10:00–10:30 Bimal K. SINHA
09:20–10:00 <i>Keynote Address:</i> T. W. ANDERSON Chair: G. P. H. Styan	10:30–10:50 <i>Coffee</i>
10:00–10:20 <i>Coffee</i>	10:50–12:20 <i>Student Session S2</i> Chair: G. P. H. Styan
10:20–11:00 <i>ILAS Lecture:</i> Gene H. GOLUB 11:00–11:30 Alastair J. SCOTT Chair: H. J. Werner 11:30–12:00 Friedrich PUKELSHEIM	12:20–14:00 <i>Lunch in Restaurant Fuuga Tampere-talo, Yliopistonkatu</i>
12:00–12:15 <i>Group Photo</i>	14:00–15:30 <i>Three Parallel Contributed Paper Sessions:</i> Chairs: T. Ando (C1), T. Nummi (C2), J. Fellman (C3)
12:15–13:30 <i>Lunch in the Restaurant of the University's Main Building</i>	15:30–15:50 <i>Coffee</i>
13:30–14:10 Seppo MUSTONEN Chair: S. Puntanen 14:10–14:40 Shayle R. SEARLE	15:50–17:20 <i>Two Parallel Contributed Paper Sessions:</i> Chairs: J. A. (Nye) John (C4), A. J. Lee (C5)
14:40–15:00 <i>Coffee</i>	17:20–17:40 <i>Coffee</i>
15:00–16:45 <i>Student Session S1</i> Chair: F. Pukelsheim	17:40–18:20 George P. H. STYAN Chair: A. J. Scott
18:00–24:00 <i>Sauna Party on Viikinsaari Island</i>	www.whatisthematrix.com

Figure 35: Schedule of the eighth IWMS; Tampere, 6–7 August 1999.

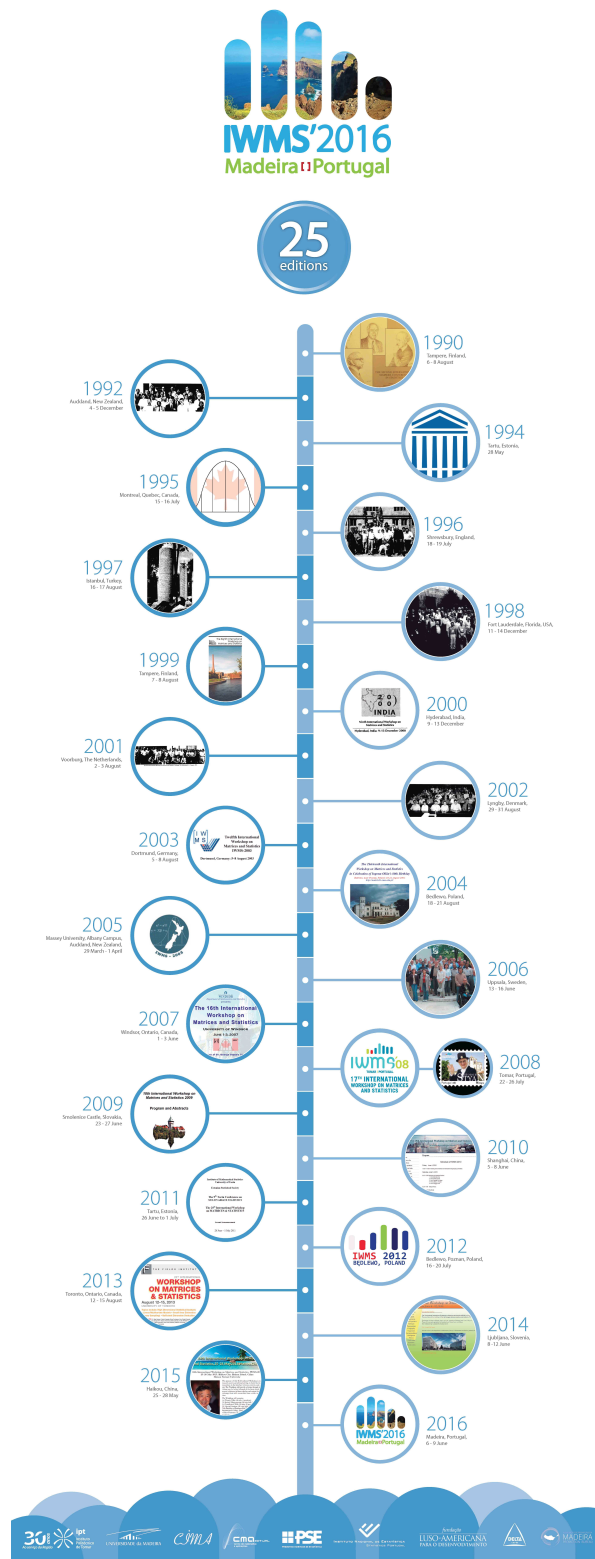


Figure 36: Totem pole of the IWMS meetings (by Francisco Carvalho).