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Cesarino BERTINI[1]
Jerzy DUDA[2]
Bartłomiej GAWEŁ[2]
Andrzej PALIŃSKI[2]
Iwona SKALNA [2]
Izabella STACH[2]

TEN YEARS OF THE SING MEETINGS

This paper provides some statistics on the SING meetings held from 2005 to 2014. Particular attention is paid to the tenth such meeting.

Keywords: *game theory, SING conference, SING history, SING meeting*

1. Introduction

The focus of this paper is on the tenth SING Meeting, with some statistics on the previous SING conferences held from 2005 to 2014. It follows on from an earlier historical paper [2] covering the period from its birth up to 2011 (see also [6]), together with some papers in Polish concerning particular meetings: on SING 5 [5], SING 7 [4], and SING 8 [7], the latter also containing a statistical comparison with SING 2.

In the next section we shall give a short introductory history of the SING conferences. This will be followed, in Section 3, by a presentation of the main innovations that were introduced into organizational procedures during the last assembly. Section 4 will present an in-depth discussion of numerical data on SING 10 and Section 5 will make a statistical comparison with previous editions. A few concluding thoughts are

[1]University of Bergamo, Department of Management, Economics and Quantitative Methods, via dei Caniana 2, 24127 Bergamo, Italy, e-mail: cesarino.bertini@unibg.it

[2]AGH University of Science and Technology, Faculty of Management, Gramatyka 10, 30-067 Kraków, Poland, e-mail addresses: jduda@zarz.agh.edu.pl, bgawel@zarz.agh.edu.pl, palinski@zarz.agh.edu.pl, skalna@agh.edu.pl, istach@zarz.agh.edu.pl

given in Section 6. Two appendices present a full history, together with the current organizational procedures of SING.

2. A short history

As SING 10 was the first SING jubilee meeting, this is a good time for making summaries and drawing some conclusions. However, the roots of SING lie more than thirty years in the past. On October 12, 1983, in Bergamo, Gianfranco Gambarelli and Michele Grillo organized the first Italian conference on game theory. Others followed, more or less annually, in various Italian cities. In 1994, Federico Valenciano organized the first Spanish conference in Bilbao, to be followed annually by others until, in 2000, a decision was made to alternate the event between Italy and Spain, starting from the following year. Later, the Netherlands also asked to take part; and so SING (Spain-Italy-Netherlands Meeting on Game Theory) was born, its first meeting being organized in Maastricht by Hans Peters in 2005. The success of SING prompted other countries to participate: Poland (Jacek Mercik in Wrocław and Izabella Stach in Kraków), France (Michael Grabish in Paris), Hungary (László Kóczy in Budapest) and next year (2015) Russia (Leon Petrosjan in St. Petersburg). For the coming years, Denmark has already been earmarked for 2016 (Peter Sudhölter in Odense) and France for 2017 (Stefano Moretti in Paris). In homage to the past, the SING logo has remained unchanged, with the simple addition of European Meeting on Game Theory.

There is no intention of being in competition with the four-yearly meetings of the GTS (Game Theory Society), launched in Bilbao in 2000 by Federico Valenciano but rather to develop more slim-line annual meetings.

Inspired by SING, Yukihiko Funaki is going to organize the first EAGT conference (East Asian Game Theory Conference) next year, 2015, in Tokyo.

3. Main organizational innovations introduced by SING 10

In previous editions, participation in the assembly was only open to those who originated from the SING countries (Spain, Italy and the Netherlands), while from 2014 such participation has been widened to include all European participants. The name has thus been changed to SING – European Meeting on Game Theory. Prior to this, each SING country had two representatives who made up the SING Representatives' Council, functioning as a reference point for decisions made by the organizational committee regarding the following conference. The new procedure means that these representatives remain, together with the addition of two Polish representatives, such representation having been assigned to all "multi-organizing countries": that is, to those countries who have organized at least two SING meetings. Poland therefore

falls within such a definition, as meetings have been organized in Wrocław and Kraków. The duration of the appointment of such representatives has been extended to three years, with at most one reelection. Other innovations include a more detailed description of the duties of the presidents of the organizational committees for the current conference and the one to follow, in such a way as to supply guidelines ensuring that important steps in the organizational process are always taken.

4. SING 10 in numbers

The tenth conference in the SING series took place on 7th–9th July 2014. The conference was organized at the Faculty of Management of the AGH University of Science and Technology in Kraków. The interest in the SING 10 conference was substantial. According to the report provided by Google Analytics, starting from July 2013 until the end of July 2014, 3125 unique users visited the conference website [6] 8556 times. These visitors came from all over the world. The concentration of the visitors to the SING 10 website is shown in Fig. 1.

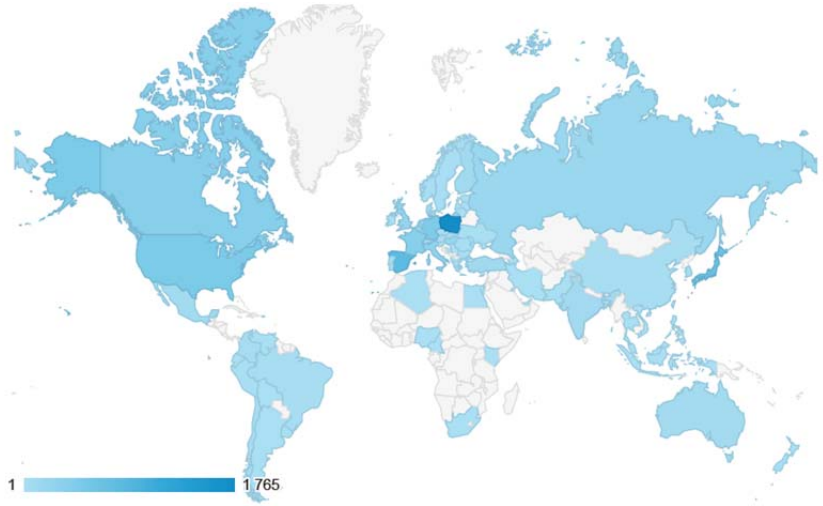

Fig. 1. Location of the audience of the SING 10 website

The darker the color of the map, the higher the concentration of visitors coming from that particular area is. As expected, the leading country is Poland with 2327 visits, which constitutes 27.2% of the total number of visits. Second place went to Spain (938 visits, which gives 10.96%), and then subsequently Japan (753, 8.8%), the United States (554, 6.47%), Germany (496, 5.8%), Canada (395, 4.62%), France (392, 4.58%), Italy (351, 4.10%), Hungary (245, 2.86%) and the Netherlands (243, 2.84%). The above order does not exactly correspond to the number of participants from the

respective countries (Table 6), but Pearson's correlation coefficient is high (0.856). It may be concluded that there is a statistically significant relationship between the number of visits and the number of participants from particular countries. Whereas, the relationship between the number of visits from a given country and the number of reports submitted for the conference is not statistically significant, the correlation coefficient is only 0.4224.

The scientific program of SING 10 included 135 presentations organized in parallel sessions and four plenary lectures (Tables 1 and 4). The videos of all the plenary sessions are available on the SING 10 website [6]. The invited lectures were given by four researchers: Gianfranco Gambarelli, Gerard van der Laan, Andrzej S. Nowak and Ariel Rubinstein. Their research profiles are briefly outlined below.

Gianfranco Gambarelli is a Professor of Mathematics and Game Theory at the University of Bergamo, Department of Management, Economics and Quantitative Methods. His current research concerns theory of cooperative games and applications related to politics, finance, medicine and sport sciences. Prof. Gambarelli in his lecture *Some open problems in cooperative games* presented some theoretical and applied problems from cooperative game theory. The applied problems mainly referred to electoral systems and forecasts of the distribution of power, takeovers and portfolio selection, repayment of developing countries' foreign debt, sports regulations and medicine. The theoretical problems concerned the comparison of power indices, indirect control, values of games as barycenters and a link between two general forms of games.

Gerard van der Laan is a Professor of Mathematical Economics at the Department of Econometrics, VU University Amsterdam. His research covers general equilibrium and disequilibrium, fixed point algorithms, non-cooperative game theory, in particular evolutionary games, and cooperative game theory, in particular games on networks and their applications. Prof. Van der Laan presented a lecture entitled *Cooperative decision making in water allocation problems*. He discussed the problem of sharing the benefits arising from the optimal use of water from an international river among the countries located along the river.

Andrzej S. Nowak is a Professor of Mathematical Sciences at the Faculty of Mathematics, Computer Sciences and Econometrics, University of Zielona Góra, Poland. His research interests include stochastic games, Nash and correlated equilibria in dynamic games with a continuum of states, intergenerational games, and applications of stochastic games to theory of economic growth, Markov decision processes and values of cooperative games. His lecture was entitled *Markov perfect equilibria in stochastic altruistic growth economies*.

Ariel Rubinstein is a Professor of Economics at Tel Aviv University and New York University. His research interests include: economic theory, models of bounded rationality, game theory, choice theory, economics and language and experimental economics. Prof. Rubinstein gave a plenary lecture entitled *Response time and decision making. A free experimental study*.

In addition to the plenary lectures, there were many interesting presentations organized in thematically diverse parallel sessions (Table 1). The call for papers attracted 182 submissions from 37 countries all around the world (Table 2). The submitted papers covered a variety of topics on game theory and its applications. The conference in Kraków was attended by scientists from 5 continents, and the final number of participants was 189 (Tables 3 and 5). From among the accepted abstracts (Table 2), eventually 135 presentations were made in 41 parallel sessions, each session included 3–4 talks. As mentioned above, the sessions were thematically diverse (Table 1). As indicated by Ramsza [5] in his report on SING 5, starting from the first edition of the SING meetings, the conference topics have been dominated by theory and applications of cooperative games. However, he has also noticed that an increasing number of reports are devoted to non-cooperative games. There is no denying that the number of reports on cooperative games is very impressive but it is increasingly difficult to make a clear division between sessions that are solely devoted to cooperative games and those devoted to non-cooperative games. Moreover, it can be noticed that there is an increasing number of reports on networks. For example, five of thematic sessions at SING 10 included the word *networks* in their titles (Table 1), and reports related to networks were also presented in some of the remaining sessions (see [1]).

Table 1. Thematic sessions at SING 10

Session	Papers	Session	Papers
Allocation	4	Extensive and strategic games	4
Allocation and networks	3	Games with externalities	4
Assignment games	6	Learning and experimentation	2
Auctions	4	Market models	4
Bankruptcy game	4	Mechanism design	3
Bargaining	6	Monopoly and oligopoly games	4
Cooperative games	3	Duopoly and hotelling	3
Cooperative games: solutions	4	Models of interaction in game theory	7
Cooperative games: values	6	Nash equilibrium	4
Cooperative games: Shapley value	3	Public good	3
Cooperative games and networks	3	Signaling and cheap talk	4
Decision making and simulations	3	Social networks	2
Dynamic networks and cooperative games	7	Solutions for games with coalitional structure	4
Equilibria	5	TU games	6
Evolutionary games and prisoner's dilemma	4	Voting	7
Experiments/experimental game theory	3	Voting and power indices	6

During SING 10 and also SING 5, SING 8 and SING 9, the EasyChair conference management system was used to manage the conference submissions and reviews. The

system provides statistics about the papers submitted. Those related to the papers accepted for SING 8 and SING 10 are presented in Table 2. The table contains the number of authors, the number of accepted papers and the number of authors per paper, for each country. The number of accepted papers per country is measured by the overall "share" (fraction) of this country in the number of all accepted papers. The index which indicates the number of authors from a given country per paper was computed by dividing the number of authors by the number of accepted papers. The reciprocal of this index indicates what proportion, from a statistical point of view, of a paper was written by a single author at a given conference.

Based on the number of authors from a given country summarized in Table 2, the following conclusions can be drawn. The SING 10 conference was dominated by papers and authors from Spain, Poland, Germany, France, Hungary, Italy, Japan, the Netherlands, the United Kingdom and the United States. The number of papers accepted for the conference from each of these countries is a two digit number. The authors from these countries constitute 73% of all the authors, and almost 71% of all the reports come from these countries. During SING 8, about 80% of the authors were from these countries. The decrease was caused mainly by the lower number of authors from the Netherlands (which fell from 34 to 11).

However, it is worth noting that the number of authors from Denmark increased significantly (Table 2). This increase may well continue, since in 2016 the SING 12 conference is to be held in Denmark.

Table 2. Comparison of the number of papers and authors accepted for SING 8 and SING 10

Country	SING 8			SING 10		
	Authors	Accepted papers	Authors per paper	Authors	Accepted papers	Authors per paper
Argentina	2	0.67	2.99			
Australia	1	1.00	1.00	4	2.17	1.84
Austria	2	1.50	1.33	2	0.75	2.67
Belgium	4	2.33	1.72	7	4.50	1.56
Canada	5	3.33	1.50	8	6.17	1.30
Chile	2	1.00	2.00	2	1.00	2.00
China				1	1.00	1.00
Colombia				1	1.00	1.00
Curaçao				1	1.00	1.00
Czech Republic				3	2.00	1.50
Denmark	1	0.50	2.00	9	4.50	2.00
Estonia	1	1.00	1.00			
Finland	6	3.50	1.71	5	4.50	1.11
France	17	10.67	1.59	18	11.42	1.58
Germany	24	15.33	1.57	20	13.67	1.46
Greece	4	2.00	2.00			

Country	SING 8			SING 10		
	Authors	Accepted papers	Authors per paper	Authors	Accepted papers	Authors per paper
Hong Kong	1	1.00	1.00	1	1.00	1.00
Hungary	23	19.33	1.19	17	11.50	1.48
India				2	1.00	2.00
Iran	1	2.00	0.50			
Israel	6	4.50	1.33	6	3.50	1.71
Italy	18	10.67	1.69	10	6.25	1.60
Japan	21	12.00	1.75	10	8.00	1.25
Korea	2	1.33	1.50	3	1.83	1.64
Macao				2	1.00	2.00
Mexico	3	2.00	1.50	6	3.33	1.80
Moldova	3	2.00	1.50	1	1.00	1.00
Netherlands	34	13.67	2.49	11	5.83	1.89
New Zealand	2	0.67	2.99	2	0.75	2.67
Peru				1	0.50	2.00
Poland	7	5.25	1.33	26	16.83	1.54
Portugal				1	1.00	1.00
Romania	5	2.00	2.50			
Russia	10	7.50	1.33	10	7.67	1.30
Singapore	1	0.33	3.03	1	1.00	1.00
Spain	52	22.33	2.33	64	31.75	2.02
Sweden	1	1.00	1.00	3	1.17	2.56
Switzerland				5	3.00	1.67
Taiwan	1	0.50	2.00	1	1.00	1.00
Turkey	2	1.50	1.33	3	2.50	1.20
United Arab Emirates	1	1.00	1.00			
United Kingdom	11	5.33	2.06	16	9.17	1.74
United States	23	13.25	1.74	14	7.75	1.81
Total	297	171.99		297	182.01	

Based on [3] and the proceedings of SING 10 [1].

5. SING conferences in numbers

Based on the ten years of the SING meetings, it is possible to present some observations on how these meetings have evolved over time and perhaps to make predictions regarding the future of these meetings. Table 3 shows that the average number of participants is about 164. This value was attained in Amsterdam, and exceeded in 6 of the 10 SING meetings (which is more than 50%). The number of participants exceeded two hundred only in Paris.

The number of countries represented, according to affiliations, oscillated from 21 (in Wrocław) to 29 (in Paris and Budapest). The average number of contributed talks is about 135. This number was attained in Kraków and Foggia and only two SING meetings (in Paris and Madrid) had a greater number of contributed talks.

Table 3. Ten SING meetings in numbers

SING	Date	Place	Number of			
			Participants	Countries	Plenary speakers	Contributed talks
1	24–26 June 2005	Maastricht, the Netherlands	136	23	5	131
2	14–17 June 2006	Foggia, Italy	166	26	6	135
3	4–5 July 2007	Madrid, Spain	181	26	4	147
4	26–28 June 2008	Wrocław, Poland	106	21	4	91
5	1–3 July 2009	Amsterdam, the Netherlands	164	26	5	132
6	7–9 July 2010	Palermo, Italy	141*	21	5	128
7	18–20 July 2011	Paris, France	209	29	5	186
8	16–18 July 2012	Budapest, Hungary	187	29	5	133
9	8–10 July 2013	Vigo, Spain	157	26	3	127
10	7–9 July 2014	Kraków, Poland	189	27	4	135
Total			1636	254	46	1345

*The organizers of SING 6 published only the author's names in the proceedings, and not the list of all participants. Based on the proceedings and photos from this event, we conclude that the number of the participants was not lower than 141.

Taking into account the plenary sessions and speakers of the SING meetings (Table 4), it can be observed that over these ten years there have been 46 plenary sessions given by 42 different, famous game theory researchers. Professor William Thomson has given three plenary talks, while Gianfranco Gambarelli and Stef Tijs have twice had the opportunity to present their work during the plenary sessions at SING meetings. The SING meetings have been dominated by plenary lectures and key speakers from outside of Europe. A half of these lectures were given by key speakers from the United States and Israel (16 and 7 talks from these countries, respectively). Taking into account European key speakers, the Netherlands has had the most with six plenary lectures, Spain is second with four plenary lectures, then France with three lectures, Denmark and the United Kingdom with two lectures each, Italy with two lectures, and Austria, Hungary, Poland and Switzerland with one plenary lecture each.

Table 4. Plenary sessions from SING 1 to SING 10

SING	Place	Plenary speakers
1	Maastricht, Netherlands	Bezalel Peleg, The Hebrew University of Jerusalem, Israel Eva Tardos, Cornell University, USA William Thomson, University of Rochester, USA Stef Tijs, Tilburg University, the Netherlands Rakesh Vohra, Northwestern University, USA
2	Foggia, Italy	Peter Borm, Tilburg University, the Netherlands Francoise Forges, University of Paris 9, France Steffen Jorgensen, University Southern Denmark Harold Kuhn, Princeton University, USA David Schmeidler, Tel Aviv University, Israel Myrna Wooders, University of Kent, USA
3	Madrid, Spain	Guillermo Owen, Naval Postgraduate School, USA Roberto Serrano, Brown University, USA Karl Sigmund, University of Vienna, Austria William Thomson, University of Rochester, USA
4	Wrocław, Poland	Jesús Mario Bilbao Arrese, University of Seville, Spain Steven Brams, New York University, USA Gianfranco Gambarelli, University of Bergamo, Italy Stef Tijs, University of Tilburg, the Netherlands
5	Amsterdam, the Netherlands	Michel Grabisch, University of Paris 1 Panthéon-Sorbonne, France Bettina Klaus, University of Lausanne, Switzerland Bernhard von Stengel, London School of Economics, UK Federico Valenciano, Universidad del País Vasco, Spain David Wettstein, Ben-Gurion University of the Negev, Israel
6	Palermo, Italy	Robert Aumann, The Hebrew University of Jerusalem, Israel Tamer Başar, University of Illinois, USA Alberto Bressan, Penn State University, USA Munther Dahleh, Massachusetts Institute of Technology, USA Ehud Kalai, Northwestern University, USA
7	Paris, France	Mathew Jackson, Stanford University, USA Annick Laruelle, University of Basque Country, Spain Hervé Moulin, Rice University, USA Hans Peter, University of Maastricht, the Netherlands Peter Sudhölter, University of Southern Denmark
8	Budapest, Hungary	Francis Bloch, École Polytechnique, France Péter Csermely, Semmelweis University, Hungary Aviad Heifetz, The Open University of Israel Jean-Jacques Herings, University of Maastricht, the Netherlands Hamid Sabourian, University of Cambridge, UK
9	Vigo, Spain	Ignacio García-Jurado, Coruna University, Spain Ehud Lehrer, Tel Aviv University, Israel William Thomson, University of Rochester, USA
10	Kraków, Poland	Gianfranco Gambarelli, University of Bergamo, Italy Andrzej Nowak, University of Zielona Góra, Poland Ariel Rubinstein, Tel Aviv University, Israel Gerard van der Laan, UV University, the Netherlands

SING 2 hosted the greatest number of plenary sessions (6). The most common number of plenary lectures was five and this number of lectures took place in Maastricht, Amsterdam, Palermo, Paris, and Budapest (Table 4).

Table 5. Number of participants from SING 1 to SING 10

Country	SING									
	1	2	3	4	5	6	7	8	9	10
Algeria			2		1		1			
Argentina				1				1		
Australia					1			1	2	1
Austria	1	1	1		2		1	2		
Belgium	6	1	1		1		7	3	1	3
Brazil	1		1						1	
Canada	1	1	1				4	6	3	5
Colombia							1		1	1
Chile							1	2		
China				1	1					
Curaçao					1				1	1
Cyprus						1				
Czech Republic		2		3	3	2	1			2
Denmark		1	2		1	3	1		2	4
Finland	4	6	4	3	5	2	4	4		4
France	6	7	7	4	6	5	29	13	10	10
Germany	2	5	3	3	3	6	12	14	9	12
Ghana		1								
Greece						1		2		
Hong Kong								1		2
Hungary	2	1	2	2	5	5	13	41	8	9
India									1	
Iran					1			1		
Ireland		1		1			1			
Israel	3	1	2		2	2	2	5	3	6
Italy	12	41	18	15	13	28	10	7	5	6
Japan	6	2	6	1	8	6	6	9	4	7
Kazakhstan							1			
Macau										1
Malaysia	1									
Mexico	2	4	1		2	4	2	1	1	3
Moldova		1	1			1	1	1	1	1
the Netherlands	28	20	19	15	34	22	21	16	11	7
Norway						1				
New Zealand	1	1	1	1			1	1	1	
Pakistan		1								
Poland	3	6	1	19	9	6	6	6	8	42

Country	SING									
	1	2	3	4	5	6	7	8	9	10
Portugal		4	3						1	
Romania			1	1	1	1		2	1	
Russia	6	7	6	5	7	6	13	7	6	5
South Africa			1							
South Korea	1				2					
Spain	33	40	80	21	37	29	35	23	62	39
Switzerland			1	1	1		2			2
Sweden	2	1								
Taiwan				1			1		1	1
Turkey	1			2			2	2		1
Ukraine								1		
United Arab Emirates								1		
United Kingdom	6	5	7	3	8	3	10	9	6	5
United States	8	5	9	3	9	7	11	5	7	9
Total	136	166	181	106	164	141	200	187	157	189

Based on the proceedings of the SING conferences.

The total number of participants over all the SING conferences has reached 1627 (compare Tables 5 and 6), which is quite impressive. These participants represented 51 countries from six continents. It is worth noting that 11 countries were represented at each of the ten SING meetings. Nine of these countries are in Europe: France, Germany, Hungary, Italy, the Netherlands, Poland, Russia, Spain and the United Kingdom, and two outside Europe: Japan and the United States (see Tables 5 and 6).

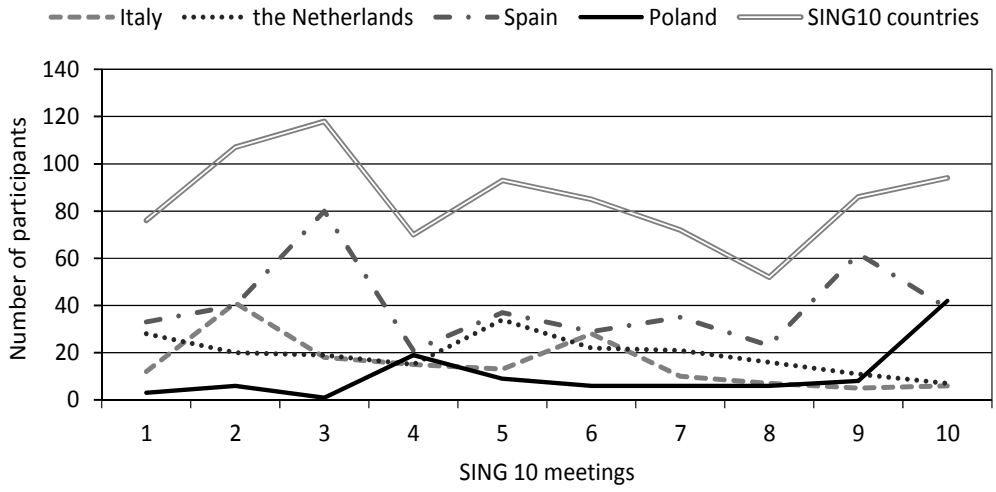

Fig. 2. Attendance by the SING countries over the ten years (2005–2014)

Figure 2 shows how the SING countries (Spain, Italy, the Netherlands and Poland) have attended the SING meetings over the last ten years (from 2005 to 20014). It can be noticed that:

- Spain is always the most represented among the SING countries, and the other countries have a similar number of participants as Spain when they are the host country.
- There is a noticeable downward trend in the number of participants from Italy and the Netherlands.
- Each of the SING countries has an evident increase in the number of participants when the conference is hosted by that country.
- Poland seems to have a weak, but positive trend in the number of participants.
- After SING 8, the number of participants from the SING countries seems to have increased not only thanks to the number of Polish participants, but most of all thanks to the number of Spanish participants.

Table 6. Ten year summary statistics for the number of SING participants

Country	Total number of conferences attended	Average	Median	Standard deviation	Coefficient of variation [%]	Min.	Max.	Total number of participants in 10 years
Algeria	3	1.33	1.0	0.58	43	1	2	4
Argentina	2	1.00		0.00		1	1	2
Australia	4	1.25	1.0	0.50	40	1	2	5
Austria	6	1.33	1.0	0.52	39	1	2	8
Belgium	8	2.88	2.0	2.42	84	1	7	23
Brazil	3	1.00	1.0	0.00	0	1	1	3
Canada	7	3.00	3.0	2.08	69	1	6	21
Colombia	3	1.00	1.0	0.00	0	1	1	3
Chile	2	1.50	1.5	0.71	47	1	2	3
China	2	1.00	1.0	0.00	0	1	1	2
Curaçao	3	1.00	1.0	0.00	0	1	1	3
Cyprus	1	1.00	1.0			1	1	1
Czech Republic	6	2.17	2.0	0.75	35	1	3	13
Denmark	7	2.00	2.0	1.16	58	1	4	14
Finland	9	4.00	4.0	1.12	28	2	6	36
France	10	9.70	7.0	7.30	75	4	29	97
Germany	10	6.90	5.5	4.48	65	2	14	69
Ghana	1	1.00	1.0			1	1	1
Greece	2	1.50	1.5	0.71	47	1	2	3
Hong Kong	2	1.50	1.5	0.71	47	1	2	3
Hungary	10	8.80	5.0	11.94	136	1	41	88
India	1	1.00	1.0			1	1	1
Iran	2	1.00	1.0	0.00	0	1	1	2

Country	Total number of conferences attended	Average	Median	Standard deviation	Coefficient of variation [%]	Min.	Max.	Total number of participants in 10 years
Ireland	3	1.00	1.0	0.00	0	1	1	3
Israel	9	2.89	2.0	1.62	56	1	6	26
Italy	10	15.50	12.5	11.23	72	5	41	155
Japan	10	5.50	6.0	2.51	46	1	9	55
Kazakhstan	1	1.00	1.0			1	1	1
Macau	1	1.00	1.0			1	1	1
Malaysia	1	1.00	1.0			1	1	1
Mexico	9	2.22	2.0	1.20	54	1	4	20
Moldova	7	1.00	1.0	0.00	0	1	1	7
the Netherlands	10	19.30	19.5	7.83	41	7	34	193
Norway	1	1.00	1.0			1	1	1
Curacao	3	1.00	1.0	0.00	0	1	1	3
New Zealand	7	1.00	1.0	0.00	0	1	1	7
Pakistan	1	1.00	1.0			1	1	1
Poland	10	10.60	6.0	12.02	113	1	42	106
Portugal	3	2.67	3.0	1.53	57	1	4	8
Romania	6	1.17	1.0	0.41	35	1	2	7
Russia	10	6.80	6.0	2.29	34	5	13	68
South Africa	1	1.00	1.0			1	1	1
South Korea	2	1.50	1.5	0.71	47	1	2	3
Spain	10	39.90	36.0	18.07	45	21	80	399
Switzerland	5	1.40	1.0	0.55	39	1	2	7
Sweden	2	1.50	1.5	0.71	47	1	2	3
Taiwan	4	1.00	1.0	0.00	0	1	1	4
Turkey	5	1.60	2.0	0.55	34	1	2	8
Ukraine	1	1.00	1.0			1	1	1
United Arab Emirates	1	1.00	1.0			1	1	1
United Kingdom	10	6.20	6.0	2.35	38	3	10	62
United States	10	7.30	7.5	2.41	33	3	11	73
Total	254	162.70						1627

Table 6 shows summary statistics for each of 51 countries that participated. It includes measures of central tendency and variability. Based on these statistics, it can be observed that:

- A quarter (399/1627 = 0.24) of the total number of participants over the ten years were scientists from Spanish research centers.
- Almost 45% of all the participants are from the original SING countries (Italy, the Netherlands and Spain), together with the Polish participants, this proportion exceeds 52%.

• The number of participants from Hungary and Poland is characterized by large variability (in both cases, the coefficient of variation is higher than 100% and the standard deviation is about 12). This is caused mainly by the fact that these countries noted a large increase in the number of participants in the years when they were the host countries.

• The number of participants from Germany is also characterized by quite a large variability (the coefficient of variation is 69%). In this case, this is caused by the fact that the number of German participants is constantly growing.

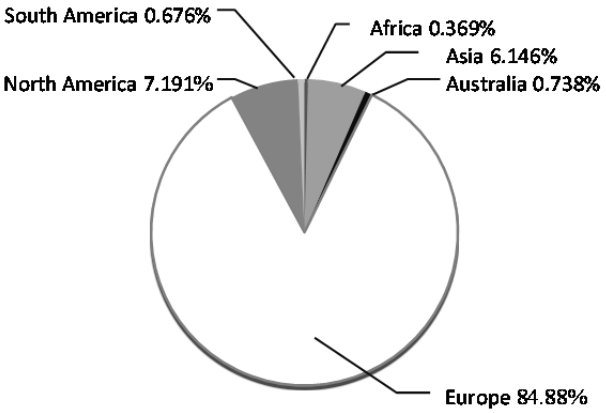

Fig. 3. Concentration of SING participants according to continent

The piechart in Fig. 3 shows the concentration of SING participants, according to their affiliations, over the six continents. We can observe that researchers from European universities constituted 84.88% of all participants and 6.15% of researchers were from Asia. Participants from Kazakhstan and Russia are assumed to be European. This is not an unreasonable assumption, because the majority (if not all) of these participants or authors come from the European part of these countries. For example, at SING 10, all the participants from Russia came from institutes or universities based in Saint Petersburg. Moreover, we observe that 55% of Asian participants come from Japan (Tables 6 and 7).

Over the ten meetings, all six continents have been represented (5 continents have almost always been represented). However, researchers from Europe, North America and Asia constitute 98% of all participants. In Figure 4, we observe that the trend in the proportion of participants who are European at SING meetings is negative. The maximum (92.45%) was attained at SING 4 in Wrocław, and the minimum at SING 10 (80%).

During the last ten years, the structure of participants of SING has changed. It can be argued that the conference has lost participants from the SING countries in favor of participants from other European countries, and also other continents.

Table 7. Summary statistics for the participants of SING meetings according to continent

Continent	Countries	Average No. of participants| from one country	Standard deviation	Coefficient of variation [%]	Min.	Max.	Total No. of participants
Africa	3	2.00	1.73	86.60	1	4	6
Asia	12	8.33	16.28	195.34	1	55	100
Australia	2	6.00	1.41	23.57	5	7	12
Europe	26	53.12	87.48	164.69	1	399	1381
North America	4	29.25	30.31	103.64	3	73	117
South America	4	2.75	0.50	18.18	2	3	11
Total	51	31.90	66.75	209.24	1	399	1627

It can also be noted that the role of Italy and the Netherlands has been taken over by France, Hungary and Denmark, and also Poland (Fig. 2, Table 5), although these are countries, except Poland, outside of the SING countries. There is no doubt that the group of German game theorists is becoming stronger, and that there is an upward trend in the number of participants from countries outside Europe such as Canada and Israel (Tables 5 and 6). It is also evident that SING enjoys a growing amount of interest from scientists in Asia, particularly Japan. This is reflected not only by the increase in the number of participants but also by the number of reports from these countries (Tables 2 and 5).

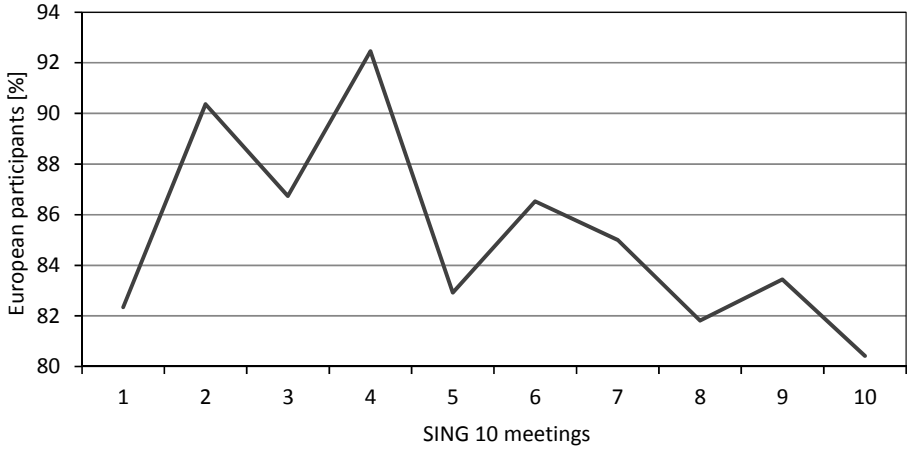

Fig. 4. European participants of SING meetings

The SING meetings are constantly of great interest to game theorists. This interest can be justified by several factors. First of all, the conference is devoted exclusively to

game theory and covers a wide range of topics including both theoretical and practical aspects of game theory. The conference is organized annually at the beginning of summer, each time in a new place, which makes it even more attractive. The conference procedure obeys a set of rules that have been set by the SING Council and SING Assembly and are constantly being improved based on new experiences. Moreover, the organizing committees of SING meetings always try to provide lectures given by worldwide recognized experts in game theory. All of this makes this event quite exceptional.

6. Concluding remarks

In this paper, the ten years of the SING meetings has been summarized from a statistical point of view. The statistics were obtained based on data from the proceedings provided by the organizers of the SING meetings on the number of participants, contributed talks and plenary sessions, invited speakers, affiliations of the authors and participants.

Over the ten years, Poland has been the only country to join the original SING countries. SING was organized for the first time in Poland in 2008, in Wrocław. Six years later, it was again organized in Poland. This time the host city was Kraków. Will future decades bring new members? France seems to be a potential candidate to join the multi-organizing countries in 2017 (see Appendix 2). If France organizes SING 13, then it will have waited as long as Poland to become a member of the multi-organizing countries (measured by the time between the first two conferences organized in a country). The question remains as to whether the Hungarians will attempt to organize this conference again in the near future. For now, they have not shown any plans to do so. Russia and Denmark will organize the SING meetings in 2015 and 2016, so these two countries are also potential candidates. From outside of the SING countries, it is Germany who seems to be the most interested in organizing the SING meeting in 2018 and ultimately joining the SING countries.

Regarding the SING countries (Spain, Italy, the Netherlands and Poland), it can be observed that the fall in the number of participants from Italy and the Netherlands has been balanced by an increase in the number of participants from outside the set of Multi-organizing countries. The number of participants from Spain seems to be steadily increasing. It is difficult to predict the trend in the number of Polish participants, because firstly Poland only became a member of the SING countries in 2014, and secondly until SING 10 the number of participants from Poland was rather stable. The number of Polish participants at the SING 10 conference was higher than in other years. However, as mentioned before, this is quite natural as Poland was the host country.

Based on the collected data about the ten years of SING meetings, it can be stated that Spain stands out from other European countries. At all the SING meetings the Spanish game theory research centers were most strongly represented in terms of the number of participants, authors and accepted papers (Tables 2 and 5). Although, taking into account the SING 8 and SING 10 meetings, it must be admitted that the number of Spanish authors per article is greater than for the majority of other countries (Table 2). Also, the number of invited speakers and plenary sessions indicate that Spain is placed just after the Netherlands, which leads among the European countries (Table 4). It would be perhaps valuable to analyze the subjects of papers and sessions presented at the SING meetings, but this is a subject for a separate report. Nevertheless, based on the observations given in [5] and [7], it can be concluded that the SING meeting is moving with the times, and that there is an increasing number of papers devoted to networks.

In the future, the SING meeting may become not only a European, but a World Congress. For years, Professor Yukihiko Funaki from Waseda University has strived to organize the SING conference in Japan. However, since the procedure of the conference does not allow such an option (see Appendix 2), in 2015 (August 24–26) Professor Funaki will organize a satellite conference in Tokyo entitled the East Asian Game Theory Conference.

The authors hope that this paper will be useful, as the information presented here has already been requested by the organizers of the next planned meetings (Appendix 1).

Acknowledgment

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Appendices

For the benefit of readers, in the following two appendices we give a detailed history and the current organizational procedure of SING, also to be found in [6].

Appendix 1. History

The history of SING dates back to the beginning of the 1980s, with the first meetings being held in Italy. Subsequent meetings were added in Spain, the Netherlands and Poland.

Italy. The first time Italian researchers joined together for a meeting on game theory was due to the initiative of the mathematician Gianfranco Gambarelli and the

economist Michele Grillo. On the 12th of October 1983, a working day was held in Bergamo entitled: A Discussion between Economists and Mathematicians. Recent Contributions of Game Theory to Economics. From then on, meetings took place almost annually under the title of Convegno di Teoria dei Giochi ed Applicazioni: in Pavia (1984, organized by Pierangelo Mori and Fioravante Patrone), Florence (1986, Andrea Battinelli), again Bergamo (1987, Gianfranco Gambarelli), Cagliari (1988, Andrea Battinelli), Modena 1989 (Gianni Ricci), Florence (1991, Piero Tani), Pisa (1992, Giacomo Costa), Genoa (1993, Fausto Mignanego and Fioravante Patrone), Siena (1995, Stefano Vannucci), Bergamo (1996, Gianfranco Gambarelli), Milan (1997, Michele Polo and Mario Gilli), Genoa (1998, Fioravante Patrone) and Bologna (1999, Elettra Agliardi). After this, the conferences began to take an international form as described later.

Spain. The first Spanish meeting on game theory was organized in 1994 in Bilbao by Federico Valenciano and Jose Zarzuelo. This was followed by meetings in Santiago de Compostela (1996, organized by Ignacio García Jurado), Barcelona (1998, Carles Rafels) and Valencia (2000, Amparo Urbano). During the World Meeting of the Game Theory Society, organized in 2000 in Bilbao by Federico Valenciano, the idea of an international meeting arose that will be discussed later.

The Netherlands. There was no tradition of organizing Dutch game theory conferences. Before the SING joint venture, only periodic seminars and impromptu conferences were held. As far as seminars are concerned, monthly ones were organized by Stef Tijs in Nijmegen at the beginning of the 1980s. Others followed in Tilburg under the supervision of Peter Borm. Again in Tilburg, a monthly seminar has been held on the closely related area of social choice since the mid 1980s, organized by Ton Storcken, Ad van Deemen, and Harrie de Swart. Several workshops on cooperative game theory have been organized by Gerard van der Laan and René van den Brink in Amsterdam and by Theo Driessen in Enschede.

Regarding conferences, in 1996 the 3rd International Meeting of the Society for Social Choice and Welfare was organized in Maastricht by Hans Peters and Ton Storcken. In 1998, the 8th International Symposium on Dynamic Games and Applications was organized in Maastricht-Va by Frank Thuijsman and Koos Vrieze. The first conference on Logic, Game Theory and Social Choice (LGS1) was organized in Tilburg-Oisterwijk by Harrie de Swart in 1999. In 2002, Peter Borm organized a game theory conference in Tilburg on the occasion of Stef Tijs' 65th birthday.

Poland. While some of the pioneering works in game theory are due to Polish mathematicians such as Hugo Steinhaus and Jan Mycielski, no national meeting in this area was ever established in Poland. Since the 1970s, groups working on game theory and related topics in Warsaw and Wrocław held regular seminars that used to be rather

interdisciplinary. In 2004 Andrzej Wieczorek organized an international conference on game theory and mathematical economics in Warsaw, and in 2008 the 13th International Symposium on Dynamic Games was organized by Andrzej Nowak in Wrocław just after SING 4.

SING – a joint venture. In 2000, Federico Valenciano organized GAMES 2000, the first Meeting of the Game Theory Society, held in Bilbao. During this conference, Fioravante Patrone took the initiative of setting up a "joint venture" between Italy and Spain, suggesting that meetings be held alternately in Italy and Spain. The agreement on this idea by the researchers involved led to meetings in Ischia (2001), Sevilla (2002), Urbino (2003) and Elche (2004). During the meeting in Urbino, the Netherlands asked to join the Italian-Spanish alternating agreement and so SING (the Spanish-Italian-the Netherlands Game Theory Meeting) was set up. The first Dutch edition was organized by Hans Peters in Maastricht from the 24th to 26th of June 2005; the subsequent meetings are listed in Table A1.

A1. List of the international conferences

Year	Name	Location	Organizer
2001	Italy/Spain 1	Ischia, Italy	Jacqueline Morgan
2002	Italy/Spain 2	Sevilla, Spain	Jesús Mario Bilbao, Francisco Fernández
2003	Italy/Spain 3	Urbino, Italy	Gian Italo Bischi
2004	Italy/Spain 4	Elche, Spain	Joaquín Sánchez Soriano
2005	SING 1	Maastricht, the Netherlands	Hans Peters
2006	SING 2	Foggia, Italy	Andrea Di Liddo
2007	SING 3	Madrid, Spain	Juan Tejada
2008	SING 4	Wrocław, Poland, G	Jacek Mercik
2009	SING 5	Amsterdam, the Netherlands	René Van den Brink
2010	SING 6	Palermo, Italy	Dario Bauso
2011	SING 7	Paris, France, G	Michel Grabish
2012	SING 8	Budapest, Hungary, G	László Kóczy
2013	SING 9	Vigo, Spain	Gustavo Bergantiños
2014	SING 10	Kraków, Poland, G	Izabella Stach
2015	SING 11	St. Petersburg, Russia, G	Leon Petrosyan
2016	SING 12	Odense, Denmark, G	Peter Sudhölter

G – guest organizing country.

It was then agreed that other European countries wishing to enter the rota had to participate first as guest organizers and only after a second participation in this role could they then actually join SING. As a result, the following countries acted as guest organizers, Poland in 2008 (Wrocław, organized by Jacek Mercik), France in 2011 (Paris, Michel Grabisch) and Hungary in 2012 (Budapest, László Kóczy). Poland was

a guest organizer for the second time in 2014 (Kraków, Izabella Stach) and thus it became an actual member of SING. A decision has been made not to change the acronym, in view of the fact that it has become well-known, but to transform the name of the meetings from now on to the SING European Meeting on Game Theory. The 2015 edition is scheduled to take place in St. Petersburg, organized by Leon Petrosyan. Odense (organizer Peter Sudhölter) and Paris Dauphine (organizer Stefano Moretti) are candidates for the following meetings.

Appendix 2. Organizing procedure for the SING – European Meeting on Game Theory (approved by the SING Assembly of 2014)

GLOSSARY

SING Meeting means the SING European Meeting on Game Theory.

SING Assembly is the assembly of those participants of a SING Meeting who are citizens of European countries. This assembly takes place during each SING annual meeting. It is chaired by the President of the Organizing Committee of the Meeting. The SING Assembly takes decisions on proposals from the Country Representatives' Council.

Multi-Organizing Countries are those European countries that have organized at least two SING meetings (taking into account previous SING editions since 2005).

Each multi-organizing country has two *Country Representatives* appointed at the end of each annual SING Assembly by the participants of that country attending the assembly, according to the following rules:

The representatives do not have to be present at the current assembly.

The cadency of each Country Representative lasts for two annual assemblies, except for the younger of the two Country Representatives of a country (if any) classified as a Multi-Organizing Country for the first time; in this case, the cadency of this representative will last for three assemblies. After two years, a representative may be confirmed for two more years, for a maximum of four years.

After serving for four years, a Country Representative can only be nominated again after a break of at least two years.

The Country Representatives have the duties of:

– attending the Representatives' Council, directly or by nominating a delegate;

– deciding, in agreement with the organizer of the next SING meeting, the invited speakers, the dates and the full and reduced fees;

– participating in the Scientific Committee of the Meeting, that includes all the present SING representatives, chosen from among the former SING representatives, the President of the Organizing Committee, and at most four members invited by her/him;

– taking part in any possible urgent decision to be made before the following assembly.

The SING Representatives' Council is the meeting of Country Representatives, held annually during each SING meeting, some days before the assembly. The organizers of the current and of the next SING meetings belong to this council only for topics regarding the appropriate meeting. Each Country Representative that cannot attend the council has to be represented by a delegate. The council is chaired by the President of the Organizing Committee of the current SING meeting.

The council has the duty of forwarding to the assembly all the candidacies received for organizers of forthcoming SING meetings, and to propose to the assembly possible changes to these rules and any suitable topic.

REQUEST TO ORGANIZE A SING MEETING

SING meetings can be organized only in European countries.

Any person working in a European country may ask to organize a SING meeting. In order to do so, s/he has to send a formal request to all the current Country Representatives, specifying the location and the year (or the years) in which s/he could organize a meeting. In the request, it is necessary to explicitly accept and bind oneself to respect all the conditions of this procedure.

DUTIES OF THE ORGANIZER OF A SING MEETING

The organizer will contact the Country Representatives to start the procedure of organizing a new SING meeting. In particular, s/he should not spread preliminary information about a meeting that requires the approval of the Country Representatives, without their agreement (tacit approval is assumed if no reply to a request is made within two weeks).

S/he will prepare a webpage promoting the meeting (e.g. About SING), including the information received by the President of the Organizing Committee of the previous SING meeting and updating it appropriately, i.e.:

– past and future,

– organizing procedure,

– list of Country Representatives (with the e-mail addresses of the current ones and their year of election),

– minutes of the last assembly.

– the new organizer will not change any of the above information. Only in the case in which his/her country becomes, due to hosting for a second time, a Multi-Organizing Country, s/he will add, to the end of the SING history, a brief description of past activities in the field of game theory carried out in her/his country, of a similar style and length to the other descriptions.

Related to the acceptance or rejection of submitted proposals for talks, the President will send all the abstracts to each member of the Scientific Committee, requesting a response within a suitable deadline. S/he will then send to all those members only

the abstracts for which at least one of them has reported some concerns, and ask for a definitive answer within a second deadline. The final decision will be taken according to the majority decision of those who answered by the last deadline (in the case of a tie, the President's vote will be deciding).

In the scheduling of the meeting, the organizer has to timetable:

– A session of the SING Representatives' Council; this should take place on the first day and preferably not overlap with other scientific sessions.

– A plenary session for the SING Assembly; this should take place at the end of the meeting. The organizer will chair and ensure that both sessions are minuted.

– At the end of the assembly, the organizer has to confirm the newly elected Country Representatives.

– After the conclusion of the meeting, the organizer has to send the full mailing list of the SING meetings, including new participants and/or updated addresses, to the organizer of the following meeting.

Within one month of the conclusion of the meeting, the organizer has to send all updated information for the webpage About SING to all the Country Representatives, asking for their approval (with tacit approval assumed when no reply is received within two weeks). Then, this information will be sent to the President of the Organizing Committee of the next SING meeting.

S/he should maintain the web page of the meeting active for at least one year, possibly publishing the Minutes of the Assembly and, in particular, the newly appointed Country Representatives.

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