Arbeitstagung in 1957, Alexander Grothendieck, son of a Russian anarchist and eternal expatriate in France and everywhere, presented its great generalisation.

Perhaps the Riemann–Roch–Hirzebruch–Grothendieck theorem, which fused and crowned efforts of dozens of great creators from all corners of Europe, deserves to be put on the flag of the United Europe more than any other symbol.

Yuri I. Manin
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Stanislaw Janeczko, Director of the Banach Centre, Poland, participated in the memorial session giving a presentation in which he focused his speech on the influence of Friedrich Hirzebruch on the Banach Centre; a specific article on this topic will appear soon.

Mathematics in the Streets of Kraków

Ehrhard Behrends (Freie Universität Berlin, Chair of the EMS rpa committee)

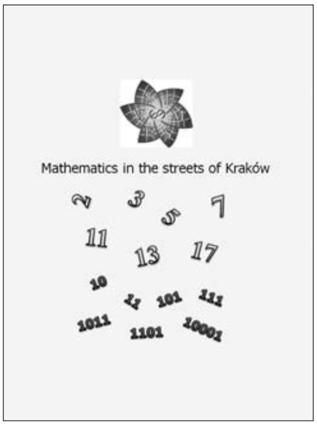
The 6th European Congress of Mathematics took place in Kraków, 2–7 July 2012. As a special activity associated with this event the EMS rpa committee organised “Mathematics in the Streets of Kraków”.

The idea was to increase the profile of mathematics during these days in the city with as many people as possible (inhabitants and tourists) made aware of the fact that an important mathematical congress was taking place in the first few days of July.

The rpa committee decided at its meeting in Bilbao (November 2011) to realise this idea by performing “maths busking”, going into the street and interacting with the people directly! Some members of the committee (Franka Brueckler, Croatia, Steve Humble and Sara Santos, UK) have experience with this kind of public awareness activity, and one “only” would have to run a Polish version.

The preparations started early. Krzysztof Ciesielski from Kraków (thank you, Krzysztof!) negotiated with the local authorities and finally we had permission to be active in the central marketplace and in a small place close to the university. He also took care of the numerous preparations: printing of the papers that would be used during the busking project, finding a team of students to help us, production of the special T-shirts, etc.

These T-shirts not only announced the busking activities but also advertised www.mathematics-in-europe.eu, the public awareness webpage of the EMS. (On www.mathematics-in-europe.eu/krakow the English and Polish versions of our presentations were – and still are – available.)



Franka, Sara and Steve had a meeting with the Polish students on Sunday and Monday to prepare the busking activities. These took place on Monday and Tuesday afternoon between 4 and 8 pm. Unfortunately conditions were not optimal: immediately after we started it was necessary to convince the police that we had all necessary permissions, many other (non-mathematical) performances were competing with us and it was very, very hot (about 35 degrees!). Nevertheless, several hundred people participated in our “mathematics in the streets of Kraków”.



The police and some of the competitors.

The “buskers” had prepared a large variety of interactive presentations. They performed magical tricks with a mathematical background, provided mathematical riddles with surprising solutions, etc. The Polish students were very helpful in assisting the project, in particular as translators.

The busking team (with Krzysztof in the first row on the right)

Franka presenting a card trick with a mathematical background

Sara prepares a knot trick.

Steve with a performance based on the Kruskal count.

As an example we describe here Steve's variant of the *Kruskal count*, which is explained in a box below. (You are invited to perfom this trick at your next summer party. More examples of magical tricks with a mathematical background can be found at www.mathematics-in-europe.eu, "Enjoy maths/recreational mathematics".)

Steve asks a visitor to shuffle a deck of (rather large) cards. Then they are put on the ground face up to form a square pattern. Cards with a picture and the aces count as one; the values of the others are the numbers printed on them. One spectator determines where to start and whether to walk left or right in a snaking pattern down through the grid. The rule of the game: if you are on a card with value i then step i steps forward in the direction determined at the beginning. A number of people start their walk at different starting positions and – big surprise! – all end up on the same card.

"Mathematics in the streets of Kraków" was a very interesting experience and we are sure that many people have seen aspects of mathematics they had never met before.

Ehrhard Behrends is a professor of mathematics at Freie Universität Berlin, working in functional analysis and probability. He is author of several monographs, textbooks and books for the general public. He is also Chair of the RPA Committee of the EMS.

The Kruskal count

Suppose that you produce n random numbers from the set $\{1,\dots,k\}$, where every i is generated with a positive probability and n is much larger than k. E.g. in the case $k = 6$ one could use an ordinary die; the result could be 3,1,4,5,3,2,2,1,6,5,2, 1,3,4,6,1,3,2,4,3,1,1,4,5,2,6.

Such a sequence gives rise to walks: 1. Start at any of the numbers. 2. Proceed by the following rule. If the present number equals i then move i steps to the right (if this is possible). For example, if we use the preceding numbers and start at the second place (the 1) then our steps touch 1,4,2,6,6,1,1,4,4 and here we must stop since only three numbers remain.

There is a very surprising fact in connection with these walks: With an overwhelming probability all end up at the same number, provided that one starts at one of the first numbers. Check it with our example; when starting at 3,4,5,3,2,2,1,6,… the final position is the same 4 as in the case of the first walk.

The explanation is not difficult. Start a walk at the first position and mark the numbers that are visited. Then start at another number. That the final position will be the same (with high probability) is obvious if one combines the following two facts:

- Whenever the new walk touches a number that is already marked the final position will be the same as that of the first walk.
- Suppose that the walk is at a non-marked position. At least one of the next six numbers to the right is marked so that the probability to arrive *not* at a marked one in the next step is at most 5/6. (Here it is of importance that the numbers are generated as an i.i.d. sequence.) Thus, if the total walk has r steps, one touches a marked number with probability at least $1-(5/6)^r$. And since we assumed that n is large when compared with k the number $1-(5/6)^r$ will be close to one.

It should be clear how to generalise this argument to the case of arbitrary k and arbitrary probability distributions on $\{1,\dots,k\}$. Note that in Steve's case the values of the cards are not an i.i.d. sequence so that one has to argue slightly more carefully.