

# Reversibility, Event Structures and Petri Nets

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I came to know about Maciej in the nineties as a brilliant researcher from the University of Newcastle upon Tyne, a co-author with Ryszard Janicki of several seminal papers on non-interleaving models of concurrency [6, 5]. We met I think in State College, Pennsylvania at the 11th International Conference on Concurrency Theory CONCUR 2000. Maciej had a paper with Victor Khomenko on LP deadlock checking using partial order dependencies [7], and I presented a joint work with Shoji Yuen on process calculi for eager bisimulation in [15]. I thought Maciej was a very friendly and quite knowledgeable in all aspects of computer science and life in general. What I also remember well is that we enjoyed a local speciality of alligator meat at one of the evening meals.

Next time we attended CONCUR together was in 2011 in Aachen, Germany, where our proposal to host the 23rd edition of CONCUR in Newcastle upon Tyne in 2012 was approved. Naturally, we were delighted with the decision, and it was clear to me that Maciej's standing in the concurrency community and his skills as well as the allure of Newcastle and Durham were the deciding factors that persuaded the Steering Committee of CONCUR to bring the conference to England (for only the second time ever). Apart from celebrating our good fortune, we discussed among others my interest in the modelling of reversible computation in process calculi, the topic that I started to work on in 2004. Maciej told me about the rôle of reversibility in traditional Petri nets research (during a coach trip to Maastricht for a social event dinner). It was a peripheral topic in Petri nets research, and we thought that the same held about other areas of research, like program inversion, debugging, circuit design, semantics of concurrency. Wouldn't it be interesting we thought to involve all those scientists from different fields of computer science who are interested in reversibility into an international network to discuss, research and apply reversibility?

A year later at CONCUR in Newcastle, I was working on extending event structures with reversibility to model both the causal-consistent reversibility [4, 10, 8] and the so-called out-of-causal order reversibility [13], which is present in many bio-chemical reactions. There was not much opportunity for research in Newcastle because Maciej and I were busy with running the conference. However taxi rides from Spital Tongues to Newcastle Hilton, the venue of CONCUR 2012, allowed ample time to think. What was started in Newcastle in 2012 resulted in several papers. Iain Phillips and I showed how to reverse prime and asymmetric event structures so that different forms of reversibility can be modelled [11, 12]. Jointly with Shoji, Iain and I proposed the enabling with prevention relation that extends general event structures with reversibility [14].

I finally enticed Maciej to the topic of reversibility a few years after CONCUR 2012. I applied for a COST Action grant titled "Reversible Computation:

extending the horizons of computing” in 2014. COST Action grants aim to support networking, training, meetings and one to one research visits, and our idea was to use COST Action funds to develop, promote and popularise reversible computation research in Europe. When the grant was awarded and the COST Action IC1405 was established in the spring of 2015, Maciej became one of the members of the Management Committee of the Action. In collaboration with Łukasz Mikulski from Nicolas Copernicus University in Toruń (Poland) Maciej started working on reversibility in Petri nets. Soon afterwards, Kamila Barylska and Marcin Piątkowski from Toruń joined the research and they published a number of papers including [2, 3], where they consider a number of ways that the reverse versions of transitions can be added to Petri nets, and how adding such reverse transitions impacts on their behaviour. This work within the framework of the Action IC1405 led also to cooperation with Anna Philippou and Kyriaki Psara from the University of Cyprus who also became interested in reversibility in Petri nets [9]. They have recently carried out joint work with Anna Gogolińska on the modelling of reversing computation in coloured Petri nets [1]. Thanks to Maciej’s involvement and encouragement, and the support of IC1405, there is now a group of young researchers who work on reversibility in Petri nets. As for me, I am still aiming to join this research effort and transfer some of the reversible event structures techniques to Petri nets.

I appreciate very much Maciej’s friendship, advice and generosity, and hope that we continue in this way for some time to come.

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