Statistical Theory and the Real World

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Standard statistical analysis mostly concerns the situation in which one observes repeated outcomes of a particular process, and the goal is to infer hypotheses (parameters, confidence intervals, structural properties, …) about the distribution of these outcomes.
But often the relation between the data, the hypotheses and the real world is not nearly as convenient as that: either the data selection process or the data measurement process may play a crucial role; or the interest is in hypotheses about what happens when intervening in the process. Such complications play a crucial role in nonrandomly *coarsened data*, in *causal inference*, in observations *of quantum-mechanical processes* and in *forensic statistics*.
The aim of the workshop was to bring together world-leading researchers working on these topics – often viewed as very different, but with a common fascination for the nontrivial interaction between theory and the physical world. We wanted to foster interaction between them and provide new inspiration for their respective fields. Indeed the workshop was held on the occasion of the retirement of Richard Gill, Professor of Statistics at Leiden University who is well-known for his fundamental contributions to all these tricky areas. While some of the speakers were *eminences grises* who have intensively collaborated with Gill in the past, we made sure to also invite young researchers with fresh ideas. We also arranged a mix of broad, overview talks and some shorter, specialized talks about cutting-edge research. The extended talks very well served their purpose of making advances in each one of the areas mentioned above accessible to researchers in the other areas; highlights included Keiding's talk about *bias* in all its facets, Pawlowski's talk about *quantum causality* and Derksen's talk about *estimating* innocence, i.e. estimating the percentage of people that are innocent in jail – all three talks prompting a lot of discussion and comment from researchers in other fields. Our biggest worry for this workshop was that there would be no interaction between researchers in the different fields, and that e.g. the statisticians would stay in their hotels when the quantum people spoke. But this did not happen at all – most workshop attendees stayed for most of the week. Thus we feel we have really succeeded in achieving the workshop goal. Again, the high quality of individual researchers and talks played a substantial role here. Several participants – including Richard Gill himself – told us that they really enjoyed the workshop. Given all this, we consider the workshop a big success – where we emphasize that the main underlying reason for the success is the Lorentz center concept itself with its excellent facilities and extremely friendly and capable staff, which allowed not only the participants but also the organizers to focus 100% on the science.

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