



## **A Comparative Study of Statistical Inference from an Educational Point of View** **Invited Paper Session 116, 61st World Statistics Congress**

Marrakech, 16.-21.7.2017

Organiser: Manfred Borovcnik, AAU Klagenfurt

Chair: Michael G. Schimek, Med U Graz

Discussant: Jan Hannig, UNC at Chapel Hill

Speakers:

Robert delMas, U Minnesota: A 21st Century Approach towards Statistical Inference – Re-Randomization, Resampling, and Bootstrap to Replace Traditional Statistical Inference

Min-ge Xie, Rutgers U, New Jersey: Urging A Paradigm Change: An Introduction to BFF (Bayesian, Frequentist And Fiducial) Inferences and how Bayesian and Frequentist Come together

Dalene Stangl, Duke U, Durham: Informal Inference – Some Thoughts to Reconsider

Manfred Borovcnik, AAU Klagenfurt: Why and how to Train Introductory Statistics Students in Bayesian Thinking – A Decision-Oriented Approach towards Statistical Inference

The aim of the session is to initiate a critical discussion about

- classical methods of statistical inference
- the Bayesian approach to inference,
- a decision-oriented approach to inference,
- using resampling in inference

The latter resampling school has gained massive attention within the statistics education community (starting with Cobb, 2007). The principal aim is to discuss merits and disadvantages of the various approaches towards statistical inference. A side goal is to find a legitimation for statistical inference in the curriculum of secondary schools and debate on possibilities of teaching statistical inference in the era of big data.

The resampling approach is intended to replace all other approaches towards inference in statistical education from high school to undergraduate studies. The argument is said to be evidence-based with studies to show that students acquire better competencies. The solutions are easily implemented by simulation, or better, by resampling the data. However, probability is completely reduced to frequencies and all information is perfectly contained in data – any extra hypotheses or prior knowledge are excluded from consideration. Such a session to discuss the relative merits of the various approaches towards statistical inference is urgently needed. At ICOTS 9 in Flagstaff there have been two complete sessions focusing entirely on the informal approach (of re-randomization and resampling including bootstrap). Though this way may be good as a transient stage towards statistical inference, its strengths and limitations should also be investigated, especially what it can achieve and whether it can stand for itself.

One speaker in the session will take the position of „informal inference”, one will take a Bayesian view, a third representing a decision-oriented approach, and a fourth to balance the benefits and drawbacks after presenting the classical view.

This would continue the endeavour of the late-breaking session “Statistical Inference – an Unresolved Issue in Statistics Education” at the WSC in Hong Kong to develop a comparative study of teaching statistical inference. The considerations will be qualitative scientific argument as well as empirical evidence. As Barnett (1973) analysed statistical inference from a comparative perspective to shed light on the various approaches, which all have their benefits and drawbacks, we should analyse the grand scenario of statistics education from a comparative perspective and investigate the relative merits and limitations of reducing the concept of probability to a pure frequentist concept. The various schools of statistical inference may no longer be needed.