A seminar on

The Key Concepts of Modern Statistical Thinking with Application

The modern statistical science goes back to 20th century with important contributions that had a substantial impact on development of modern sampling theories, statistical inference and approaches for handling missing data, for example, Fisher's randomisation (1925), Neyman's concept of a confidence interval (1935) and Rubin's Causal Model (Holland, 1986). A carefully crafted study design that is based in the subject matter theory of the studied filed, is one of the crucial aspects of the modern statistical science. The art of cautiously designed studies requires statistical thinking that is based on modern statistical science, i.e., modern statistical thinking.

In the first part of this seminar, a new approach to statistical thinking is presented. This new approach extends the previous definitions of statistical thinking in order to respond to the developments of modern statistical science in the last century, particularly in the field of causal inference. Kolar (2019) defines statistical thinking as a conscious thought process that is based on the knowledge of modern Sampling Theories, approaches to handle Missing Data, understanding about the insights that Descriptive Statistics can and cannot provide, and understanding about the weaknesses and strengths of Inferential Statistics. The fundamental component of this new approach is understanding of the science behind causal thinking. Such understanding enables us to analyse data in a scientifically objective way, and thus assists us in recognising and acknowledging different causal mental models. The causal thinking process consists of two parts. First, we develop understanding of *what is causal conceptually*, i.e., physical versus factual cause, and, second, we develop understanding of *what is causal* according to the modern statistical science. This new approach to statistical thinking is further extended by identifying the key skills and attitudes that are required for development of modern statistical thinking skills.

In the second part of this seminar, we show how modern statistical thinking looks in practice. We examine three study designs: (i) a study design for evaluating impact of air-pollution on children's health; (ii) a study design that provides answers on whether women are more absent at work than men; and (iii) a study design examining differences in wages between men and women.

Speakers:

Dr. Ana Kolar is a Visiting Researcher at Department of Mathematics and Statistics, University of Helsinki, and a founder of Tarastats, Helsinki, Finland.

Dr. Per Johansson is a Professor at Department of Statistics, Uppsala University, Sweden, and at the Yau Mathematical Sciences Center, Tsinghua University, Beijing, China.

Venue: Economicum, sh.3 – 4, Arkadiankatu 7, Helsinki
Time: 12.30 – 15.30