

Jürgen Pilz · Teresa A. Oliveira ·
Karl Moder · Christos P. Kitsos *Editors*

Mindful Topics on Risk Analysis and Design of Experiments

Selected contributions from ICRA8,
Vienna 2019

 Springer

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Editors

Jürgen Pilz
Department of Statistics
University of Klagenfurt
Klagenfurt, Austria

Teresa A. Oliveira
Department of Sciences and Technology
Universidade Aberta
Lisbon, Portugal

Karl Moder
Applied Statistics and Computing
University of Natural Resources
and Life Science
Vienna, Austria

Christos P. Kitsos
Department of Informatics
University of West Attica
Egaleo, Greece

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Preface

In principle, risk is defined as an exposure to the chance of injury or loss. Practically, it is a hazard or dangerous chance and is wondering about the probability that something unpleasant will take place. Therefore, the probability of damage, caused by external or internal factors, has to be evaluated. The essential factors influence the increment of the risk which is asked to be determined. That is why eventually we are referring to relative risk (RR) as one factor might influence the risk in a way that is different from that of another factor. Certainly, interest must be focused on providing qualitative methods to measure the relative risk.

In decision theory, risk is well defined through the appropriate definition of “rules” and a solid Bayesian background. But a number of applications from epidemiology, toxicology, economics, and engineering do not really obey this framework. The logit and probit models provided the first opportunities to work separated from the decision theory. Other techniques have been developed meanwhile approaching the RR in a number of applications.

In epidemiological studies, it is needed to identify and quantitatively assess the susceptibility of a portion of the population to specific risk factors. It is assumed that they have been equally exposed to the same possible hazardous factors. The difference, at the early stage of the research study, is only to a particular factor which acts as a susceptibility factor. In such a case, statistics provide the evaluation of the RR.

Under this line of thought, we started the ICCRA (= International Conference on Cancer Risk Assessment) conferences on August 22, 2003, in Athens, and we proceeded in Santorini, 2007 and 2009. We moved to Limassol, Cyprus 2011, with the essential adjustment to ICRA (= International Conference to Risk Analysis). ICRA5 moved to Tomar, Portugal, 2013, where actually was established the extension of RA to bioinformatics, management, and industry. The SRPRINGER volume in 2013 provides the appropriate evidence. One step forward, further from game theory, towards more fields pertaining to risk, was offered by the second SPRINGER volume, in 2018. Meanwhile, ICRA6 moved to Barcelona, Spain, ICRA7 to Chicago, USA, and ICRA8 in 2019 to Vienna, Austria.

The Vienna ICRA8 conference was a crossroad: Risk analysis performed with design of experiments in a joint conference. How close or how far are the two statistical lines of thought it is really a big issue. It seems difficult to see common ground between decision theory and Fisher's foundation in 1922. You might be closer if you think in terms of clinical trials. We really enjoyed the joint meeting. That is why the present volume is divided in two parts:

Part I: Risk Analysis Development

Part II: Experimental Design Theory

Since the time that Quincy Wright (1890–1970) in his excellent book “A study of War” offered a development of simple indexes evaluating risk, for such an important issue as the war, has passed some time. New indexes, new strategies, and new statistical insight have been developed and SPRINGER volumes try to reflect this improvement and excellent evolution; we try to follow and guide with ICRA conferences.

Jürgen Pilz
Teresa Oliveira
Karl Moder
Christos Kitsos

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