



Overview

Biographical Sketch

- *April 13, 1929, in Vienna
- 1953 PhD (Dr. Phil), supervised by Johann Radon
- Dep. of Statistics in Vienna (W. Winkler's chair); social research institute in Dortmund; Cologne (J. Pfanzagl's chair)
- 1962 Habilitation, thesis on controlling census results
- 1963–1969 chair in statistics, TU Berlin
- 1967–68 university president (Rector), TU Berlin
- from 1969 LMU Munich
- 1974 Foundation of the Institute of Statistics and Philosophy of Science at LMU
- from 1997 emeritus professor
- † February 7, 2016, in Grafing

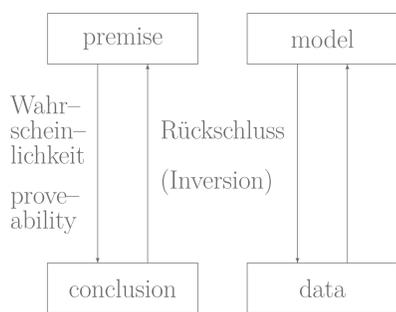


Contributions to ISIPTAs

- ISIPTA '99: The theory of interval probability as a unifying concept for uncertainty.
- ISIPTA '01: The status of F-indicator-fields within the theory of interval-probability.
- ISIPTA '03: On the symbiosis of two concepts of conditional interval probability.
- ISIPTA '05: The logical concept of probability and statistical inference + tutorial
- ISIPTA '07: The logical concept of probability: Foundation and interpretation.
- ISIPTA '09: Symmetric probability theory (special session)

Logical Probability

Two-place function:
 $P(\text{conclusion}||\text{premise})$



Inaugural Speech

[...W]e are challenged with the task to reconceptualise the foundations of probability. The question is whether we can make progress towards a broader concept designation without losing key benefits of the previous – objectivistic – concept.

[...] As in many cases in the history of science it is shown also here that – as a form of compensation for desired benefits – we have to abandon a “habit of thinking” (Denkgewohnheit). In the present case this is the habit of thinking that the probability is always a number. We must instead allow sets of numbers – say the interval between 0.2 and 0.3 – to act as the probability of the inference from the proposition B to the proposition A. [...]

This extension of the probability concept from a number to a set of numbers is encouraged as soon as we try to formalize Fisher's fiducial probability. Therefore, the American Henry Kyburg Jr. has already taken a similar approach [...]

(Weichselberger, 1968, p. 47) [translation from German by TA & RS]

Symmetrical Theory: Weichselberger (2009, V49, 268 pages)

In co-operation with Anton Wallner

I The Logical Concept of Probability

- W-fields: Axioms SI, SII
- Independence

II Duality

- concordant W-fields
- Axiom SIII perfect duality
- applications in the classical context

III Inference

- regression
- preliminary: concatenation of W-fields
- preliminary: quasi-concordance

Elementare Grundbegriffe einer allgemeineren Wahrscheinlichkeitsrechnung, Vol. 1

Contents

1. Background and Historical Overview

2. Axioms

- Measurable space (Ω, \mathcal{A}) , assignments on σ -fields:

$$P(\cdot) = [L(\cdot), U(\cdot)]$$

- Structure \mathcal{M} : set of all Kolmogorovian probabilities compatible with $P(\cdot)$
- R-probability: $\mathcal{M} \neq \emptyset$ ($\xrightarrow{\approx}$ avoiding sure loss)
- F-probability: $L(\cdot)$ and $U(\cdot)$ are envelopes of \mathcal{M} ($\xrightarrow{\approx}$ coherence): $\forall A \in \mathcal{A}$:

$$L(A) = \inf_{p(\cdot) \in \mathcal{M}} p(A) \quad \text{and} \quad U(A) = \sup_{p(\cdot) \in \mathcal{M}} p(A).$$

- From R-probability to F-probability
 - rigorous standpoint ($\xrightarrow{\approx}$ natural extension)
 - cautious standpoint ($\xrightarrow{\approx}$??)



3. Partially determinate probability

- Assessments on $\mathcal{A}_L, \mathcal{A}_U \subseteq \mathcal{A}$
- normal completion ($\xrightarrow{\approx}$ natural extension)
- probability intervals (PRI)
- cumulative F-probability: $\xrightarrow{\approx}$ p-boxes



4. Finite Spaces

- Linear programming
 - Checking R- and F-probability
 - Calculation of natural extension and of the assignment resulting from the cautious standpoint.
 - Duality theory is also powerful for deriving theoretical results
- Generalized uniform probability/principle of insufficient reason
 - *Epistemic Symmetry*: No knowledge of asymmetry (negative symmetry)
 - *Physical Symmetry*: Knowledge of symmetry (positive symmetry)



Planned Volume II, Activities



- manuscript of some 350 pages
- law of large numbers
- conditional probabilities: *intuitive* versus *canonical* concept
- Bayes' theorem
- parametric models: interval-valued parameters
- Workshop in Melchsee-Frutt
 - Walley, Goldstein, Hampel, Coolen, Morgenthaler, Smets ...
- The first ISIPTAs
- Lev Utkin in Munich as Humboldt Fellow
- Colloquia on the occasions of 75th and 80th birthday