Imprecise probabilities workshop

Centre International de Mathématiques et Informatique de Toulouse

Toulouse, 27-29 May 2015

CIMI Toulouse

- Excellence Laboratory chosen by the ANR for 2012-2020 with the participation of:

    - Institut de Mathématiques de Toulouse (IMT)

    - Institut de Recherche en Informatique de Toulouse (IRIT)

Main goals of the workshop

- Bringing together European specialists on different areas of Imprecise Probabilities and more classical statisticians from the IMT.

- To make Imprecise Probabilities more visible for the scientific community in Toulouse.

- Favor direct contacts between scientists that are representative of different areas of imprecise probabilities.

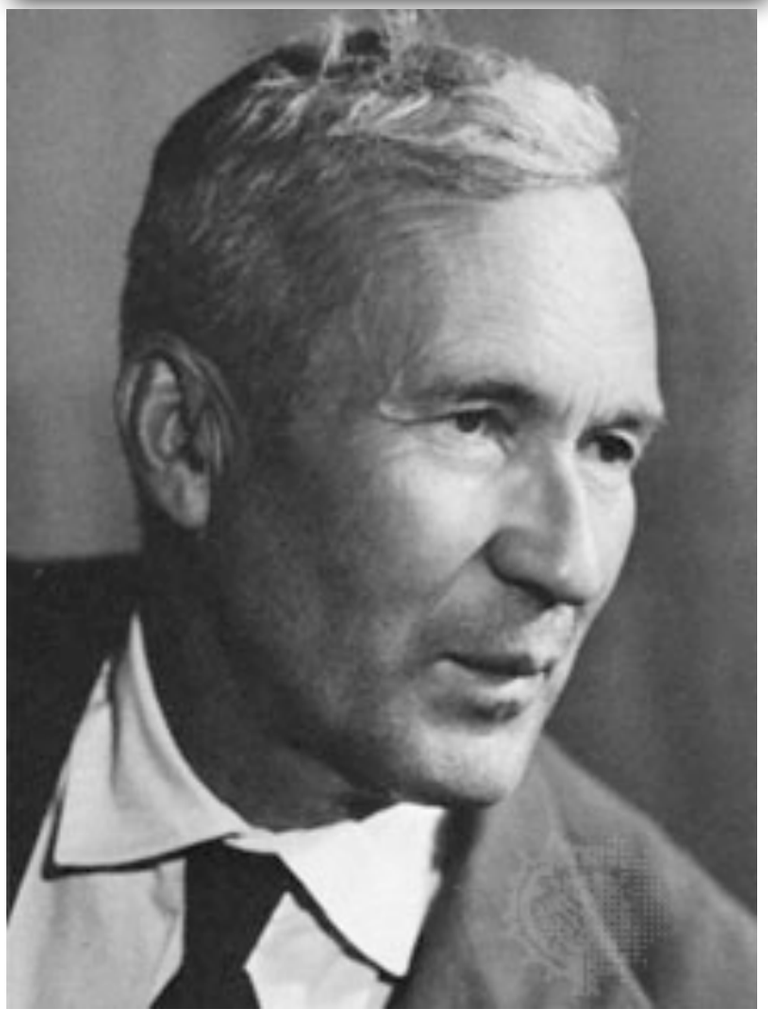
Invited speakers

- Five from Belgium, Germany, Spain, Switzerland and UK.
- Five from France (outside Toulouse).
- Six from Toulouse:
  - Two from IMT.
  - Four from IRIT.

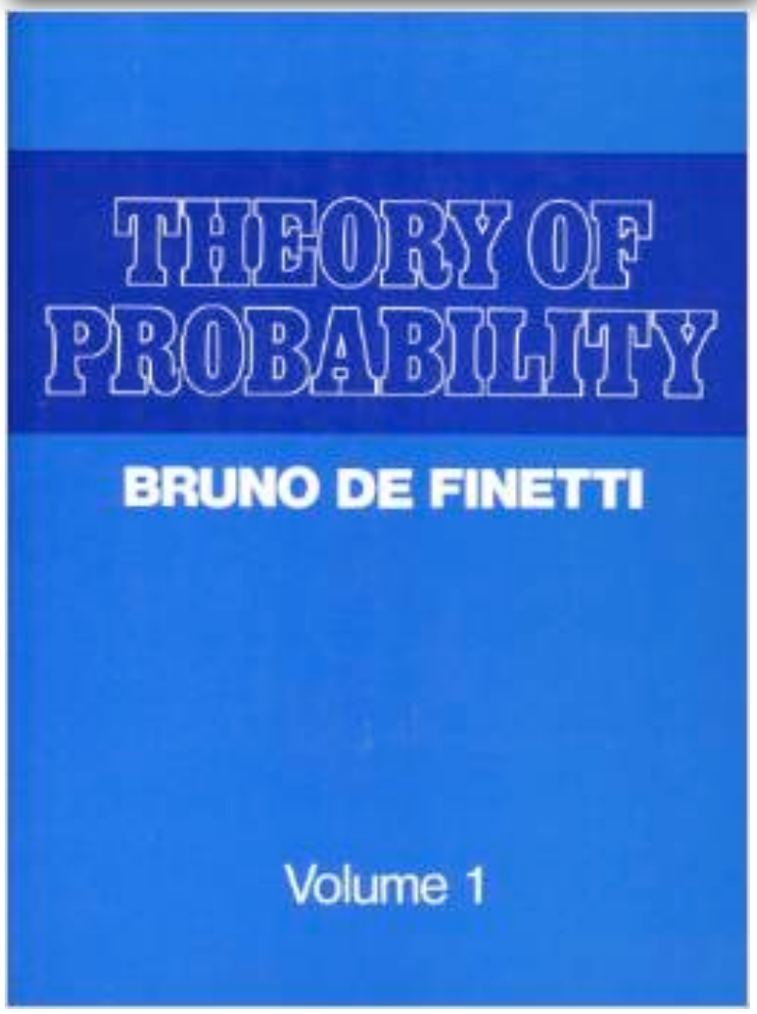
Different definitions/interpretations of probability

CLASSICAL

FREQUENTIST



SUBJECTIVE



Introduction to Imprecise Probabilities

- Term “Imprecise Probabilities” coined by P. Walley.

- Walley extends De Finetti’s subjective approach.

    - De Finetti: personal fair prices (“previsions”) for buying and selling random variables (“gambles”).

    - Walley: upper buying prices, lower selling prices (lower and upper previsions). He provides a representation of partial knowledge.

Desirability and preference

- Experts provides:
    - partial preference pre-orderings between gambles or
    - sets of desirable gambles
- This information leads to a pair of upper and lower previsions defined on the set of gambles; equivalently, to a convex set of probabilities over the set of states of nature.

Similar formal frameworks, different approaches

- Frequentist approach: interval data.
- Generalised Bayesian models: set of priors.
- Subjective behavioural approach: desirability, partial preference relations between gambles.

Special cases

- Probability measures.
- Possibility and necessity measures.
- Infinite order capacities (belief and plausibility measures).
- Order n capacities.
- Order 2 capacities.

References

- P. Walley, Statistical reasoning with imprecise probabilities, Chapman and Hall, 1991.

- T. Augustin, F.P.A. Coolen, G. de Cooman, M.C.M. Troffaes (eds), Introduction to Imprecise probabilities, Wiley, 2014.

- M.C.M. Troffaes, G. de Cooman, Lower previsions, Wiley, 2014.

Outline of the workshop

- **Decision making:** Matthias Troffaes (Durham), Olivier Spanjaard (Paris), Didier Dubois (Toulouse).

- **Estimation, regression models, classification, machine learning:** Thomas Augustin (Munich), Thierry Denoeux (Compiègne), Sébastien Destercke (Compiègne), Silvie Galichet (Annecy), Aurélien Garivier (IMT, Toulouse), Romain Guillaume (IRIT, Toulouse), Jean-Michel Loubes (IMT, Toulouse), Serafín Moral (Granada), Mathieu Serrurier (IRIT, Toulouse).

- **Graphical models:** Alessandro Antonucci (Lugano), Serafín Moral (Granada).

- **Stochastic processes:** Gert de Cooman (Ghent).

- **Applications to risk analysis:** Erik Chojnacki (Cadarache).

- **Applications to signal processing:** Olivier Strauss (Montpellier).

Practical information

- Coffee breaks outside this room.
- Lunches at Upsidum: