# The Language of Desirable Gambles for Imprecise Probabilities

Serafín Moral

University of Granada, Spain

smc@decsai.ugr.es

**Abstract**

In most of the cases, imprecise probability is represented by means of probability intervals, upper and lower previsions, or credal sets (closed and convex sets of probability distributions). However, there is a language based on sets of desirable gambles [4, 2, 1] that presents some advantages. First, it is more general than the other models, and for this reason it was advocated by [3] as the unifying theory of imprecise probability. The second reason, is that in spite of this generality, many of the most important concepts and results are more easily expressed, justified, and proved using desirable gambles. This talk is devoted to discuss and support the use of this model. I shall illustrate with examples the representation of a variety of situations in which there is uncertainty and partial ignorance. Then, I shall concentrate in the concepts of natural extension, conditioning, and independence, showing variations of the basic axioms for different notions of conditioning. A very important property of this model is the possibility of expressing how to make conditioning to events of probability equal to zero. I shall discuss the implications of it in the properties of conditional independence and in procedures for knowledge revision. Finally, I will show how to carry out local computations in join trees under epistemic independence. This problem has been studied with the credal set representation but it has turned out to be extremely complex. When we look at it with the gambles representation, a simple procedure can be easily devised.

## References

[1] N. Wilson, S. Moral (1994) A logical view of probability. *Proceedings of the 11th European Conference on Artificial Intelligence (ECAI-94)*, pp. 71–95.

[2] P. Walley (1991) Statistical Reasoning with Imprecise Probabilities. *Chapman & Hall, London.*

[3] P. Walley (2000) Towards a unified theory of imprecise probability.*International Journal of Approximate Reasoning* 24, 125–148.

[4] P.M. Williams (1975) Coherence, strict coherence and zero probabilities. *Fifth international Congress of Logic, Methodology and Philosophy of Science*, pp. VI, 29–33.

L. Magdalena, M. Ojeda-Aciego, J.L. Verdegay (eds): Proceedings of IPMU'08
Torremolinos (Málaga), June 22–27, 2008