

# Imprecise probability assessments and the Square of Opposition

Invited abstract in session **WB-11: Probabilistic Models**, stream **Probabilistic Models**.

Area: Artificial Intelligence, Fuzzy Systems and Computing

**Wednesday, 10:30-12:00**

Room: Building CW, 1st floor, Room 127

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## Abstract

There is a long history of investigations on the square of opposition spanning over two millenia. A square of opposition represents logical relations among basic sentence types in a diagrammatic way. The basic sentence types, traditionally denoted by A (universal affirmative: "Every S is P"), E (universal negative: "No S is P"), I (particular affirmative: "Some S are P"), and O (particular negative: "Some S are not P"), constitute the corners of the square, and the logical relations--contradiction, contrarity, subalternation, and sub-contrarity--form the diagonals and the sides of the square.

We investigate the square of opposition from a probabilistic point of view. To manage imprecise assessments which generally are non-closed or non-convex sets, we generalize the notions of coherence for interval-valued probability assessments to the case of imprecise (in the sense of set-valued) probability assessments. We interpret a basic sentence type as a pair  $(F, I)$ , where  $F$  is a sequence of conditional events and  $I$  is an imprecise probability assessment on  $F$ . Moreover, by means of the notion of  $g$ -coherence, we introduce the above mentioned logical relations among our probabilistic interpretation of the sentences.

Then we show how to construct probabilistic versions of the square of opposition by forming suitable tri-partitions. Finally we present applications of the probabilistic square of oppositions to study defaults and the semantics of quantified statements.

## Keywords

- Artificial Intelligence

**Status:** accepted