

- ▶ GUILLERMO BADIA, RONALD FAGIN, AND CARLES NOGUERA, *Completeness theorems for first-order real-valued logics with multidimensional sentences*.
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Many-valued logics in general, and real-valued logics in particular, usually focus on a notion of consequence based on preservation of full truth, typically represented by the value 1 in the semantics given in the real unit interval $[0, 1]$. In a recent paper [1], Ronald Fagin, Ryan Riegel, and Alexander Gray have introduced a new paradigm that allows to deal with inferences in *propositional* real-valued logics based on a rich class of sentences, multi-dimensional sentences, that talk about combinations of any possible truth-values of real-valued formulas. They have given a sound and complete axiomatization that tells exactly when a collection of combinations of truth-values of formulas imply another combination of truth-values of formulas. In this talk, we will extend their work to the first-order (as well as modal) logic of multi-dimensional sentences. We will give axiomatic systems and prove corresponding completeness theorems, first assuming that the structures are defined over a fixed domain, and later for the logics of varying domains. As a by-product, we will also obtain a 0-1 law for finitely-valued versions of these logics.

[1] Ronald Fagin, Ryan Riegel, and Alexander Gray. *Foundations of Reasoning with Uncertainty via Real-valued Logics*, arXiv:2008.02429v2, 2021.