

The Prague Seminar on Paraconsistent Logic II

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Ofer Arieli: Four-valued parafinite logics. Parafinite (‘beyond the definite’) logics are logics that can be used for handling contradictory or partial information. As such, parafinite logics should be both paraconsistent and paracomplete. In this talk we consider the simplest semantic framework for defining parafinite logics, consisting of four-valued matrices, and study the better accepted logics that are induced by these matrices. (This is a joint work with Arnon Avron.)

Anna Zamansky: A paraconsistent view on some modal logics. Paraconsistent logics are logics that in contrast to classical and intuitionistic logic, do not trivialize in the presence of inconsistent theories. In this talk we take a paraconsistent view on some well-known modal logics, including the well-known logics B and S5. We show that while B and S5 are both members of the well-studied family of paraconsistent C-systems, they are remarkable due to having the replacement property, which means that equivalence of formulas implies their congruence. We also discuss some further remarkable properties of these logics. (This is a joint work with Arnon Avron.)

Arnon Avron: Paraconsistent fuzzy logics. We describe a general non-deterministic framework, based on truth-degrees, for conservatively extending the positive fragments of the standard fuzzy logics with an involutive negation, so that the resulting logics respect the law of excluded middle, but are paraconsistent. We show that the resulting logics and the method have certain advantages over previous methods for developing paraconsistent fuzzy logics. We also show that one of the main logics which are obtained in our framework, GN, is equivalent (via translations) to the well-known semi-relevant logic RM. For this particular logic GN, as well as to several other related ones, we provide in a modular way Kripke-style semantics, and cut-free hypersequential sound and complete proof systems.

Tomáš Jakl: Bitopological view on Belnap’s logic. Bilattices and bitopological spaces are two different kinds of structures with a four-valued interpretation. In this talk, we introduce d-frames as algebraic duals of bitopological spaces and show some benefits of this approach. We also mention how an exchange of ideas from both worlds has already positively influenced both fields of study. In particular, we show how one can obtain non-symmetric models of a Belnap’s logic.

Michele Pra Baldi and Stefano Bonzio, Paraconsistent Weak Kleene logic: Syntax and semantics. In this talk, we study both syntax and semantics of Paraconsistent Weak Kleene logic, one of the three valued logics within the Kleene family. In the first part of the talk we will introduce its algebraic counterpart, involutive bisemilattices, and study PWK under the perspective of Abstract Algebraic Logic. In the second part, we will focus on its syntax, providing both a Hilbert style and a sequent calculus. Observing that all the existing sequent calculi for paraconsistent three-valued logics (including both PWK and LP) present non-standard features, for instance non-atomic axioms, logical rules introducing more than one connective, or logical rules that can be applied only in presence of certain linguistic conditions, we prove the impossibility of providing standard (whose definition will be made precise) sequent calculi for a family of logics including both LP and PWK.

Adam Přenosil: Invertible sequent calculi for super-Belnap logics. In this talk, we introduce a Gentzen-style proof theory for super-Belnap logics (extensions of the four-valued Dunn–Belnap logic), expanding on an approach initiated by Pynko. Just like substructural logics may be understood proof-theoretically as logics which relax the structural rules of classical logic but keep the logical rules as well as the rules of Identity and Cut, super-Belnap logics may be seen as logics which relax Identity and Cut but keep the logical rules as well as their inverses and the structural rules of classical logic. A generalization of the cut elimination theorem for classical propositional logic is then proved and used to establish interpolation for various super-Belnap logics. In particular, we obtain an alternative syntactic proof of a refinement of the Craig interpolation theorem for classical propositional logic discovered recently by Milne.