Abstract ID: 427

Abstract category: A2. Philosophical Logic

Presentation type(s): Contributed symposia

Ratio ad contrarium: the logical and philosophical importance of reasoning under contradictions

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The paraconsistent paradigm of reasoning, in particular the paraconsistent logics, consists of expanding traditional logic in various ways in order to maintain sensible reasoning under the presence of actual or potential contradictions. It is a remarkable philosophical wonder that a traditional wisdom which concerns the so-called “dialectical reasoning” in Western philosophy, as beautifully summarized by Lao-Zi (or Lao-Tzu, founder of Taoism), "being and nonbeing produce each other", seems to be applicable to contemporary science, from mathematics to computer science and the natural sciences. The interest of developing techniques, as well as philosophical theories, dedicated to tackle the wide question of carrying out reasoning in the presence of inconsistency seems to be a hallmark of the contemporary scientific society. This symposium aims to explore this theme in a broad sense.

Probability measures of the inconsistent-- and of the contradictory

Popper famously warned, in his “What is dialectic?” of 1940, that “once a contradiction were admitted, all science would collapse”. Thus one of the most prominent philosophers of science would never admit positive probability of a contradiction, with good reason: in traditional logic, if one admits to accept A and ~A at the same time, any proposition will be derived from them. But perhaps Popper, as many other philosophers, will have failed to notice that logic and probability are completely dependent: as non-classical logics have flourished nowadays, unless we stick to strict logical monism it is only natural to think on probabilities based on such new logics. A few logicians have already considered, for instance, the possibility of attaching positive values to contradictory propositions, opening the way to paraconsistent probabilities. The same for intuitionistic logic, giving rise to incomplete or default probabilities.

I intend to show here how a very natural notion of probability measure can be assigned to the (paraconsistent) Logics of Formal inconsistency, so that distinct contradictory beliefs may have significantly different probability degrees, reflecting the fact that not all contradictions are necessarily equivalent. Moreover, the notion of consistency can also be attached a measure of probability, and the interplay between the notions of contradiction and consistency generalizes the classical instance of probability. This permits one to define a new notion of Bayesian conditionalization, with interesting consequences for the adventure of reasoning, including for the riddles of Quantum Mechanics.

Paraconsistency as evidence preservation: a natural deduction approach

The acceptance of a pair of contradictory sentences A and not A in
Paraconsistent logics may be understood as the occurrence of conflicting evidence about the truth value of A. Evidence that A is true (or false), in its turn, may be understood as reasons for believing that A is true (or false). From this point of view, the notion of preservation of evidence presents itself as a topic to be further developed in paraconsistency.

In the BHK interpretation for intuitionistic logic, natural deduction rules preserve of (some sense of) construction. Analogously, we present a natural deduction sentential system designed to express preservation of (some sense of) evidence. The system is paraconsistent and paracomplete, since neither explosion nor excluded middle hold, although double negation equivalence holds. The inference rules for disjunctions, conjunctions and conditionals are obtained in two steps. First, we ask about the sufficient conditions for having evidence that a given proposition is true. We ask then what would be sufficient conditions for having evidence that a given proposition is false. Each step produce rules whose conclusions are disjunctions, conjunctions, conditionals and negations of these formulas. Once the introduction rules are obtained, we get the elimination rules, as suggested by Gentzen, as 'consequences' of the introduction rules.

Although the system so obtained is able to express the notion of preservation of evidence, and not preservation of truth, by applying the resources of the logics of formal inconsistency, classical logic is recovered with respect to propositions whose truth value has already been conclusively established. Once classical logic is recovered, the system turns out to be able to give also an account preservation of truth. (Joint work with Walter Carnielli).

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Der Läufer darf gerade ziehen und der Läufer darf nicht gerade ziehen?

*Sketches for an anthropological philosophy of paraconsistency, based on the notion of rules*

In Grundgesetze II, Frege (1903) incidentally uses the notion "conflict of rules" ("Widerstreit der Regeln") to explain what contradictions are, when he is critically evaluating some formalist accounts of mathematical practices and entities. In 1930, when Wittgenstein was preparing Waismann for representing him in a very influential panel on the Philosophy of Mathematics to be held in Königsberg, he explicitly borrows from Frege's discussions this notion "conflict of rules" to criticize Hilbert's metamathematical enterprise, especially his account of consistency (Widerspruchsfreiheit). Due to these discussions with members of the Vienna Circle (1929-1932), some authors suggest that Wittgenstein could be held as a forerunner of paraconsistent logics. Indeed, Wittgenstein, during these discussions, and in other texts from the same period, reacts very tolerantly to some non-classical reasoning, especially in the presence of formal contradictions. In this talk, we will not engage in the evaluation of Wittgenstein being a real forerunner for some non-explosive logics, but rather we will investigate why and how the notion of rules in a game could be a seminal philosophical alternative in understanding the nature of contradictions without the appeal to dialetheias. In the beginning of the 30's, Wittgenstein's focus was neither on formal trivialization nor on any mandatory collapse of calculi which entail contradictions, but rather he was already sketching a very comprehensive anthropological account of logic. This account may help us to articulate, through the notion of normativity and rules, the nature of formal systems and the relevance of human practices in the construction of both paracomplete and paraconsistent logics.

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On Paraconsistent Belief Revision: the AGM rationality criteria revisited

Belief revision is the process of changing beliefs to take into account a new piece of information. The AGM system, a most influential work in this area of study, adopts the following rationality criteria:

1. when possible the belief set should remain consistent; 
2. any sentence logically entailed by beliefs in a set should be included in it; 
3. when changing beliefs, loss of information should be kept to a minimum; 
4. beliefs held in higher regard should be retained in favor of those held in lower regard.
The strong relation among those criteria will be discussed. The focus is to present the AGM-like systems of Paraconsistent Belief Revision developed by the authors, and to discuss the concept of rationality captured by those systems. By permitting the reasoning from contradictory belief sets, Paraconsistent Belief Revision offers more flexible ways of revisions, expounding the important opposition between consistency and minimality (concerning the first and third criteria respectively).