ABSTRACTS

A2.17 Philosophical Logic

Anderson and Belnap's Confusion

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Anderson and Belnap, in their otherwise very thorough grammatical appendix to volume 1 of their book 'Entailment', knew that they were treading on shaky ground. For they wanted to make it philosophically respectable, they said, to 'confuse' two things. Their attempt was to 'make it philosophically respectable to "confuse" implication or entailment with the conditional'. But there are other cases they needed to consider besides the ones they did which show that they definitely created confusion, thereby failing to make the matter 'philosophically respectable.' Clarifying the matter has a number of significant consequences not only for their work on Entailment, but also for the Relevance Logic tradition and indeed standard propositional logic quite generally.

Metalogical Decorations of Logical Diagrams

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In the last few decades, the classical square of oppositions has been extended to larger diagrams such as hexagons and cubes, and applied to various contemporary logical systems such as modal logic. Recently, logicians have also started using Aristotelian diagrams to visualize the relations between metalogical notions such as tautology and consistency. In this presentation, we will extend this line of work and provide a unifying perspective on the existing results. Next to the set of Aristotelian relations, we define three other sets of logical relations, viz. opposition, implication and duality relations.

It can be shown that every pair of formulas stands in exactly one of the four opposition relations, viz. contradiction (CD), contrariety (C), subcontrariety (SC) and non-contradiction (NCD). Hence, they constitute a quadripartition of logical space, whose powerset consists of $2^4 = 16$ elements, and can be visualized by means of a three-dimensional rhombic dodecahedron (RDH). This diagram is significantly larger than the metalogical hexagons studied so far, and moreover, turns out to contain many of them as subdiagrams. For example, several authors distinguish between 'strong' and 'weak' senses of contrariety, which correspond to C and C v CD, respectively. We can define a second 'weak' sense of contrariety, viz. as C v NCD, and prove it to be dual to the first (in the sense that two formulas are in C v CD iff their negations are not in C v NCD). The Aristotelian and duality relations between these various senses of contrariety can be visualized by means of octagons, which are subdiagrams of RDH (see Figures 1 and 2).

Since implication is a partial order, we can construct a second metalogical RDH for the implication relations. This stands in sharp contrast to the well-known hexagon for the arithmetical ordering between numbers, which is a total order.
Notions of relevance for classical logic.

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In a sense, all logics should be relevance logics. After all, since ancient times, lack of relevance between premisses and conclusions has been considered a logical defect and not only a rhetorical shortcoming. Of course, some logical systems, including classical logic, have prominently failed to have some types of relevance, such as variable-sharing. On top of that, the very notion of relevance is notoriously difficult to make precise if we want to avoid psychological overtones. Because of this, some logicians have postulated that relevance, at least in some versions of the notion, is not a necessary condition for logical correctness. Yet, there are strong reasons to try to find for each notion of logical correctness at least one notion of logical relevance, and to distinguish such a notion from related notions of a more psychological nature. This paper builds on seminal work on the semantic content of declarative propositions and reviews some informational notions of relevance exhibited by several important logical systems, including good ol’ classical logic itself. This shows that in those cases and at least in some very precise senses of relevance, our age-old intuitions could be satisfied.

On the Multiple Advantages of a Certain Uniform Framework for Consequence

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One way of semantically characterizing the received notion of logical consequence [A. Tarski, D. Scott] is by way of certain distinguished truth-values being preserved from the set A of sentences taken as premises to the set B of sentences taken as alternative conclusions. This can also be framed in terms of the incompatibility between the attitudes involved in accepting A while simultaneously not accepting B; equivalently, it may be put in terms of the incompatibility between rejecting B while not rejecting A. Capitalizing on the assumed contradictory opposition between acceptance and rejection, one may then argue that logics are in fact two-valued [R. Suszko], and insisting on the bipolarity of attitudes one may argue that standard logics are, after all, mono-valued [Y. Shramko–H. Wansing].

Heterodox approaches to consequence often proceed by generalizing the standard approach in allowing acceptance and rejection to be independent attitudes, thus preventing the coincidences between acceptance and nonrejection, and between rejection and nonacceptance. In that respect, one well-explored alternative is the notion of q-entailment [G. Malinowski], according to which nonacceptance is allowed to intersect nonrejection, and B is said to follow from A when it is incompatible to nonaccept A while simultaneously nonrejecting B. Dually, according to the notion of p-entailment [S. Frankowski], acceptance may intersect rejection, and B is said to follow from A when it is incompatible to accept A while simultaneously rejecting B. If one strives to characterize such heterodox notions of entailment according to the Tarskian framework, it will appear that standard properties of consequence (such as extensiveness, or cut) fail. However, using a framework that allows for independent collections of distinguished truth-values, all the above notions are easily seen to be particular examples of a more general four-place entailment [A. Bochman]. In our contribution we will show how such uniform framework connects to modern reconstructions of the square of oppositions, to bilattice-based reasoning, and to nondeterministic semantics.