Frank J. Wroblewski
EstelleW@uwyo.edu
1662 Coughlin Street, Laramie, Wyoming 82072

Completing Classical Logic

Classical logic founders on truth-value gaps when it comes to guide a consistent discourse involving unavoidable indeterminacies such as Heisenberg's uncertainty. Two chronic deficiencies disable it in this task. First, of the two Sheffer hypotheses underlying classical logic, the truth conditions falsifying joint-denial overlook the case where one propositional component is the denial of the other. Second, classical truth-values are limited to propositions determined to be true or determined to be false. Propositions not so determined are left without truth-values, hence truth-value gaps. Indeed, the indeterminacies of particle physics refute the law of bivalence. By exhausting the truth-values via the law of excluded middle, we gain the complementary truth-value 'neither true nor false,' which defines 'indeterminate.' The indicated accretions complete and preserve the core classical logic. The truth conditions for an indeterminate joint-denial are deduced. It remains to deduce the truth conditions conferring the three truth-values on the other propositional connectives defined by joint-denial.

Quantification truths accommodating indeterminacy are deduced from the hypotheses for quantification found in Quine's 'Mathematical Logic' with which familiarity is assumed. Thus, we deduce the correct form of existential instantiation. Quantification is shown to collapse in a true-false dichotomy. Undecidable propositions prove to bear two or three alternate truth-values.