Is the disjunctive form really normal? Teaching boolean algebra via original sources

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In 1847, George Boole launched the study of boolean algebra with a bold new approach to logic. He further developed this approach in his 1854 *An Investigation of the Laws of Thought*. Although few copies sold when it first appeared (Boole and a friend who bore the expense of its initial printing probably did not recover their costs), the algebraic methods of *Laws of Thought* attracted considerable attention in ensuing years. Axiomatized by Edward V. Hungtington in 1904, the abstract structure known today as a *boolean algebra* was eventually recognized as an important tool in applications outside of mathematics, most notably in Claude Shannon's groundbreaking work on circuit design of 1938. Boolean algebra remains important today, as both an interesting mathematical object in its own right and a powerful tool for applied practitioners.

This talk surveys the (hi)story of Boole's 'Algebra of Logic' through a sequence of three student projects based on original source readings from Boole, Huntington, Shannon and others. We then focus on extracts from the third project that introduce the concept of *disjunctive normal form* through excerpts from Boole and Shannon. Experiences using these projects with both undergraduates and advanced middle school students will be shared.