Simposio Internacional: El legado de Alan Turing
***International Symposium**: The Alan Turing lagacy*

Madrid, 23-24 de octubre de 2012
Madrid, October 23-24, 2012

George Boole, a precursor of today's Computer Algebra based Demonstrations

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In the monograph "The Genesis of Boole´s Logic, its History and a Computer Exploration" (L. M. Laita, Memories of the Royal Academy of Sciences of Madrid, Mathematics, Volume XXXIII (2005), I studied the historical, philosophical and scientific influences led by the great English mathematician and logician George Boole. The question is: why in this short talk are Alan Turing (born 1912, died 1954) and George Boole (born 1815, died 1864) linked? In outline, the answer to the question "why" is that their works can be considered as intimately related to what today is known as "Symbolic Computation". The computation model provided by Turing Machines, as well as their more modern computation models, proved to be equivalent in some crucial ways to universal Turing machines, and can be considered Symbolic Computation, as they are based on strict programs and strict concepts of the word "algorithm". The link with George Boole is established on our claim that his algebraic logic demonstrations, based on a methodology called "the method of Separation of Symbols", first used in France by, among others, Lagrange, Laplace and Arbogast, was later used in Great Britain (by, for instance, the Scottish mathematician Duncan F. Gregory) and was subsequently developed fully and in-depth by Boole. More importantly, as we will try to show in our exposition, Boole's use of the method of separation of symbols can be extended to what now is known as "Symbolic Computation"; in particular, but not exclusively, dealings with symbolic logic proofs based on Buchberger´s Gröbner bases. As we will illustrate, this can be used in what in Artificial Intelligence are known as "expert systems". As far as we know, neither Boole nor Turing ever referred to "Artificial Intelligence", but we believe that some of their thoughts were directly related with this topic.