"BECAUSE THERE ARE NO OTHER IN THE PRINTING HOUSE". ON THE RELATIONSHIP BETWEEN PRINTING TECHNIQUES AND THE ALGEBRAIC SIGN SYSTEMS IN TEXTBOOKS FROM THE 16TH TO 18TH CENTURIES IN SPAIN

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Since the invention of the movable type printing press in Mainz, composition of algebra books has had to be done with the technical means available to each printing house, types for the letters and other signs, and blocks for the figures. These technical characteristics of printing have had consequences in the development of algebraic sign systems, which, in the case of France in the 16th century, have been studied by Loget (2012), showing the role of authors and printers in cases in which the printers were directly involved. We present here two cases from Spain: the case of cossic signs, and that of a sign for equality derived from the Zodiac sign Libra, ♎, used in Spain in the 16th to 18th centuries.

The first book printed in Spain dealing with algebra is Aurel (1552), written by a German, and published by the Flemish printer Joan de Mey in Valencia, where he settled in the mid-16th century. Aurel used the German cossic signs and de Mey had them available in his printing house or brought them from Flanders. However, cossic signs do not appear again in any other book printed in Spain, except in a short one, Tolra (1619), published as an appendix to his Spanish translation of Ventalloll's arithmetic. After Aurel's, the second one was Pérez de Moya (1558), in which, once cossic characters are presented, he says that he is going to use abbreviations similar to the Italian ones instead "because there are no others in the printing house". His decision had a great impact because he kept it when he included this book in Pérez de Moya (1562), which was reprinted some thirty times until 1798. And he kept it despite the fact that the printer, the Flemish Mathias Gast, is known for the quality and variety of fonts he used.

In the case of the equals sign, Pérez de Moya (1573) also justifies replacing it with "ig. à", the abbreviation for "igual à [equals to]", for the same reason. Zaragozà (1669) reacts in another way: he personally makes punches, matrices and types, as the types, including that equals sign, which he prefers to the one used by Descartes, do not exist in the printing house either. And Omerique (1689) does not renounce using that equals sign either, and resorts to composing a similar sign with two existing types in the printing house. This equals sign was melted again for Tosca (1706) by the printer Antonio Bordazar, who, like Tosca, was an active member of the group of scientists known as the "Novatores" ("Innovators"), who met in Valencia regularly. It was also used in other books at least until the end of the 18th century, and we know that it was used in handwriting, as is particularly attested to by a manuscript (Corachán, undated), which contains a Spanish translation of Rolle's *Traite d'algebre*, in which Corachán, another member of the "Novatores", "translates" Descartes equals sign by this equals sign derived from the Zodiac sign Libra.

Aurel, Marco (1552). *Arithmetica Algebratica*. Valencia: Joan de Mey.
Loget, François (2012). Printers and algebraists in mid-16th century France. *Philosophica, 87*, 85-116.
Omerique, Antonio Hugo de (1698). *Analysis geometrica*. Gadibus: Christophori de Requena.
Pérez de Moya, Juan (1558). *Compendio de la regla de la cosa o arte mayor*. Burgos: Martin de Bitoria.

Pérez de Moya, Juan (1562). *Arithmetica practica y speculativa*. Salamanca: Mathias Gast.

Pérez de Moya, Juan (1573). *Tratado de Mathematicas*. Alcalá de Henares: Juan Gracián.

Corachán, Juan Bautista (undated). *Tratado de la Algebra*. Manuscript GM388. Archivo del Real Colegio de Corpus Christi de Valencia.

Tolra, Juan Baptista (1619). *Tratado de la Arte Mayor de la Arismetica llamada Algebra o Regla de la Cosa*. Tarragona: Gabriel Roberto.

Tosca, Thomas Vicente (1709) *Compendio mathematico: en que se contienen todas las materias mas principales de las ciencias, que tratan de la cantidad. Tomo II, que comprehende Arithmetica superior, algebra, musica*. Valencia: Antonio Bordazar.

Zaragozà, Joseph (1669). *Arithmetica Universal, que comprehende el arte menor, y maior, algebra vulgar, y especiosa.* Valencia: Geronimo Vilagrasa.