Squares, Cubes and Circles. Sketches of Oppositional Geometry between Geulincx and De Morgan

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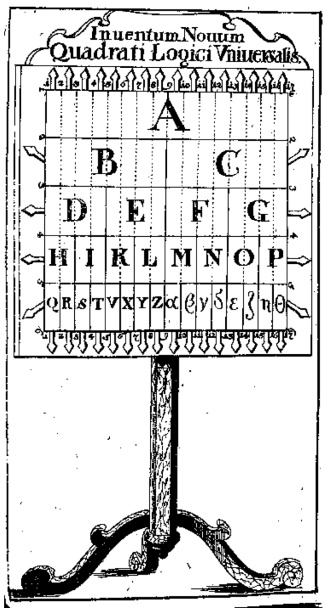
Normally the history of oppositional logic and esp. "oppositional geometry" is focused on squares of opposition in the middle ages and the 20th century: Aristotle has used terms of "oppositional geometry" such as "contrariety" and "contradiction" [1] which were elaborated by (Ps-)Lucius Apuleius Madaurensis in form of a "quadrata formula" [2]. This square of opposition became popular by scholastic philosophers. The oldest document of this geometrical form was found in a Church in Gotland [3]. Finally, in the 20th century, the square of opposition was transformed in a "logical hexagon" and a "logical tetrahexahedron" [1, 4] by Augustin Sesmat (1951) and Robert Blanché (1953).

In addition to that history, my talk brings up a discussion on the geometry of logical opposition between the 17th and the 19th century. A few examples can be mentioned to show the diversity of topics: At first, I will argue that Arnold Geulincx has invented a logical cube in which a square of opposition is integrated, cf. [5]. But another, more sophisticated form of the logical cube was provided in Johann Christian Lange's *Inventum novum quadrati logici universalis*, published in 1714. This cube (see frontispiece below) combines Eulerian diagrams (by using cubes in a vertical order) with oppositional geometry (by using arrows). In the last part of my talk, I will show the connection between the early modern forms of oppositional geometry with modern logic, esp. the analysis of Augustus De Morgan [6].



References

1. A. Moretti, "Arrow Hexagons", in: *The Road to Universal Logic: Festschrift for the 50th Birthday of Jean-Yves Béziau, vol. 2*, A. Koslow and A. Buchsbaum, eds., Basel: Birkhäuser, pp. 417–489.

2. H. Schepers: "Logisches Quadrat", in: *Historisches Wörterbuch der Philosophie, vol. 7*, H.J. Ritter, K.Gründer et al., eds., Basel, 1971 et seqq., pp. 1733–1736.

3. U. O'Meadhra, "Medieval Logic Diagrams in Bro Church, Gotland, Sweden", *Acta Archaeologica*, vol. **83**, 2012, pp. 287–316.

4. A. Moretti, *The Geometry of Logical Opposition*, PhD thesis, 2009, chapter 7.

5. A. Geulincx, "De Cubo Logico", in: *Methodus inveniendi argumenta, quae solertia quibusdam dicitur*, Lugdunum Batavorum, 1675, cap. VII.

6. A. De Morgan, "Logical Bibliography", *Notes and Queries*, vol. **3:6**, 1864, pp. 101—104.