

Stoicheia in Prior Analytics?

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ARISTOTELES 2400 YEARS (Academy of Athens, 14-17 Jan. 2017)

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Oxford Studies in Ancient Philosophy, 53 (2017).

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14 valid syllogistic moods, e.g. Barbara

if AaC and CaB , then AaB (C is called “middle term”)

φανερὸν δὲ καὶ ὅτι, ὅταν τὸ A τῷ B ὑπάρχη, εἰ μὲν ἔστι τι μέσον, ἔστι δεῖξαι ὅτι τὸ A τῷ B ὑπάρχει, καὶ στοιχεῖα τούτου ἔστι ταῦτα καὶ τοσαῦθ' ὅσα μέσα ἐστίν· αἱ γὰρ ἄμεσοι προτάσεις στοιχεῖα, ἢ πᾶσαι ἢ αἱ καθόλου. (Posterior Analytics I. 23, 84^b19-22)

It is evident that when A belongs to B, then if there is some middle term it is possible to prove that A belongs to B, and the elements of this [conclusion] are these [premisses] and they are as many as the middle terms; for the immediate premisses are elements, either all of them or the universal ones.

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Finally, a comment is in order on Aristotle's remark that there are as many elements as middle terms (μέσα, Post. An. I. 23, 84b21). As it stands, this remark is not entirely correct. The number of ultimate premisses in a deduction is one more than the number of middle terms: ... (pages 179-180)

Ἐπὶ στοιχείων τὴν διδασκαλίαν ποιεῖται ὑπὲρ τοῦ ἐνδείξασθαι ἡμῖν, ὅτι οὐ παρὰ τὴν ὕλην γίνεται τὰ συμπεράσματα, ἀλλὰ παρὰ τὸ σχῆμα καὶ τὴν τοιαύτην τῶν προτάσεων συμπλοκὴν καὶ τὸν τρόπον. οὐ γὰρ ὅτι ἤδε ἢ ὕλη, συνάγεται συλλογιστικῶς τόδε, ἀλλ' ὅτι ἢ συζυγία τοιαύτη.
(Alexander of Aphrodisias. *Aristotelis analyticorum priorum librum I commentarium*, in: M. Wallies (ed.), *Commentaria in Aristotelem Graeca*, vol. 2.1, Berlin, 1883, page 53, 28-31)

He uses letters in his exposition in order to indicate to us that the conclusions do not depend on the matter but on the figure, on the conjunction of the premisses, and on the modes. For so-and-so is deduced syllogistically not because the matter is of such-and-such a kind but because the combination is so-and-so.

(Alexander of Aphrodisias. *On Aristotle's Prior Analytics 1.1-7*, transl. by J. Barnes et al., Cornell Univ. Press, 1991, page 116)

$$\begin{array}{ccccccc}
 \underline{AaC_1} & \underline{C_1aC_2} & \underline{C_2aC_3} & \underline{C_3aC_4} & \underline{C_4aC_5} & \underline{C_5aC_6} & \underline{C_6aC_7} & \underline{C_7aB} \\
 \underline{AaC_2} & & \underline{C_2aC_4} & & \underline{C_4aC_6} & & \underline{C_6aB} & \\
 & \underline{AaC_4} & & & & & \underline{C_4aB} & \\
 & & & & \underline{AaB} & & &
 \end{array}$$

Aristotle regards these indemonstrable premisses as elements ($\sigma\tau\omicron\iota\chi\epsilon\acute{\iota}\alpha$) of the theorems demonstrated from them:
 In this passage Aristotle states that each of the immediate premisses AaC_1 , C_iaC_{i+1} , and C_7aB is an element of the conclusion AaB . (page 178 of Malink's paper)

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 & & & & AaB & & &
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8 premisses: AaC_1 , C_1aC_2 , ..., C_6aC_7 , C_7aB

Alternative interpretation

$$\text{instance 1 of Barbara: } \frac{AaC_1 \quad C_1aC_2}{AaC_2}$$

$$\text{instance 2 of Barbara: } \frac{C_2aC_3 \quad C_3aC_4}{C_2aC_4}$$

.....

$$\text{instance 7 of Barbara: } \frac{AaC_4 \quad C_4aB}{AaB}$$

W. Burkert: ΣΤΟΙΧΕΙΟΝ. Eine semasiologische Studie,
Philologus 103 (1959), 167-97.

Στοιχεῖα ist nicht ein nach Einfall und Laune frei gewählter Titel, sondern ein fester Begriff, der in der Mathematik zumindest des 4. Jahrhunderts geläufig ist; diese Schriften heißen nicht στοιχεῖα, sie sind τα στοιχεῖα schlechthin....

Die mathematischen Sätze, die sich gegenseitig zum System ergänzen, logisch aufeinander ausgerichtet sind, das sind στοιχεῖα. (page 193)

T. J. Crowley. On the use of stoicheion in the sense of 'element', Oxford Studies in Ancient Philosophy, 29 (2005), 367-94.

Admittedly, one might not think of a set of rules or the fundamental branches of a discipline as 'constituents' of that discipline, in the way, for instance, that phonemes constitute syllables. But what these usages do suggest is the organization of stoicheia into an order, or a comprehensible whole. The core sense of stoicheion, then, is that of a basic part of a whole.
(page 392)

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The logic of the Stagirite and Euclid's Elements were born in the same spirit.

(page 183 of C. Fili. Aristotle the Predecessor of Euclid (in Greek), Yearbook of the Research Center for Greek Philosophy (Academy of Athens), 39 (2009), 170-184)