

## Completeness of an Ecthetic Syllogistic

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In this paper I study a formal model for Aristotelian syllogistic which includes deductive procedures designed to model the "proof by ecthesis" that Aristotle sometimes uses and in which all deductions are direct. The resulting system is shown to be contained within another formal model for the syllogistic known to be both sound and complete, and in addition the system is proved to have a certain limited form of completeness.

*1 Background* This paper follows [4] and [9] in treating Aristotle's syllogistic as a natural deduction system for categorical propositions. In Mates's terminology [7], a *premiss-conclusion argument* (P-c argument) is a set of premisses and a conclusion. If the premisses imply the conclusion, the argument is valid. Aristotle defines a syllogism as "a discourse in which, certain things being posited, something different from the things posited follows of necessity because of their being so" (*Prior Analytics* A.1, 24b18-20). It is clear from this that every syllogism contains a valid P-c argument; also, following Corcoran [3], [4] and Smiley [9], every valid P-c argument is a syllogism. A *perfect* or *complete* syllogism is a discourse which makes it evident that a certain conclusion follows from certain premisses. For some P-c arguments (i.e., the first-figure syllogisms) this is already evident, so that these constitute perfect syllogisms by themselves. A valid P-c argument which is not evidently valid is an *imperfect* or *incomplete* syllogism; if further discourse be added to such an argument which makes its validity evident, then the result is a *perfected* or *completed* syllogism. Thus, a perfect syllogism is a deduction, and the process of completing an imperfect syllogism is the process of constructing a deduction of its conclusion from its premisses. For the details of this terminology and the interpretation of Aristotle which it reflects see [4], pp. 90-94. *Prior Analytics* A 4-7 gives deduction schemata with which to accomplish this for syllogisms in the various Aristotelian moods together with counterexamples to reject other

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