

## Syllogistics IV

The first figure is ‘perfect’; the modes of the other figures can be *reduced* to it. Take *Camestres* (PaM, SeM ⊢ SeP) which can be derived from *Celarent* (MeP, SaM ⊢ SeP) (cf. Aristotle quote, Handout 8):

- (a) The first letter (‘C’) indicates from what mode in the first figure it is derived.
- (b) The ‘m’ after the first vowel in ‘Camestres’ means a simple switch of the *Celarent*’s premises: from PaM (major) and SeM (minor) to SeM (major) and PaM (minor): E–A to A–E.
- (c) The ‘s’ after the second vowel (‘e’) means a simple conversion: SeM ⊢ MeS.
- (d) But PaM, MeS ⊢ PeS; and PeS ⊢ SeP (simple conversion again). *q.e.d.*

“[T]he first figure in *Barbara* gives us: ‘All B is C’, ‘All A is B’, therefore ‘All A is C’. Now suppose the conclusion is false, i.e. that it is true that some A is not C. Then one or other of the premises will also be false. If we suppose that the second is true, the first, which says that all B is C, will have to be false, so its contradictory will be true, i.e. some B will not be C. And this will be the conclusion of a new argument, derived from the falsity of the conclusion and the truth of one of the premises of the preceding argument. Here is the new argument: ‘Some A is not C’ (contradictory of the previous conclusion assumed false), ‘All A is B’ (previous premise assumed true), therefore ‘Some B is not C’ (present true conclusion, contradicting previous false premise). This argument is in the mood *Bocardo* of the third figure, which can therefore be demonstrated quickly and obviously from the mood *Barbara* of the first figure, using only the principle of contradiction [what involves a contradiction is false].”<sup>1</sup> In sequents: MaP, SaM ⊢ SaP becomes MoP, MaS ⊢ SoP.

### General Rules<sup>2</sup>

These rule out the vast majority of possible syllogisms.

- “Nothing follows from two particular premises.”
- The middle term must be distributed at least once. “The middle term cannot be taken particularly twice.” *Fallacy of the Undistributed Middle* (cf. the dog/squirrel case, Handout 1):  
   ‘All philosophers are smart’ (P = M not distributed),  
   ‘Some children are smart’ (both S and P = M undistributed),  
   *therefore* ‘Some children are philosophers’. (Remember: invalid arguments may have true conclusions.)
- Any term distributed in the conclusion must be distributed in the premises.  
   False: MaP, SeM ⊢ SeP (corrupt *Celarent*). *Fallacy of the Illicit Major/Minor*.

1 From Leibniz, *Nouveaux Essais* IV.ii.1 (*New Essays on Human Understanding*), Transl. P. Remnant & J. Bennett (1982). Cambridge: Cambridge University Press (pp. 363–4).

2 Arnauld & Nicole, *Logic or the Art of Thinking*.

- “No conclusion can be drawn from two negative premises.”  
False: MeS, MoP ⊢ SoP (corrupt *Ferison*)
- “A negative conclusion cannot be proved from two affirmative premises.”  
False: PaM, MaS ⊢ SoP (corrupt *Bamalip*)
- If either of the premises is negative, the conclusion must be negative too.  
False: MeP, MaS ⊢ SiP (corrupt *Fesapo*)

### Two Further (Non-Categorical) Syllogisms

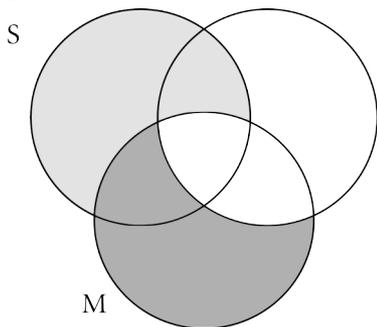
Hypothetical syllogism:  $P \supset Q, Q \supset R \vdash P \supset R$

Disjunctive syllogism:  $P \vee Q, \sim P \vdash Q$

### Test for Validity

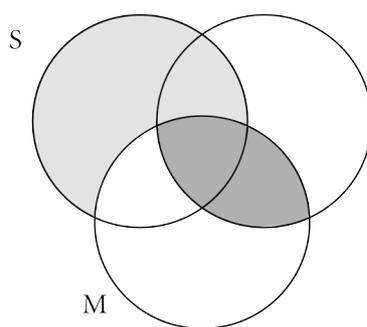
While some segments may be empty, the extension of the terms may not be. This relates to the *truth* the propositions: if there are no As, say, then A has no extension (A does not refer), and AaB is false. The test itself is simple: a syllogism is *valid* if the combined diagram of the premises contains the diagram for the conclusion.

*Barbara*



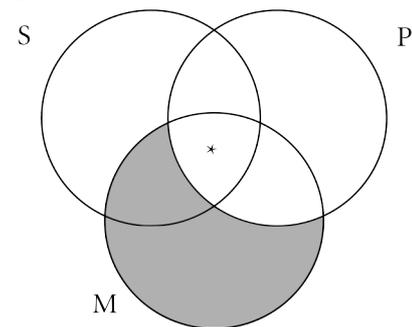
The shaded areas are empty: since all *M* are *P*, there are no *M* which are not *P* (dark grey), and since all *S* are *M*, there are no *S* which are not *M* (light grey). So, all *S* are in *P*. *q.e.d.*

*Celarent*



Since no *M* is *P*, the intersection  $M \cap P$  is empty (dark grey), and since all *S* are *M*, most of the *S* area is empty (light grey). So, no *S* is *P*. *q.e.d.*

*Darii*



Since all *M* are *P*, most of the *M* area is empty (shaded); and since there is at least one *S* which is *M*, there is an asterisk in the non-empty (not shaded) intersection  $S \cap M$ . So, there are some *S* which are *P*. *q.e.d.*

“It must be admitted that the scholastic syllogistic form is not much employed in the world, and if one tried to use it seriously the result would be prolixity and confusion. And yet—would you believe it?—I hold that the invention of the syllogistic form is one of the finest, and indeed one of the most important, to have been made by the human mind. It is a kind of universal mathematics whose importance is too little known. It can be said to include an *art of infallibility*, provided that one knows how to use it and gets the chance to do so—which sometimes one does not.”<sup>3</sup>

3 From Leibniz, *Nouveaux Essais* IV.xvii.4, *op. cit.*, p. 487.

