Notre Dame Journal of Formal Logic
Volume 28, Number 3, July 1987

A Rationale for Aristotle's Notion of Perfect Syllogisms

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1 Introduction The intention of this essay is to defend the distinction between perfect and imperfect syllogisms found in the first book of Aristotle's *Prior Analytics*. This will involve close attention to arguments of Gunther Patzig, surely one of the major modern interpreters of Aristotle's syllogistic. The essay will conclude with a few comments about Aristotle's reluctance to employ term complements.

2 History of the distinction According to Aristotle, there are three syllogistic "figures" – or, we might say, "configurations."[1] What distinguishes the three is the arrangement of terms in the two premises:

(1) if, in the premises, the subject term of the conclusion applies to[2] the one term which does not appear in the conclusion (i.e., the middle term) and the middle term applies to the term which appears as predicate in the conclusion (this relationship 'applies to' being asymmetric), then the syllogism belongs to the first figure (APR 25b32-7; 26a17-23).[3]
(2) if one and the same term (i.e., the middle term) applies, in different premises, to the two terms which appear in the conclusion, the syllogism is of the second figure (APR 26b34-8; 27a26-32).
(3) if, in the premises, both terms which appear in the conclusion apply, in turn, to the one that doesn't, the syllogism is of the third figure (APR 28a10-14; 28b5-7).

Because he defines the three figures in this fashion, ignoring, for the most part, the order of the terms in the conclusions (or, more precisely, simply assuming a particular order), Aristotle has only three figures – since (prescinding from the

Received August 5, 1985; revised February 10, 1986

order of the terms in the conclusion and also the order of the premises, which is of no logical significance)[4] there are only three possible combinations of terms. For him, therefore, the question of a 'fourth figure' is a moot one.[5]

The quality of perfection, says Aristotle, belongs only to the first figure (although not all first figure syllogisms are perfect).[6] He explains the distinction in this fashion (APR 24b22-26):

> I call a syllogism perfect which requires nothing, apart from the things actually grasped [*para ta eilēmmena*], in order for the necessity to be apparent; imperfect if it requires one thing or more which, although necessary, given [*dia*] the terms which have been laid down, are not actually grasped [*eilēptai*], given [*dia*] the premises.[7]

Consider the following syllogisms (Barbara and Cesare):

(1) All *B* are *A*
All *C* are *B*
———
All *C* are *A*;

(2) No *A* are *B*
All *C* are *B*
———
No *C* are *A*.

The first syllogism being of the first figure is perfect; the second (of the second figure) is imperfect; and the latter, argues Aristotle, is less apparent due to a certain lack.

Naturally, defenders of Aristotle have adopted different tactics in providing an exegesis of this somewhat obscure claim. Alexander of Aphrodisias, for example, understood the imperfect syllogisms as enthymematic and for that reason less apparent. Philoponus conceived of the distinction almost sociologically, arguing that the perfect syllogism is isolable in that it takes a trained logician to comprehend an imperfect syllogism.[8] Needless to say, however, Aristotle's claim of self-apparency has not gone unchallenged. Critics have pointed out that, although perhaps Barbara is more obvious than Cesare, Aristotle also identifies Celarent, Darii, and Ferio as perfect, and these seem no more obvious than Cesare.

Other defenders of the Aristotelian doctrine have focused not so much on the obviousness of the distinction as on its relationship to the entire Aristotelian corpus. W. D. Ross, for instance, says that the distinction is largely due to the influence on Aristotle of Plato (cf. [9], p. 27). Others have found connections with Aristotle's metaphysical thought.[9]

In the twentieth century, two major commentators, J. Łukasiewicz and I. Bochenski, have taken an "axiomatic approach" in explicating Aristotle's theory of the syllogism. They both contend that, while Aristotle was right to identify certain rules as axioms and to derive the others from them, he erred (at least at first) in giving certain perfect syllogisms preeminent place.[10]

One modern, however, Gunther Patzig, is a more staunch defender of the distinction. His apologetic is interesting and fruitful but, I am afraid, it does not fully account for the high regard in which Aristotle held the first figure. Nonetheless, a brief initial look at one of his arguments (we look at some others below) will tell us much about the way Aristotle understood the notion of perfection.

The obviousness of the distinction, claims Patzig, inheres in Aristotle's arrangement of premises (and therefore terms). First of all, Aristotle would not have set out a syllogism as was done in (1) and (2) above. Such an arrangement, to be sure, is the most convenient given English and Latin (or even Greek) syntax, and the scholastic logical tradition, therefore, adopted it; but Aristotle went out of his way to reverse the order of the terms. Rarely did he speak of all *B* being *A* (or anything similar, employing this order of terms); rather, he spoke of *A* "belonging" or "applying" to *B*, as was mentioned above. So, instead of (1) we have:

(3) *A* applies to all *B*
B applies to all *C*
―――――――――――
A applies to all *C*

Where Aristotle did speak of all *B* being *A* (or use similar words which reverse the order of terms), he also (says Patzig) reversed the order of the premises:

(4) All *C* are *B*
All *B* are *A*
―――――――――
All *C* are *A*

so that in either case the connection between the first and the second premises *by way of B* is obvious. Aristotle's claim to the obviousness of the distinction, says Patzig, depends on this specific arrangement; it is not surprising that many philosophers and historians of philosophy, influenced as they were by scholastic reformulations of the original doctrine, were unable to see it. And, writes Patzig:

> [in *Prior Analytics* chapters 4 to 6] there is *only one* passage where his choice of the constant 'be in . . . as in a whole' alters the order of the *terms*, and only here does he decide to alter the order of the *premises* as well,—an order which he elsewhere invariably retains in first figure arguments. ([8], p. 59; all italics his)

I have two objections to this line of argument. In the first place, Patzig seems to realize that in order to make a strong case he needs to be able to say that *whenever* Aristotle reverses the order of the premises the terms too are reversed. This seems to be the reason why he says (in the above quotation) "only here does he decide to alter the order of the premises". But it is not true that only where the terms are reversed in these chapters does Aristotle reverse the premises. This occurs also, for instance, at 28b5-9 where Aristotle discusses Disamis. In this passage he says that where one universal and one particular term stand in their respective relationships with the one term that does not appear in the conclusion, and where both of the former are positive, a syllogism results. Throughout the passage he speaks first of the terms which *apply to* the other term ("the middle term") thereby preserving his typical order of terms. He illustrates what he has already in abstract terms explained, by speaking first of the universal premise, secondly of the particular: "For if *R* applies to all *S* and *P* to some *S*, *P* must apply to some *R*" (APR 28b7-9). This reverses the usual order of the premises.[11] No doubt realizing this, Patzig appends to his basic claim the (rather incomprehensible) rider, "an order which he elsewhere invariably retains in first figure arguments". But to be able to say merely that Aristotle maintains the order in the first figure (and not also the others) attenuates, to say the least, his claim that Aristotle relied upon a "standard formulation" (cf. [8], p. 58).

My other objection is connected with the former. Although it is certainly true that the arrangement that Patzig points to is the true Aristotelian one, it establishes nothing approaching a logical distinction between the two notions, such as Aristotle seems to presume. I will, in fact, be adopting this more Aristotelian order of terms in what follows, since it is pedagogically useful, as perhaps Aristotle saw. It cannot, however, constitute the mainstay of a rationale for the distinction, since Aristotle doesn't regard it as such (as is shown above). Patzig expands upon this argument by making his conception of the distinction more rigorously precise; but this expansion does not alter the character of his explanation of the perfect/imperfect distinction. I will examine this below. For the moment, though, we must find a rationale for the distinction that comes closer to being logical, at least in an Aristotelian sense.

3 A defense of the distinction In order that the following arguments might more easily come across to the reader, a few preliminaries will be necessary. I shall be presenting a system of diagrams that lends itself to a sort of pictorial understanding of what appears "before the mind's eye". Even before that, however, we shall require a special notation, one that captures more fully the *operation* involved in a predicate applying to a subject.

In order to capture this notion, I will employ an arrow (→). An A-proposition will be represented in this fashion:

$$A \rightarrow \text{all } B.$$

The arrow will serve our purposes with I-propositions as well; but for E- and O-propositions we require a slightly different symbol. O-propositions, for example, will be represented thus:

$$A \nrightarrow \text{some } B.$$

The ×-cum-arrow can be read '. . . does not apply to . . .'. Similarly, an E-proposition can be represented in this fashion:

$$A \nrightarrow \text{any } B.$$

This is to be read '*A* does not apply to any *B*'. To have used 'all' instead of 'any' here would have been unacceptable because of the ambiguity in the word 'all'. It would be possible to represent E-propositions in this fashion:

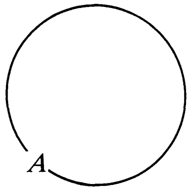
$$A \rightarrow \text{no } B,$$

but for reasons having to do with the nature of negation it is best to employ the more symmetrical notational system whereby the two negative categorical propositions involve the ×-cum-arrow. The arrow scheme in general can be understood as signifying hitting (→) or missing ($\nrightarrow$) the mark. This idea will, I hope, become more clear below.

The diagrams which I shall be using resemble, in ways, Euler diagrams.

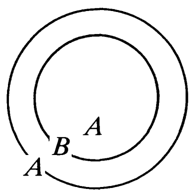
When I say, for instance, that *A* applies to all *B*, I will first draw a circle *labeling* it '*A*'. Labeling is effected by superimposing the appropriate letter over the line constituting the circumference of the circle, thus:

(5)



Since we are saying that *A* applies to all *B*, we will draw a second circle (labeled '*B*') within the A-labeled circle. Moreover, we will *mark* it '*A*':

(6)

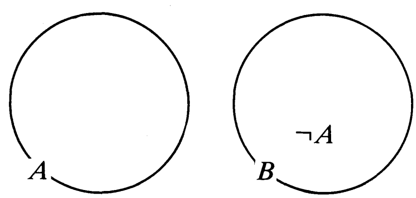


The marking helps to bring out the relationship between the two terms: i.e., that *A applies* to *B*. Once a circle is marked, it is to be understood that anything within it falls under the concept represented by the mark—including whatever circles are subsequently drawn within it.

Marking is in a way a superfluous addition to a diagram, except to the extent that it makes operations performed apparent. Were I working at a blackboard, the order in which circles might be drawn, my gestures, explanations, etc., would make it obvious which terms do or do not apply to which other terms: i.e., one would perceive the operation itself.

Negative propositions are represented diagrammatically in this fashion:

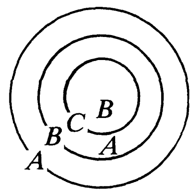
(7)



The '$\neg A$' tells us that the operation of negation has been worked upon (all) *B*. In other words, *A* does not apply to any *B*.

To return to Barbara, however, diagram (6) depicts the idea embodied in its first premise. The second premise is now added to it. Although B has been spoken *of* in (6), it too can serve as a predicate. That is, it can be said to apply or not to apply to a subject. In the depiction of Barbara, therefore, we move from (6) to:

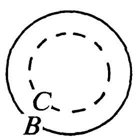
(8)



which says that *B*, in turn, applies to all *C*.

Darii requires a slight variation on the above notation. The syllogism contains an I-proposition as a premise; we must, therefore, have some way of representing particular terms. When dealing with the latter, therefore, we will use circles composed of broken lines. So, then, '$B \to$ some C' will be represented:

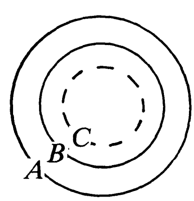
(9)



And the syllogism Darii will be represented thus:

(10) $A \to$ all B
$B \to$ some C

$A \to$ some C



Note again that marking is not integral to the diagraming technique. Marks are merely *indication* of the important thing: the operation. (More on this later.)

I shall be adding to this diagrammatic system below. Before, however, taking up again the issue of perfection, I must add one more preliminary point. As we work through syllogisms in this (literally) graphic manner, we must be conscious of the slightest inferential move in our following of the rule embodied in a syllogism. To be more precise, but also (at this point) more obscure, we must pay close attention to whether we can make a "clean sweep" through a syllogistic diagram. It is possible in this fashion to see that there is an important difference (and perhaps even a logical difference) between what Aristotle identifies as perfect and imperfect syllogisms.

This method, involving, as it does, the requirement that we "be conscious of the slightest inferential move", etc., might be thought too psychological. It might be charged that introspection can have nothing to do with the properly logical. Such a charge would be unjustified for it is always legitimate in the practice of logic to ask another or oneself the question: What inference did you make? That in answering such a question a person looks to what he has *done* (which is a look in the direction of something psychological, since "doing" is intentional) is by no means to suggest that the nature of logical relations is psychological.

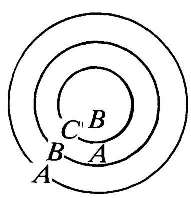
As for using diagrams intended (as I said) to characterize what appears before the mind's eye, this psychological aspect is not something that would have worried Aristotle. In the second sentence of *De Interpretatione*, for instance, he says that "words spoken are symbols or signs of affections or impressions of the soul". *We* might possibly be suspicious of the Boolean notion that logic is the science pertaining to the laws of thought; an ancient Greek had no reason to— and plenty of reason to think otherwise.

My central claim, therefore, is this: When Aristotle says that a syllogism is perfect, he means that during the process (or operation) of constructing a mental picture[12] of what a syllogism says, once a person has *grasped*[13] the premises, he sees the conclusion. The operation is simple and smooth. One reads through the syllogism (or, for us, works through the syllogistic diagram) without a hitch: i.e., without having to make any suppositions *about* different steps in the process.

An example of a perfect syllogism actually employed by Aristotle might be of some help in comprehending this claim: "'Being near' applies to the planets; 'not twinkling' applies to all near things; therefore, 'not twinkling' applies to the planets" (APO 78b1-3).[14] If one thinks of the planets having the property of being near and then of near things (obviously, including those things identified in the previous premise as near—i.e., planets) as not twinkling, one *already sees* that the planets do not twinkle, if he understands what has already been said. If he doesn't see this, the introduction of a logical rule will not help things at all. (This is the point of the phrase "requires nothing, apart from the things actually grasped" in the above quotation.)

Let us look now once again at Barbara:

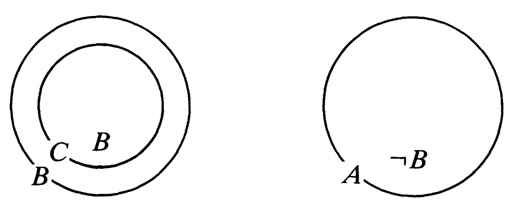
(11) $A \rightarrow$ all B
$B \rightarrow$ all C
―――――
$A \rightarrow$ all C



As mentioned above, a person can work through the premises fairly easily, conceiving all along of a predicate applying to a subject.

But consider now an imperfect syllogism (Cesare):

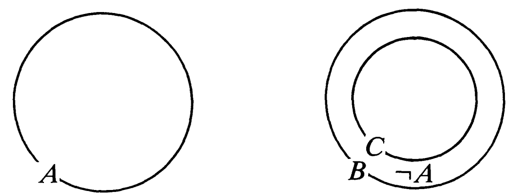
(12) $B \nrightarrow$ any A
$B \rightarrow$ all C
―――――
$A \nrightarrow$ any C



As one goes through the operation of drawing the diagram, assuming that he has begun by depicting the first premise first (although one could also begin with the second premise), he finishes the operation by drawing the C circle inside the B. With his mind on this latter act, he does not have in mind the relationship between B or C and A. A has been left behind, as it were, the ideas have not *combined* in a way that makes the conclusion self-apparently true as one completes the operation. If one wants to determine whether or not A applies to C, he must explicitly ask himself about the relationship between the terms previously set out—i.e., the two sides of the representation. No doubt, the required reasoning is accomplished in a very brief moment, but the move *is* there, whereas with the perfect syllogism the conclusion is already in mind when the premises are in mind. The relationship is not *inferred*: it is seen, as it were, in fact.

Aristotle says of Cesare that the first premise can be converted, thereby giving us a perfect syllogism (Celarent) and, indeed, he is right. The two circles of figure (12) become:

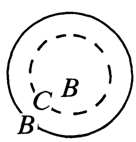
(13) $A \nrightarrow$ any B
$B \rightarrow$ all C
———
$A \nrightarrow$ any C



The operation is now perspicuous in a way that it was not in (12).

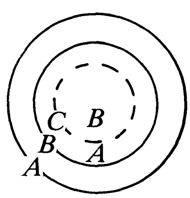
Let us consider the remaining two first figure syllogisms, Darii and Ferio. Working through the former, beginning this time with the second premise, we have:

(14) $B \rightarrow$ some C



The first premise adds an outer circle:

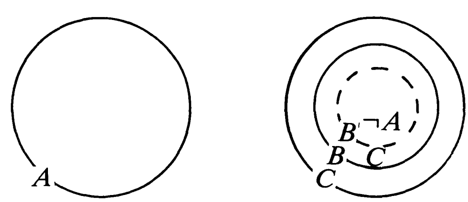
(15) $B \rightarrow$ some C
$A \rightarrow$ all B



It is apparent, from the moment one considers applying A to all B, that it also applies to the particular C (or C's) represented by the broken circle. The operation is quite smooth.

There is not present the same smoothness, for instance, in Bocardo, a third figure syllogism. The full diagram would look like this:

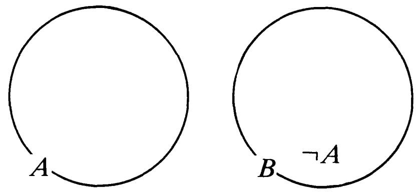
(16) $A \nrightarrow$ some B
$C \rightarrow$ all B
———
$A \nrightarrow$ some C



Beginning this time with the second premise (as does Aristotle at 28b17ff., no doubt because it is the smoothest way), it is quite obvious that our progress through the diagram is broken at at least one point. *C* applying to all *B* is no problem, of course. In order to represent—or, in fact, to think through—*A* not applying to some *B*, however, we must use some "extraneous", although quite elementary, logical acumen: the understanding that "some *B*" falls among all *B*. Having done this (and represented it), we can pull back and notice that since *A* does not apply to some *B* it also doesn't apply to some *C* (i.e., that very *B*).

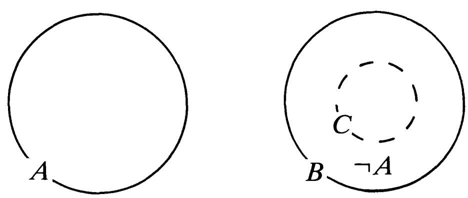
Finally, there is the perfect syllogism Ferio.[15] With this syllogism, we must not allow the diagram to get in the way of our perceiving the smoothness of operation. The first premise is represented as here:

(17) $A \twoheadrightarrow$ all B



This itself is a simple operation. Our attention is not in two places (although there are two circles in the diagram) but on the *fact* that no *B* is *A*. (This is not a "psychological report" from the present writer: if someone insists that in looking at the diagram his attention *is* divided, I cannot deny it; but that is not the point. The diagrams are intended to suggest mental operations and the mental operation "No *B* is *A*" or "All of *B* is not *A*" is quite simple.) With this in mind, and adding the second premise, as here:

(18) $A \twoheadrightarrow$ any B
$B \rightarrow$ some C



the understanding that this (some) *C* is not *A* is immediately apparent.[16]

To conclude this portion of my argument, then, I should claim that this way of understanding the Aristotelian distinction between perfect and imperfect allows us to see how he might have regarded the distinction as a matter of high—even logical—import. Certainly it points to a more significant aspect of the perfect syllogism than that called to the fore by Patzig. Moreover, it seems to be in accord with what Aristotle says in his most explicit statement about the perfect syllogism: that it is one which "requires nothing, apart from the things actually grasped, in order for the necessity to be apparent".

4 Patzig's expanded argument As mentioned, Patzig, in an expansion of his former argument (that which relies upon the position of letters signifying terms), attempts to make his notion of perfection "clear and distinct".[17] Indeed, he does this, but only at the expense of pointing up the fact that the distinction, for him, relies ultimately upon conventions that Aristotle establishes in the early chapters of *Prior Analytics*. It is my position that this does not sufficiently account for the importance Aristotle attached to the perfect syllogism: in other words, under Patzig's interpretation, the distinction does not even approach status as logical.

In the logic of relations there is a simple notation for representing the "relative product" of relations R and S as it holds between the arguments x and z. That is, we can abbreviate '$(\exists y)(xRy \,\&\, ySz)$' by means of the following definition:

(19) $xR|Sz =_{df} (\exists y)(xRy \,\&\, ySz)$.

What this notation shows is that either side of the '|' is bound to the other by another element ("which needn't be mentioned at the moment"). The abbreviation is not at all unlike our natural language abbreviation for the relationship which holds between a man and a (presumably) younger man by way of the first man's daughter who is married to the second man. This is rather a headfull, so we abbreviate the relationship and say that the first man is the second's father-in-law. (There is here no mention the daughter/wife, i.e., 'y'.)

Let us replace the relational symbols R, S, (T and U) in (19) by a, e, i, o, which will have the meanings '*** $\rightarrow$ all ###', '*** $\nrightarrow$ any ###', etc.; and replace the argument variables x, y, and z by symbols for terms: A, B, C.

We can now represent Celarent in this fashion:

(20) AeB & BaC implies AeC,

the premises of which, employing the former definition (19) (*mutatis mutandis*), become:

(21) $Ae|aC$.

But note, says Patzig, that we can not do such for an imperfect syllogism. Datisi, for instance, when put in relational notation becomes:

(22) AaB & CiB implies AiC.

The last term of the first premise and the first of the second do not coincide: there is no one term, according to this formulation, which can be eliminated. This fact, he claims, gives us quite a precise way of distinguishing perfect from imperfect syllogisms.

As is readily apparent, this way of distinguishing perfect from imperfect is not terribly different from merely noting that, when terms and premises are set up in the "proper" Aristotelian fashion, the middle term ('B') in perfect syllogisms establishes a visual link between the two others. But now Patzig goes on to consider a possible objection which, as I suggested above, calls into question the adequacy of his general approach.

It might be objected, he says, that this capability of translating a perfect syllogism into the notation of relational logic is of little significance since we can always take the converse relation and represent it by means of a distinctive symbol. That is, it is possible to change (22) to:

(23) AaB & $B\tilde{i}C$ implies AiC,

by simply giving the converse of 'i' a distinctive symbol: $\tilde{i}$. It is worth quoting Patzig's rejoinder directly:

> However, the formal difference between Darii and Datisi is not destroyed by this artifice but merely displaced. For the difference in degree of evidence between the two syllogisms no longer depends on the position of their terms but on the fact that in Datisi one converse and two non-converse relations appear and it must be more difficult to assess the value of the product of such *heterogeneous* relations than of homogeneous ones. ([8], pp. 54–55, italics his)

To what extent is this a sufficient rejoinder? In one sense, Patzig is right: there is still a difference between perfect and imperfect syllogisms. But it is doubtful whether the difficulty embodied in the difference is sufficient to maintain the overriding *importance* of the distinction. That is, before translating all syllogisms into the language of modern relational logic, it was plausible to argue that Aristotle regarded so highly the first figure because of the juxtaposition of the linking term: this made a syllogism easier to survey. But in this new, more precise notation, where imperfect syllogisms have linking terms but heterogeneity, the difficulty is greatly reduced.

It is, perhaps, plausible to argue that there is still some difficulty inherent in the revised formulas (since one is now dealing not with "likes" but "unlikes"?); but there is certainly no more difficulty than we find in, for instance, the perfect syllogism Ferio, in which there is heterogeneity of types of categorical proposition. Indeed, the heterogeneity in Ferio is three-way (since it contains E-, I-, and O-propositions), whereas heterogeneity as *per* conversion can only be two-way. This other "difficulty" was previously kept in the background due to the more obvious awkwardness of the arrangement of terms in second- and third-figure syllogisms. With that out of the way, Patzig would seem to have precious little upon which to establish his claim of substantial difficulty.

Consider the following. Let us first of all rename the "categorical relation" in Ferison (an imperfect mood) which becomes converse if "forced" into the standard formulation (as in (23)). That is, we can rename '$\tilde{i}$' 'u':

(24) *AeB* & *BuC* implies *AoC*.

Compare this to Ferio (*AaB* & *BiC* implies *AoC*). How can one say that the one is "more difficult to assess"? One *could* simply say that Aristotle did not allow into his system "U-propositions". But this is to make the perfect/imperfect distinction a matter of conventions. Indeed, Patzig does maintain that the distinction is ultimately conventional; but the intention of this essay and of the previously expounded system of diagrams is to show that the distinction has a more solid basis. Indeed, without this basis, Patzig's position collapses into one quite similar to that of Łukasiewicz or Bochenski.

5 Explicitly modal syllogisms We must now consider the perfect syllogisms containing explicit modal operators, i.e., those containing in their premises (and conclusion) phrases such as 'may apply' (*endechetai huparchein*) and 'applies necessarily' (*huparchein anankaion*). As alluded to above, Aristotle does not consider all first-figure syllogisms of this sort to be perfect but only those that employ the same modal operator in both the major premise and the conclusion. Patzig offers a rationale for this extension of the perfect/imperfect distinction which is based on his previously expounded theory that Aristotle originally made the distinction for solely notational reasons. But then he argues that the boundary establishing the distinction is arbitrary and depends upon the makeshift introduction of a definition. Given Patzig's presuppositions, the boundary would indeed have to be drawn in an arbitrary fashion; but this, I shall contend, only shows that the distinction could not have been erected upon the base which Patzig proposes.

A good deal of Patzig's argument depends on an extremely difficult passage, one of the most obscure in the *Prior Analytics.*[18] At 32b25-32 Aristotle writes as follows (I translate quite literally):

> Because the phrase 'one thing may apply to another' can be understood in two senses—since a predicate can apply or possibly apply to a subject (for the phrase 'that to which *B*, *A* may' can refer either to (a) that about which *B* is said or (b) that about which *B* might be said)—and 'that to which *B*, *A* may' differs not at all from '*A* may apply to all *B*,' it is apparent that to say '*A* may apply to all *B*' is [also] equivocal.

Patzig understands this passage to be introducing "a new definition of '*endechesthai huparchein*'" by which a possibility operator is attached to both terms of a categorical proposition ([8], p. 63).

Let us back up a bit in order to make this more clear. Patzig's position is that a syllogism in Barbara such as:

(25) *PAaB* & *BaC* implies *PAaC*

(where '*P*' is the modal operator 'possible' and '*AaB*' represents '$A \rightarrow$ all *B*')[19] is considered by Aristotle to be perfect *because* the last member of the first premise and the first member of the second premise coincide—this despite the fact that Aristotle nowhere in the text makes such a claim.

Next, he claims that in the above passage Aristotle is introducing a new definition in order to be able also to classify the following as perfect:

(26) *PAaB* & *PBaC* implies *PAaC*

Since '*B*' does not coincide with '*PB*', Aristotle needs (says Patzig) to add a '*P*' to the first premise (by means of the alleged new definition) in order to get:

(27) *PAaPB* & *PBaC* implies *PAaC*

This expedient (which gives the boundary between perfect and imperfect its arbitrary character in Patzig's eyes) works here (in (27)), says Patzig ([8], p. 63), but it *is* an expedient:

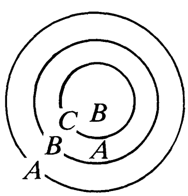
> He [Aristotle] clearly falls back on the second interpretation only in order to get round the difficulty we have noticed. All this confirms our belief that the perfection of an argument essentially depends, in Aristotle's view, on the "identity" of the final member of the relation which forms the content of the first premise with the opening member of the relation which the second premise asserts to hold.

Truth to tell, argues Patzig, "every unprejudiced mind" will find (25) "substantially more evident" than (26). The expedient is a makeshift job and should be ignored.

But (25) is only more apparent than (26) if one assumes that apparency is a function of notation. Examining the operation in either (25) or (26) for smoothness, we discover an equal ease in working through the syllogisms. This does, however, require a certain understanding of the meaning of '*endechesthai huparchein*'—and it is this which Aristotle apparently specifies in the above (most difficult) passage. But it is no "makeshift" understanding: it is one we can quite readily recognize as our own. Consider the phrase '*A* may apply to all *B*'. True, without considering it in any depth, we might be inclined to explain our understanding of this phrase by simply saying that *A* applies to what is in fact *B*. And, indeed, that may be *all* that we mean—i.e., we may mean not a whit more than that, so that if someone came up and asked, "Are you saying that *A* would apply to anything not presently *B* but which might become *B*," we would say "No," arguing that, although *A* might now apply to every *B*, there could crop up a *B* to which it couldn't. Aristotle (in the above difficult passage) admits this usage but says that this isn't the only way we can understand '*A* may apply to *B*'. The phrase is ambiguous and can also be understood as saying that whatever *turns up* being *B* can also be *A*. Indeed, I might add, this latter is a less technical understanding than the former.

So, by means of the latter understanding of '*endechesthai huparchein*', it is possible to work smoothly through, for instance, Barbara with all problematic propositions:[20]

(28) $PA \rightarrow \text{all } B$
$\underline{PB \rightarrow \text{all } C}$
$PA \rightarrow \text{all } C$



The reason is that the notion contained in the operation "possibly applying" (determined as specified) is such that it "carries through" to whatever *B* might apply to.

Patzig argues against the explanations of both Alexander of Aphrodisias and Ross of why Aristotle classifies (25) as perfect but not:

(29) *AaB* & *PBaC* implies *PAaC*.

Alexander argues that in the perfect syllogisms what holds of *B* holds of *C* because *C* is *part* of *B*; in (29), however, it is not true that *C* is *B* but only that it *could* be. Ross argues similarly, if somewhat more formally. But, says Patzig ([8], p. 64), this is to ignore the fact that Aristotle also classifies (26) as perfect and it "has the very formal property which they adduce to explain why Aristotle held [(29)] to be imperfect". This is a telling point, especially against Ross; but it does not affect the present understanding since the latter shows that the first premises in (25) and (26) but not the one in (29) have a scope which takes in what *B* might possibly apply to, including, of course, as in (25), what *B* does in fact apply to.

That Aristotle meant the latter ("less technical") understanding of '*endechesthai huparchein*' to be present in (26) is clearly indicated in a passage [32b38-33a1] following close upon the difficult passage [32b25-32] cited above. He writes:

> When, therefore, *A* may apply to all *B* and *B* to all *C*, there is a perfect syllogism since *A* may apply to all *C*: this is clear from the determination [*ek tou horismou*], for 'to possibly apply to all' is as we said.

That the "determination" [*horismou*] referred to is that found at 32b25-32 is apparent from its proximity.[21] It is true, the "determination" at 32b25-32 says merely that '*A* may apply to all *B*' is equivocal (indeed, the *indeterminacy* of this determination is what makes the passage difficult); but were it not that Aristotle was, in effect, isolating the less technical usage at 32b25-32, he could not so blandly have stated in 32b38-33a1 that it is clear (according to the determination) that *A* may apply to all *C*—and, indeed, that the syllogism is perfect (a very similar remark occurs at 33a23-5). Employment of the other, more technical usage involves one immediately in more logical reasoning than is characteristic of perfect syllogisms, which is not to mention, of course, the possible falsity of the conclusion even given the truth of the premises.

So then, since Patzig's rationale for the perfect/imperfect distinction makes such poor sense (as Patzig himself shows), some suspicion is cast on that very rationale (rather than the distinction itself). And, since it is possible to make good sense of the distinction by means of the ideas presented in Section 3, there is at least a prima facie case for its being closer to what Aristotle had in mind.

6 The reluctance to use term complements This brings us, finally, to the connected issue of Aristotle's reluctance to employ term complements, an issue I shall only touch upon. Aristotle was extremely wary of what he called *aoriston onoma* and *rhēma*, indefinite nouns and verbs, or, more literally, "boundless" nouns and verbs. He says, for instance, at *De Interpretatione* 16a30 that "'Not-man' and the like are not nouns". This reluctance, of course, also involves him in at least a partial rejection of the immediate inference obversion.[22]

The reason for this reluctance, I should claim, is very similar to his reason for singling out certain first figure syllogisms as perfect: because "genuine" terms, such as 'man', put everything to which they refer quite simply before the mind's eye. When one refers to all men (as opposed to all non-men) one can, as it were, gather all men before his mind's eye and draw a circle around them: circumscribe them. But non-man is everything *outside* that circle: objects, concepts, existent things, nonexistent things. It is hard to say precisely what (if anything) is circumscribed when a person thinks of all the non-men.

Here we see the connection with what has gone before. For Aristotle what can be gathered together before the mind's eye is in some way more important than what cannot. If his understanding of the perfect syllogism rests upon such a quasi-visual foundation, so does his rejection of obversion. A mental image, whatever it is, has this property: it has limits (in Greek, *horoi* or 'terms'). One can, as it were, fall off the edge of it. Perhaps Aristotle thought that the use primarily of these allowed for a more error-free scientific method.

In any case, in addition to a rationale for perfect syllogisms, we possibly have also a rationale for why Aristotle was reluctant to employ term complements. To be sure, this way of approaching a logical matter is distinctively nonmodern, especially to the extent that it is concerned with the way we think. But, as I argued above, it cannot be said that this constitutes psychologism. Moreover, it is unlikely that Aristotle would have worried about possible charges of psychologism.

7 Conclusion To recapitulate briefly, I have argued that it is possible to provide a rationale for Aristotle's identification of certain first figure syllogisms as perfect. This rationale involved the use of notions which today would not be considered purely logical, i.e., psychological notions. We can be fairly sure, however, that a Greek (such as Aristotle) would not have strictly segregated logical and psychological matters in the modern fashion. Finally, we might also be able to explain Aristotle's reluctance to use term complements by recalling his reasons for giving perfect syllogisms special status.

NOTES

1. I adopt the convention in this paper of using double quotation marks for scare quotes and actual quotation, single quotation marks for all other purposes, including the naming of a term, phrase, sentence, etc. Occasionally, however, where no danger of ambiguity is present, I drop such marks altogether.

2. This notion 'applies to' will be assigned a specific symbol below. The Greek word(s) here translated as 'applies to' are *huparchein* (*tini*).

3. In the first of these passages Aristotle speaks of the "first", "middle", and "last" terms; in the second of "major", "middle", and "minor". In what follows I will occasionally be employing the latter terminology. Thus, the term which appears as predicate in the conclusion is the major term, that appearing as subject the minor, and the remaining term the middle.

4. Contrast, for instance, APR 27a32-3 and 28b7-9.

5. It has not always been considered moot. See Kneale [5], pp. 100–101, 183–184. On this point I find myself in agreement with Bochenski [2], p. 45, and Hadgopoulos [4].

6. The first figure syllogisms that are imperfect are those employing disparate modal notions in major premise and conclusion. These will be examined below.

7. This translation is intended to bring to the fore ideas that will be spelled out below. It differs considerably from the Loeb translation which speaks of imperfect syllogisms requiring "one or more propositions" in addition to the terms which are laid down in order for the necessity to be apparent, although Aristotle says nothing at this point about propositions. The present translation better conveys the idea that Aristotle is concerned here with the initial mental *action* of grasping a syllogism. There is, perhaps, a hint of this in the distinction Aristotle draws between what is understood *once the terms have been set out* and what is grasped through the premises.

8. A quite extensive history of the treatment of the distinction can be found in Patzig [8], pp. 69–83. The present brief history relies to a large extent on these pages in Patzig.

9. Again, I refer the reader to Patzig's treatment of these matters.

10. See Bochenski [2], pp. 53–54; Łukasiewicz [6], p. 27; Patzig [8], pp. 68, 83–84.

11. In *Posterior Analytics* (APO 78b1-3) Aristotle provides another example of a perfect syllogism in Barbara in which he gives the terms in his usual fashion (i.e., opposite to that we are accustomed to) and yet reverses the usual order of the premises. See Note 14.

12. I am not claiming that Aristotle actually used diagrams of the sort I am presenting, although there has been much speculation that Aristotle did use diagrams of some sort (see, for instance, Kneale [5], pp. 71–72 and Ross [9], pp. 301–302. I am merely using the diagrams to suggest what goes through the mind (or could go through the mind) as we perform operations with categorical propositions.

13. The two Greek verb-forms inserted into the above translation of Aristotle's definition of 'perfect' are, of course, different forms of the verb *labein*, 'to take' or 'to grasp'.

14. This translation is quite literal except that where Aristotle employs symbols I supply the terms (which he has previously specified). Note that here again we have the peculiar Aristotelian order of terms within premises and yet he *reverses* the typical order of the premises.

15. This figure is perfect assuming, as we have been doing, that it contains all assertoric propositions.

16. The diagrammatic system, as it stands at this point, is inadequate to fully portray certain imperfect syllogisms, such as Darapti. The representation of these syllogisms would require a complication (which I set out elsewhere) which is not germane to the present argument. In any case, the *further* complexity of these syllogisms is all the more proof that they are not perfect.

17. In German [7], p. 61, he writes, "Um diesen Unterschied zwischen vollkommenen und unvollkommenen Syllogismen zu begrifflicher Bestimmtheit zu bringen. . . . "

18. Albrecht Becker [1], pp. 36–37, for instance, considers the passage (32b25-37) to have been drastically reworked. Ross [9], p. 329, agrees that the passage is difficult but rejects Becker's excisions.

19. Patzig understands Aristotle to be attaching modal operators to *terms.* I would challenge this understanding but cannot do so here.

20. A full treatment of explicitly modal syllogisms would, of course, require a distinctive way of representing "possibly applying", etc. I ignore the complication here.

21. Aristotle also in this general vicinity makes back-reference to a previous "definition of possibility" (as contingency) but for this he uses a different word [*diorismon*]. See, for instance, 33b21-4.

22. See Kneale [5], p. 57. Patzig [8], incidentally, errs when, on p. 144, he says that Aristotle "never uses and never mentions" obversion and contraposition. See, for instance, *De Interpretatione* 20a20-21, 39-40; APR 53b12-3.

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