

The Hypothetical Strategy

THE HYPOTHETICAL STRATEGY

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Abstract

Most Logic textbooks claim Aristotle ignored the hypothetical syllogism. These textbooks not only credit subsequent logicians for the invention of the hypothetical syllogism, but they often claim reasoning is founded on the hypothetical, and not the categorical syllogism. This article endeavours to prove the opposite. Aristotle knew the hypothetical syllogism was invented long before Plato, and Aristotle clearly explains the necessary categorical foundation to any hypothetical strategy, as well as the diverse homonyms of hypothetical syllogisms.

PREMINENCE CAUSES DISCOMFORT, especially when it shines forth in all disciplines at once. Nobody should be right all the time. So it's fitting to congratulate ourselves that Aristotle didn't know about the hypothetical syllogism, or that he understood something totally different by that name.

Aristotle, who spent so much time on the arid and tedious issue of modal syllogisms, doesn't deal outright with the theory of hypothetical syllogisms. The Greek expression συλλογισμὸς ἕξ ὑποθέσεως has for him a totally different meaning.¹

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¹ Joseph De Tonquédec, *La critique de la connaissance*, Paris: Beauchesne, 1929, 550.

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My discussion threatens this precious shortcoming since, in my opinion, nothing has ever been written on the nature, the purpose and the division of the hypothetical syllogism, which was more relevant and insightful than the few pages Aristotle dedicates to the topic. Those we prefer to credit with the discovery (Theophrastus, the Stoics, the Megarics, or the Medieval, Modern or contemporary logicians, or recently, the promoters of experimental Science), far from having invented or improved the theory and use of the hypothetical syllogism, have rather disfigured it and reduced it to an obscure intellectual alchemy. This will become apparent as we clearly present the Aristotelian doctrine.

There is a pressing need for this clarification, since the incumbent logicians have recently invested much effort into replacing the categorical syllogism with its hypothetical homonym. They claim the hypothetical syllogism is the most fundamental reasoning, able to supply the very essence of intellectual progress. In their opinion, its simplicity leaves aside even the subject matter and its truth. As a paradoxical effect, logic is condemned as incapable of guiding reason². Rediscovering the thought-guiding function of logic requires a correct re-assessment of the hypothetical syllogism.

This topic isn't difficult in itself. Historical circumstances make it so. One of these circumstances is certainly the generalized ignorance of the syllogism. But for those rare individuals still familiar with the *Prior Analytics*, that very familiarity causes the problem. The incorrect notions which, starting with the very first successors of Aristotle, have been used to present the hypothetical syllogism, have been so etched into minds as to become undeniable. Their claim to self-evidence runs the risk of closing minds to the following insights.

² "Logic doesn't tell us anything about how people actually reason: at the most, it deals with how people should reason... It would be an error to believe that we could improve our reasoning skills by conforming ourselves strictly to the laws of Logic... Logic is interested in the outcomes and not the actual reasoning process." (F. Tournier, *Une introduction informelle à la logique formelle*, Québec: Université Laval, 1988, 26)

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I. Definition

A. A categorical syllogism

Aristotle never wavers: *a syllogism is necessarily categorical*. Syllogizing is concluding, with necessity, the composition or division of two terms. And this conclusion is based only on the determinate relations admitted between these terms and a third one, relations which are such that *we cannot deny this conclusion without contradicting ourselves*. The *Prior Analytics* work hard to prove that these relations necessarily use one of the three classical figures³. Hence the astonishing corollary: *if the hypothetical syllogism is a syllogism, it will be categorical and will proceed by the three figures*.

Aristotle establishes his proof by visiting all available possibilities. The reasoning individual must always conclude the suitability or unsuitability of a predicate to a subject⁴. Actually, knowing truth always consists in judging that a predicate is appropriate or not to a subject. Reasoning is required only if this appropriateness cannot be determined immediately. Reasoning consists then in going back to previous judgments that are relevant to the subject as well as the predicate. But these previous judgements must also be related to something else, if we want to avoid asserting without justification what we are supposed to prove. Therefore, these previous judgments necessarily involve a new term, the "middle term", on top of the original subject and predicate of the problem (also known as the "extremes"). This can be done in only three ways: the middle term's universality is either in between the extremes, or greater, or smaller than the extremes. Hence the three possible figures.

B. An aim substitution

Aristotle will never oppose the categorical and the hypothetical as species. The hypothetical syllogism, insofar as it's a reasoning, is a categorical syllogism. Nevertheless, when Aristotle talks

³ "Every syllogism must be made in one or other of these figures". (*Prior Anal.*, I, 23, 41a17)

⁴ "Every syllogism should prove either that something belongs or that it does not". (*Ibid.*, 40b23-25)

about his intention to list all the hypothetical syllogism's modalities⁵, he states it cannot be reduced to any of the categorical figures⁶. Where exactly does he stand? Does he or does he not recognize the hypothetical syllogism as a legitimate and original rational process, alongside the categorical syllogism? *No! ... and yes!!!* We cannot correctly grasp this aspect of the Stagirite's thought without some familiarity with the nature and use of homonymous terms. Many rational instruments end up with the unique label of "syllogism", without deserving such a label because of a nature requiring the same definition. Aristotle executes for the occasion one of those *homonymical somersaults* he's famous for. "All reasonings", as we've seen, "*must show* (δείκνύναι) that a thing is predicated or not predicated." It's the act of reasoning in its most radical nature: i.e. making a determination about a statement. Aristotle distinguishes two ways of doing this: in conclusion, one *shows* and the other *doesn't show* that the thing is predicated! In the first way, such a syllogism *shows* its conclusion by *showing it* (δείκνυσι δεικτικῶς), and that's the one that has been traditionally qualified as *categorical*, i.e. as predicative (κατηγορικός). In the second way, the syllogism *shows* its conclusion *without showing it!* but *by getting it from a hypothesis* (δείκνυσι ἐξ' ὑποθέσεως)!

It's with this confusing distinction that Aristotle introduces his demonstration that a syllogism necessarily uses one of the three figures. He shows this in two phases: first he talks about the syllogisms that show *by really showing*, then he deals with those that show *without really showing*, i.e. through a hypothesis⁷. The proof concerning syllogisms that show is the one I've just discussed. It applies to all syllogisms, since showing (or concluding) belongs to

⁵ "Many other arguments are brought to a conclusion by the help of an hypothesis; these we ought to consider and mark out clearly. We shall describe in the sequel their differences, and the various ways in which hypothetical arguments are formed". (*Ibid.*, 44, 50a39-b2)

⁶ "Further we must not try to reduce hypothetical syllogisms". (*Ibid.* , 44, 50a16)
In other words: reduce them to one of the three figures of the categorical syllogism.

⁷ "Let us speak first of ostensive (περὶ τῶν δεικτικῶν) syllogisms: for after these have been pointed out the truth of our contention will be clear with regard to those which are proved [...] hypothetically (καὶ ὄλωσ ἐπὶ τῶν ἐξ ὑποθέσεως)". (*Ibid.*, 23, 40b26-29)

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the very essence of the syllogism; we reason insofar as we conclude, as we *show*, as we prove. Aristotle asserts it in the very sentence where he singles out hypothetical syllogisms as *a type of syllogism that doesn't conclude*.⁸ The second part of the proof must then establish how the hypothetical syllogism, even though it's opposed to the syllogisms that show — τοῖς δεικτικοῖς —, *actually shows*, and... *does it like them*, i.e. by using one of the three figures!!!

We are here at the heart of the problem. Is the hypothetical syllogism a true syllogism, or not? Is it a reasoning strictly speaking, a discourse which rigorously connects principles and terms to guarantee the assertion of a truth which isn't immediately apparent? As I've said: Yes! and no! The answer is twofold, since the question is twofold. What justifies the use of the "hypothetical syllogism" label is a complex reality. It's actually *a reasoning which can be as thoroughly syllogistic as you can get*, by making known a conclusion as the necessary consequence of two propositions, in total conformance to the requirements of one of the three figures. Why then all the drama? why make it a separate type? what is meant by the *hypothetical* qualifier? Just this: *the conclusion arrived at does not correspond to the initial problem*; it asserts or denies something other than what the original question was about. The hypothetical syllogism, indeed, is a *comprehensive investigation strategy*, it's bigger than a plain reasoning. As a whole, it targets a problem under discussion, a statement which we can't immediately judge whether to assert or deny. Basically, it's a reasoning like any other, just as "showing" (δεικνύς), and that's why it deserves the name of "syllogism". Nevertheless, its conclusion doesn't answer the initial question, but another equivalent one. *The conclusion of this hypothetical syllogism proves something else that we had previously agreed upon — that's the hypothesis! — i.e. that it would result in one of the problem's contradictories.*

The conclusions of hypothetical syllogisms are not shown by a syllogism, but are all admitted through a convention⁹. — In all

⁸ "It is necessary that every demonstration and every syllogism should *prove* either that something belongs or that it does not, and this [...] *either ostensively or hypothetically*". (*Ibid.*, 40b23-25)

⁹ "Ὅν γὰρ διὰ συλλογισμοῦ δεδειγμένοι εἰσίν, ἀλλὰ διὰ συνθήκης ὁμολογημένοι πάντες". (*Ibid.*, 44, 50a17-19)

hypothetical syllogisms, the syllogism doesn't deal with the aim to be shown, i.e. the *nexus* or essential point¹⁰; this point is rather assumed by a kind of hypothesis and convention. The syllogisms, on their part, target something else and deal with something else: they pertain to the substitute aim (πρὸς ἄλλο τι καὶ ἄλλου τινὸς γίνονται· πρὸς τὸ μεταλαμβανόμενον)¹¹.

II. Illustration

Let's illustrate this a bit. This will let us make more tangible, more concrete, the use of this discussion strategy. Also, by seeing how Aristotle himself uses this strategy, and how before him Plato, Socrates and the previous Geometers were all familiar with it, we'll be able to lay to rest, once and for all, this persistent legend about Aristotle ignoring its existence, and the hypothetical syllogism being a Stoic innovation.

A. Aristotle

We have the following problem: "Does the same Science, yes or no, deal with contraries?" The initial position is: "It appears so", so we'll naturally try to test its soundness. How can we attack it? The normal approach would be to use solid principles from which would rigorously and syllogistically derive the contradictory: "It's not the same Science that deals with contraries". But maybe we can't find enough directly relevant *endoxes**. Are we empty-handed? Not necessarily! Another approach is possible, a workaround, but a legitimate one: *shifting the problem*, swapping the question with another one, but similar enough to be practically equivalent. For example, a Science, in many ways, can be compared to a faculty; of

¹⁰ Τουτέστι τοῦ συνημμένου: the conditional statement (*if... then...*), by presenting the aim as the immediate consequence of another statement, connects or binds it (συνάπτει) to this other statement. Starting with the Stoics, τὸ συνημμένον, the "nexus" or knot, will become the technical label of the hypothetical syllogism's "quasi-major".

¹¹ Themistios, *Paraphrasis in Analyticorum Priorum*, I, 44, 50a16 (149, 31-33.150, 1).

* *Translator's comment*: An "endox" is a term coined by Mr. Pelletier, as a transliteration of ἔνδοξον, meaning a received opinion, an acceptable premiss; by opposition with "paradox, a tenet contrary to received opinion" (Webster's, 11th Ed.).

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which it's the "habitus", the perfection. So, there's a great affinity between the predicates which suit or don't suit them. Hence the intuition that "if the same and unique power isn't susceptible of the contraries, the same Science won't deal with them either". If this is agreed upon, the investigation's landscape changes considerably. The aim is modified, and we seek another conclusion: "The self-same power isn't susceptible of contraries". This conclusion appears easier to arrive at. Nobody will refuse, for example, that "the same faculty can't be simultaneously healthy and sick", nor that "this would be the same as being susceptible to contraries". That provides the elements for a categorical syllogism showing, by directly concluding it, that "the selfsame power isn't susceptible to contraries"¹². Let's analyse a bit more formally:

Not being able to be healthy and sick at the same time is like being not susceptible to contraries

But the same faculty cannot be healthy and sick

Therefore the same faculty isn't susceptible to contraries

This illustrates, according to Aristotle's comprehension, the hypothetical syllogism's "big picture" investigation strategy. Indeed, once we've *categorically* concluded that "the selfsame faculty isn't susceptible to contraries", *we can consider that we've shown that "the selfsame science cannot deal with contraries". We've reached the initial object of the debate, but without concluding it as such.* We've concluded something else, and yet we reached the original goal, *through a convention* which supplied the *hypothesis* or foundation to the whole process.

That, therefore, the selfsame power isn't susceptible to all contraries, *we've shown it* (ἐπιδέδεικται), but that there isn't a Science of them, *we haven't shown it* (οὐ δέδεικται). Nevertheless, *we must still admit it* (καίτοι ὁμολογεῖν ἀναγκαῖον); not because of our syllogism (οὐκ ἐκ συλλογισμοῦ), but because of our hypothesis (ἀλλ' ἐξ ὑποθέσεως). That, therefore, it isn't possible to reduce it, but that the selfsame power isn't susceptible, it's possible. Since *this, no doubt, was still a syllogism, but that a*

¹² "For instance if a man should suppose that unless there is one faculty of contraries, there cannot be one science, and should then argue that not every faculty is of contraries, e.g. of what is healthy and what is sickly: for the same thing will then be at the same time healthy and sickly". (*Prior Anal.*, 50a20-23)

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hypothesis (οὗτος γὰρ ἴσως καὶ ἦν συλλογισμός, ἐκεῖνος δ' ὑπόθεσις)¹³.

So we have all the ingredients. To start with, faced with the problem, a hypothesis¹⁴ which assimilates it to a related assertion. How come this assimilation works as a hypothesis? First, *it's an assertion, not a syllogism*; an obvious or endoxal assertion that is adopted immediately, without a middle term. We then have something we can depend on, something sure; it's something admitted as being so, for the sake of the argument. Afterward, this assertion *provides its rationale*, its principle, to the progress made in the problem's investigation. It's mostly upon this hypothesis that will be based the manifestation of the initial aim. Now, insofar as the hypothesis likens the initial aim to another one which isn't immediately obvious either, it will *require the development of a true syllogism*. This syllogism will be composed of immediate anterior propositions, by which this second aim will be confirmed. This is why the hypothetical strategy for investigation still presents a rigorous syllogistic aspect, despite the fact that the initial aim's ultimate manifestation is not itself syllogistical, but based on an immediate concession, on a convention.

We have here a natural investigation strategy. Aristotle doesn't invent it, he observes it in the spontaneous rational process of any investigator. We can catch Socrates and Plato using it. They themselves don't even claim to have invented it; they credit... the Geometers!

B. Plato

Ubiquitous in Plato, this strategy strains the reader with its abundance of developments. In the *Meno*, it gets a brief theoretical introduction. Socrates and Meno discuss virtue. Meno proposes to investigate whether it's teachable. Socrates would prefer to understand its nature. A definition of virtue would provide a principle to see the appropriateness of this characteristic. But Meno wants to find out right away if virtue is teachable. "It seems that", laments

¹³ *Ibid.*, 50a23-28.

¹⁴ This is actually how Aristotle presents the statement, introducing it by *ὑπόμμενος*, *laying down by hypothesis*, or to translate with a more Latin flavor, *supposing*.

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Socrates, "we'll need to examine *how is* what we don't even know *what it is*."¹⁵ What should we do, in the absence of the definition which would let us judge directly? Shifting the aim, dealing with a related problem, and from the solution of that related problem will derive the solution of the initial problem. That is the approach which Socrates asks Meno to grant, a process which he'll borrow from the Geometers: "Συγχώρησον ἐξ ὑποθέσεως αὐτὸ σκοπεῖσθαι, grant me to seek this using a hypothesis."¹⁶

a) "Modus ponens"

Is there something related enough to what is teachable, such that we could, without having to debate it or put forth any kind of proof, use it to show that discovering it in virtue would be like discovering that virtue is teachable?

We know neither what virtue is nor how it is. So, let's start with a hypothesis to examine if it's teachable or not. Of what kind of quality would virtue be, among those related to the soul, if virtue was teachable?¹⁷

The answer quickly arises: a Science! Science is teachable, all Sciences are teachable and nothing which isn't a Science can be taught. We've got a hypothesis, a kind of fulcrum to shift the inquiry toward a new aim. This new aim might more easily offer some premisses:

If virtue is a science, it can obviously be taught.¹⁸

Socrates, getting Meno's approval for his suggestions along the way, starts looking for premisses which could solve the new question. A reasoning emerges:

Every good is a Science
But every virtue is a good
Therefore every virtue is a Science

With this duely formed BARBARA, Socrates precisely follows the strategy described by Aristotle: having swapped the initial

¹⁵ *Meno*, 89e.

¹⁶ *Ibid.*, 86e.

¹⁷ *Ibid.*, 87b.

¹⁸ *Ibid.*, 87c.

aim with a more easily debated antecedent, he concludes this substitute aim using a purely categorical syllogism. We can clearly see how the so-called hypothetical syllogism is a syllogism only insofar as it uses a categorical syllogism. We can also see how the properly hypothetical part is more like an immediate inference justifying the shift from the initial aim to the antecedent, rather than an actual reasoning.

b) "Modus tollens"

Offhand it now seems given that "virtue is a Science". But Socrates, a rather thorough fellow, returns to the investigation. Meno complains, using almost Aristotelian technical terms: the problem has already been solved, via the hypothesis. "But Socrates, it's now obvious, because of our hypothesis (*κατὰ τὴν ὑπόθεσιν*), that virtue is teachable, if in fact it's a Science."¹⁹ Socrates insists. In a way which is enlightening for us, he looks in the direction of the consequents of the problem, rather than its antecedents, while at the same time maintaining a hypothetical investigation style. If virtue is teachable, he notes, there will be teachers and disciples of virtue.

If virtue is teachable, won't there necessarily be masters and disciples?²⁰

The hypothesis shifts the problem in a new direction. We still won't look for a way to directly conclude that "virtue is teachable" or "is not teachable", but that there "are no masters of virtue", which is a way of destroying the antecedent, i.e. that "virtue is teachable". Socrates doesn't feel the need to discuss this, since it seems so obvious to him. "Even though I often seek masters of virtue, despite all my efforts, I can't find any"²¹. But the discussion ends up leading the substitute problem to another consequent. Since the most likely masters of virtue there could be are Sophists, which we pay so much for that purpose, a hypothesis leaps to mind: "If there are masters of virtue, they are the Sophists". Anythos endeavors to

¹⁹ *Ibid.*, 89c.

²⁰ *Ibid.*, 89d.

²¹ *Ibid.*, 89e.

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destroy the consequent: "These Sophists guarantee the dishonor and ruin of whoever goes near them"²².

If virtue is teachable, *then* there are masters

But there are no masters

Hypothetical confirmation:

If there are masters of virtue, *then* they are the sophists

But Sophists aren't

Syllogistic confirmation:

No master of virtue spoils or ruins

But all Sophists spoil and ruin

Therefore no Sophist is a master of virtue

Since Sophists aren't, *therefore* there are no masters of virtue

Since there are no masters, *therefore* virtue isn't teachable

Following Socrates along has let us see once again the indissociable elements of the hypothetical syllogism, as described by Aristotle. The hypothetical syllogism is a true rational advance, since it lets us deal with a problematic statement. Its use resolves into immediate principles. It doesn't feed on random assertions and doesn't recurse indefinitely away from a reality check. The hypothesis connects, based on an endoxally or immediately obvious consequence, the initial problem to another one, and the discussion on the latter replaces the former. The substituted problem is resolved into immediate principles, based on a rigorous categorical syllogism, indistinguishable as a reasoning from a categorical syllogism using one of the three regular figures.

What is uncertain in the hypotheses, we can show using a categorical syllogism (*διὰ κατηγορικοῦ συλλογισμοῦ*), such that we won't recurse into infinity by showing with another hypothesis the previously assumed hypotheses²³.

The conclusion isn't one of the relevant problem's contradictories, but a statement for which we've agreed that its assertion would immediately confirm, with no need for a debate or reasoning, one of the contradictories of the problem. When Aristotle somewhat confusingly asserts that the hypothetical syllogism can or can't be

²² *Meno*, 91c.

²³ [23] Ammonios, *Analyticorum Priorum Commentarium*, I, 23, 40b17 (67, 13-15).

reduced (i.e. as any categorical syllogism, to one of the universal modes of the categorical syllogism's first figure), it's because he's focussing on one or the other of these aspects.

It's the same for all hypothetical syllogisms, since for all of them, *the syllogism is made by targeting the substituted aim* (ἐν ἅπασι γὰρ ὁ μὲν συλλογισμὸς γίνεται πρὸς τὸ μεταλαμβανόμενον); as far as the initial aim, we get it through a concession, or by some other *hypotheses* (τὸ δ' ἐξ ἀρχῆς περαίνεται δι' ὁμολογίας ἢ τινος ἄλλης ὑποθέσεως).²⁴

III. Falsification

The frequency of Socrates' use of this strategy shows its natural character. Aristotle doesn't invent it, but observes it. Its actual use is surprizingly varied: sometimes the initial problem is confirmed by confirming an antecedent; sometimes it's denied by denying a consequent. By scrutinizing its use by Socrates, we'll see that this process is related to a broader strategy which doesn't always include a syllogism, and often contents itself with an immediate inference²⁵. Of course if the antecedent, to which the initial problem is connected by the hypothesis, is obvious, there is no need to prove it. In such a case, it must be understood that there isn't a *hypothetical 'syllogism'* anymore, but only a hypothetical '*strategy*'. And even that is somewhat rhetorical, since the opening *if* no longer indicates an interrogation. This is the crucial distinction. Failure to grasp this distinction is the cause of the persistent tradition of Aristotle's ignorance of the hypothetical syllogism, a tradition which we must now put to rest.

The post-Aristotelian efforts to technically dress up this substitutive syllogism quickly forgot the process' core, ignoring the complete categorical syllogism which earns it the generic name of *syllogism*. Soon, logicians started to talk *as if a hypothetical syllogism could get along without syllogizing*. Already, Stoic logicians thought they could account for the hypothetical syllogism by arbitrarily presenting its substitute aim as alternating between two

²⁴ *Prior Anal.*, I, 23, 41a37-b5.

²⁵ "It's not any substituted aim that we show with a categorical syllogism; often, on the contrary, we advance it because of its evidence". (Themistios, *Paraphrasis in Anal. Prior.*, I, 44, 50a16, 151, 6-7)

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statuses. Firstly, in a "quasi-major" proposition as a conjecture (*if...*), because there is no evidence to firmly assert it. Then in a "quasi-minor", asserted with authority, by erratically forgetting its conjectural status — except *it is* conjectural! As irrational as may be this casting away of everything syllogistical from a hypothetical syllogism, it nevertheless inspires the hypothetical syllogism's presentation in all Logic textbooks:

If B, then A
But B
Therefore A

A. The Stoics

The two-thousand year-old drama of Stoic logic now appears rather deflated. Without scrutiny, this logic is congratulated for streamlining the rational process. This "streamlining" is accomplished by building the rational process on conditional propositions, and by getting rid of all the "nonsense" of categorical syllogistic modes²⁶. What is the basis for this *simplification* of Logic? Just *getting rid of reasoning!* The Stoics, and all subsequent cheerleaders of the hypothetical over the categorical, have given up reasoning unawares, to make do with immediate inference. As Stoics have seen, there's already an *inference* between judgments in a conditional proposition, an inference which is simpler than the one used in a categorical syllogism²⁷. Except it's an immediate inference, not a reasoning. The conditional proposition, in order to obtain assent for the connection between the antecedent and consequent it relates, depends on evidence which is already available, not on some evidence obtained through reduction to other anteriorly evident statements. Stoics and all their imitators, by shunning the categorical syllogism, intend to limit their intellectual progress to what is immediately obvious to them. Therefore, they give up the mediation which essentially characterizes reasoning.

²⁶ "In Stoic Logic, the conditional syllogism normally replaces the categorical syllogism [...] Despite the odds, Stoics have kept their word and built up a complete Logic without Barocos or Baraliptons". (V. Brochard, *Études de philosophie ancienne et de philosophie moderne*, Paris: Vrin, 1966, c. XI, 224-225)

²⁷ "Conditional propositions are the most natural and simple form of inference: Logic starts with them". (*Ibid.*, 224)

Husserl congratulated Descartes for admitting in his mind only concepts which he couldn't doubt: "It's making a vow of poverty in the field of knowledge"²⁸. Stoics have chosen an even more radical poverty: giving up all syllogisms, they even deprive themselves of demonstration.

If only immediate inference is considered to be a reasoning, how do we differentiate its types? By listing the various ways of flagging an immediate connection between two statements. Characteristically, Stoics qualify as ἀναπόδεικτοι, as *undemonstrable*, the species of what they wrongly consider to be forms of reasoning. They therefore admit to stating immediate truths having neither possibility nor need of a demonstration, because of their great evidence, which leaves no possibility of connecting them to more obvious statements. These ἀναπόδεικτοι or "undemonstrables" flesh out a bit the Principle of non-contradiction, but don't offer a framework for subsequent reasonings. They merely offer general molds in which we can pour matter having equally immediate but more concrete evidence.

The only possible and legitimate thing to do, is to resolve all possible syllogisms into a few elementary types of conditional, or disjunctive form. This is precisely what the Stoics did by distinguishing five irreducible or ἄπλοοι syllogisms... The whole theory of syllogisms can be reduced to these very simple formulas, simpler at least than the conclusive modes of classical syllogistics: 1. Εἰ τὸ πρῶτον τὸ δεύτερον· τὸ δέ γε πρῶτον· τὸ ἄρα δεύτερον. — 2. Τὸ πρῶτον τὸ δεύτερον· οὐχὶ δέ γε τὸ δεύτερον· οὐκ ἄρα τὸ πρῶτον. — 3. Οὐχὶ καὶ τὸ πρῶτον καὶ τὸ δεύτερον· τὸ δέ γε πρῶτον· οὐκ ἄρα τὸ δεύτερον. — 4. Ἦτοι τὸ πρῶτον ἢ τὸ δεύτερον· ἀλλὰ μὴν τὸ πρῶτον· οὐκ ἄρα τὸ δεύτερον. — 5. Ἦτοι τὸ πρῶτον ἢ τὸ δεύτερον· οὐχὶ δέ τὸ δεύτερον· πρῶτον ἄρα ἐστίν.²⁹

The first undemonstrable simply describes the substitution strategy we've presented in the name of Aristotle as the typical hypothetical syllogism: "If such a first statement is verified, then also the second; but in fact the first is verified; hence also the

²⁸ Husserl, introduction to his *Cartesian Meditations*.

²⁹ Brochard, *ibid.*, 225-226.

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second". Do we need to repeat it? The first statement, in a conditional form, talks about the immediately obvious consequence connecting both statements, as a justification to swap discussion of the antecedent for that of the consequent. The second asserts the antecedent. Here, Stoics forget that this assertion is only legitimate in two cases: 1° the statement is immediately obvious: the whole exercise has then nothing of a reasoning; 2° the statement is debatable: before asserting it, we'll have to reduce it to obvious principles given a categorical syllogism, and that will be the only properly reasoning part of this whole exercise. The third statement, once the antecedent is established, asserts the consequent as established, based on the connection admitted in the conditional statement.

The second undemonstrable describes the same strategy, but reversed: "If such a first statement is verified, then also such a second; but in fact the second isn't verified, hence neither is the first". This time, the initial conditional statement proposes to substitute the discussion of the consequent to that of the antecedent. The second statement refuses the consequent; once again, this must be made legitimate by an immediate evidence, or by a relevant argument. The third statement refuses the antecedent, based on the initially admitted connection. This is the way used by Socrates to refuse virtue's teachableness because it doesn't have masters.

The other three undemonstrables add little, if not to the superficial external presentation, by using conjunctive or disjunctive terms instead of conditional. We'll better see their scope later when we ask Aristotle what diversity he recognizes in hypothetical syllogisms. Let's content ourselves for the time being with the 4th undemonstrable. "It's either such a first statement which is verified, or such a second; in fact, it's the first, so the second isn't verified". The suggested strategy is clear. The disjunctive statement proposes to substitute the discussion of the first statement to that of the second one, based on an immediately obvious disjunction between them. We proceed with the assertion of the first statement, whose assertion, as before, is legitimate assuming an immediate evidence or an underpinning categorical syllogism. We conclude by refusing the second statement based on the admission of the initial disjunction.

Each time, all the elements of the Aristotelian hypothetical strategy are obviously required. Nevertheless, the Stoics missed this. They stripped this strategy of all the argumentation it had, with the absurd claim that what remained was the very essence of argumentation.

B. Subsequent tradition

As serious as the Stoic misconception may be, it's consistent with the universal desire for a single handy silver bullet. Tradition subsequent to Aristotle has thus tended, by superficial variations on the Stoic model, to enshrine the hypothetical strategy, stripped of its soul, as the reasoning mode opposable to the categorical syllogism. Moreover, this has been done while condemning to almost complete oblivion Aristotle's considerations, which are disqualified as "talking about something else".

But how can the repetition of the same statement, first as a conjecture, then as a firm position, be qualified as a rational process? Nobody will recognise a reasoning in the spontaneously recognized connection between two statements: "Since A, therefore Q". But what difference does this causal proposition have with the traditional quasi-major "If P, then Q", if not the conjectural character of "A" in the conditional? This conjectural character forbids us of continuing with "Since A", without looking for some sort of proof. Socrates and Meno, from the start, either know or don't know that "virtue is a Science". If they already know, their process will naturally take on the following form: "Since virtue is a Science, therefore virtue is teachable". This assertion is immediate, having nothing of a reasoning, nor anything hypothetical. If, on the other hand, they don't know it, and they immediately admit only of the necessary connection between Science and teachableness, they'll be able to assert: "If virtue is a Science, then virtue is teachable". But they won't be justified to continue: "But virtue is a Science", as long as they won't have supplied a legitimate reason to admit it, normally as a categorical syllogism. In other words, the traditional presentation...

If virtue is a Science, then virtue is teachable

But virtue is a Science

Therefore virtue is teachable

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... can only claim to a rhetorical formulation, which gives a conjectural form to a causal statement whose truth is fully known: "*Since* virtue is a Science, *then* virtue is teachable". The hypothetical syllogism's legitimate schema couldn't imitate the traditional one otherwise than by using the following form:

If A, then B
But major and minor
Therefore A
Since A, then B

We can see how the initial aim, "B", is substituted by "A". We agree from the start that proving "A" will be like proving "B", and then work to justify "A" syllogistically, to then invoke the previously agreed-upon connection to consider having justified "B". A refusal of this interpretation, whatever the intricacies used to camouflage it, necessarily amounts to claiming the status of syllogism for a connection between two statements that is in fact immediately admitted.

IV. Homonymy

Aristotle sees hypothetical syllogisms in a diversity of rational tools, if not as full-fledged species, then at least according to a greater or lesser extension. Some deserve clarifications, given the attention tradition has given them. They are not so much *species* equally classified under the "hypothetical syllogism" *genus*, but rather various argumentation strategies which share that *name*, since they integrate a categorical syllogism within a broader rational environment. We must emphasize the more grammatical than logical character of labels to which are usually attached great importance. I here *outline* some of these homonyms. *Outline*, i.e. without justifying the details, for the sake of conciseness³⁰.

A. The conditional syllogism

First homonym: the conditional syllogism. It's the most typical illustration of the hypothetical strategy.

First "figure" (modus ponens):

³⁰ For the complete rationale, please see my book on the topic: *Le syllogisme hypothétique (sa conception aristotélicienne)*, Philosophia Perennis monography #2, 2006, available on the [Society of Aristotelian Studies](#) website.

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If the antecedent, then the initial aim
But the antecedent
Syllogistic confirmation:
major — minor
Therefore the antecedent
Since the antecedent, therefore the initial aim

Second "figure" (modus tollens):

If the initial aim, then the consequent
But not the consequent
Syllogistic confirmation:
major — minor
Therefore not the consequent
Since not the consequent, therefore not the initial aim

In the hypotheses which we invoke, the immediate consequence called for between both statements varies: an effect follows its cause, and observing the effect entails its cause; the concomitant follows its concomitant; form precedes its indispensable matter, the species its proper, and reciprocally the proper its species; and so on. Each motive connects the judgment on one statement to the judgement to be made on the other. Presenting each one as grounds for a distinct species would be tedious. We can nevertheless illustrate some which require a sufficiently different grammatical form to give the illusion of a profound logical difference.

a) Division³¹

C is *either* A, *or* B
But C is not B
Syllogistic confirmation:
major — minor
Therefore C is not B
Since C is not B, *therefore* C is A

This schema varies profusely, depending on whether the supposed division targets the subject or the predicate of the problem, and asserts or denies the first or the second of the eventual subjects or predicates to conclude with the other one. However, the rational

³¹ "Division is, so to speak, a weak syllogism (ἀσθενής συλλογισμός); for what it ought to prove, it begs (ὁ μὲν γὰρ δεῖ δεῖξαι αἰτεῖται)". (*Prior Anal.*, I, 31, 46a32)

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mechanism isn't thereby modified at all, such that it would be vain to build upon that figures and modes for the disjunctive syllogism. With their 4th and 5th undemonstrables, Stoics ridicule themselves trying to exhaust the disjunctive syllogism's resources. In the *Topics* as in the *Rhetoric*, Aristotle presents division as useful to attack a position. Moreover, his presentation broadens our knowledge of available resources: not only denying a member to assert the other, but also denying all the division's members to absolutely deny the predication; asserting a member to deny the other; denying all other members to assert the remaining member, etc.

b) The cascading hypothesis

What if the hypothesis meets with reservations? The strategy fails totally, if the hypothesis isn't granted. On the other hand, if we scrutinize the hypothesis, before using it, will the scrutinized hypothesis remove the process' hypothetical character? Let's see through an example inspired by Alexander of Aphrodisias. About the question of judging whether "pleasure has of itself the nature of an end", to shift the discussion toward an aim more amenable to attack, Alexander formulates this hypothesis: "If pleasure has the nature of an end, virtue is not chosen for itself". Does someone hesitate to grant that consequence? Alexander comes thus to the rescue:

If virtue is chosen as agent of pleasure, *then* it isn't chosen for itself
But, if pleasure is an end, *then* virtue is chosen as agent of pleasure
Therefore, if pleasure is an end, *therefore* virtue isn't chosen for itself³²

There's an illustration of the mysterious syllogistical trick, baptized *fully hypothetical syllogism*³³, which has puzzled all logicians since Theophrastus, and where a cascade of conditionals come into play. Authors have long debated the categorical or hypothetical nature of such a "super-hypothetical" syllogism. It's more often claimed to be categorical, because of the obvious and indisputable rigor with which its conclusion is established. Some even believe they can reduce its presentation to that of a categorical syllogism:

³² See Alexander, *Analyticorum Priorum Commentarium*, I, 23 (264, 27-31).

³³ See *Ibid.* (265, 13-14: τὸ δι' ὅλων ὑποθετικὸν τῶν συλλογισμῶν εἶδος)

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Nothing which is chosen as agent of pleasure is chosen for itself
Virtue is chosen as agent of pleasure
Virtue isn't chosen for itself

And yet, Alexander doesn't determinately take on neither that minor nor that conclusion. On the contrary, he puts forth these statements as absurd consequences which would follow if we adopted one of the contradictories of the initial problem: "*if pleasure is the end*". As far as the major is concerned, he asserts that yes, an agent isn't chosen for its own sake but Alexander's interest in this context is the *conjectural* contraction of this consequence to virtue: "*if virtue is chosen as agent of pleasure, then virtue isn't chosen for itself*". Of this consequence, he neither asserts the antecedent nor the consequent, but gives the consequent's absurdity as clue to the antecedent's falsehood.

The hypothesis, whereby the discussion is shifted to a substitute aim, here shows *its three components*. This hypothesis must: 1° announce the universal assimilation (or repugnance) of two terms, and 2° ask the question of the relationship of one of them to a third term, but especially 3° promise the recognition of a relationship of the other term with this third one, should the relationship with the first term be confirmed.

Hence, the major of our fully-hypothetical syllogism: 1° recognizes a universal repugnance between *agent of pleasure* and *being chosen for oneself*: the agent of pleasure isn't chosen for its own sake; 2° asks "if virtue is chosen for its own sake as agent of pleasure"; 3° commits to recognize, if this should be the case, that "virtue wouldn't wouldn't be chosen for its own sake". A regular syllogistic proposition, as opposed to a hypothesis, only has the first of these three components: the attribution of one term to another.

Therefore, Alexander doesn't strictly propose to us a categorical syllogism, since nothing is asserted or denied of any term. A hypothetical syllogism, then? No, to continue speaking strictly. You might be fooled into thinking Yes, since we do have the transfer of the interrogation bearing on an antecedent, to its consequent, just like the second figure of the conditional syllogism. This even occurs repeatedly: it's in each premiss, and appears again in the conclusion. But in fact, no categorical argument appears to settle the fate of the granted consequents. What is it, then? A hypothetical strategy, but without the categorical syllogism to confirm or invalidate the

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substitute aim? More than that, since the problem is actually settled. And settled *mediately*. Let's not forget that it's a *pre-syllogism*, and that the problem it immediately targets is the legitimacy of the main problem's transfer to one of its consequents.

We have what, for lack of a better expression, we could call a... "*conditional categorical syllogism!!!*" A categorical string of conditions, one condition set up as a consequence of two others, with the use of a middle term between an antecedent and a consequent to emphasize their consequence. This chain of conditionals is *just as solid as an ordinary categorical syllogism*, since *it too is resolved into the impossibility of a contradiction*. This series connects the two hypotheses which serve as propositions, and the one serving as a conclusion, so firmly that we cannot, without contradicting ourselves, grant the first two hypotheses and refuse the third. A "categorical conditional" syllogism, since it *categorically* demonstrates the division of two terms — "virtue would not be chosen for its own sake" — *under the condition* that pleasure be the ultimate end.

B. The qualitative syllogism

Different grounds for the immediate consequence between two terms impose minimal differences to the hypothetical argument: it remains a conditional syllogism. A deeper source of differences sometimes appears. Aristotle indicates *the qualitative syllogism* (ὁ κατὰ τὴν ποιότητα) as a notably separate species.

The relation, which suggests replacing an aim's subject or predicate with another one, can constitute *something other than a direct consequence*. It can be secondary, qualitative: both subjects can present *comparable grounds to merit the predicate* under discussion. This comparison of the rights of both subjects to demand the same predicate supplies in various circumstances a sufficient basis to endoxically assure that this predicate is suitable to one when it's suitable to the other, or conversely, that it's unsuited to one because unsuited to the other. Aristotle calls these syllogisms κατὰ ποιότητα, *according to the quality*, the strategies which flow from this comparison; indeed, being *equally* or *more or less* thus concerns the qualitative predicates.

We call "according to the quality" the syllogisms proceeding from the more and the less and the similar (οἱ ἀπὸ τοῦ μᾶλλον

καὶ ἤττον καὶ ὁμοίου δεικνύντες), since these determinations, the similar, the more and the less, relate to what has quality (τῷ ποιῶ παρακολουθεῖ)³⁴.

a) Similarity (ὁ κατὰ τὴν ὁμοιότητα)³⁵

When these subjects generally share the same predicates, then observing in one subject the presence of a predicate lets us legitimately expect its presence in the other. A particular species of the hypothetical syllogism is grounded on this similarity of the subject of the problem, to any other subject which would facilitate discussion on the suitability of the problematic predicate. Schema:

If the predicate is appropriate to one of two similar subjects, *then* also to the other

But the predicate is appropriate to one of two similar subjects

Syllogistical confirmation:

Major — Minor

Therefore the predicate is appropriate to one of two similar subjects

Since the predicate is appropriate to one of two similar subjects, *therefore* also to the other

b) Superiority and inferiority of plausibility (ὁ κατὰ τὸ μᾶλλον καὶ τὸ ἥττον)

Superior plausibility is a bit awkward to describe verbally, but simple conceptually. It lets us invalidate the problematic predicate of the initial aim's subject, when that predicate is seen to be unsuitable to another subject, even though it should be far more

³⁴ *Ibid.*, 29 (324, 19-22).

³⁵ Note how Aristotle presents the similar-based argument in words typically used for hypothetical syllogisms, in terms of aim substitution: "The examination of likeness is useful with a view [...] to hypothetical reasonings, [...] it is a general opinion that among similars what is true of one is true also of the rest. If, then, with regard to any of them we are well supplied with matter for a discussion, we shall secure a preliminary admission that however it is in these cases, so it is also in the case before us: then when we have shown the former we shall have shown, on the strength of the hypothesis, the matter before us as well: for we have first made the hypothesis that however it is in these cases, so it is also in the case before us, and have then proved the point as regards these cases". (*Top.*, I, 18, 108b7-19) — See also *Top.*, III, 6, 119b21ss.

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suiting to that other subject than to the subject of the initial aim. Inferior plausibility just works in the opposite direction. A predicate, which is suited to a subject, to which it is less plausibly suited than to the initial subject, will also be suited to the initial subject.

A majori

If the predicate doesn't suit the more plausible subject, *then* neither the less plausible subject

But the predicate doesn't suit the more plausible subject

Syllogistical confirmation:

Major — Minor

Therefore the predicate doesn't suit the more plausible subject

Since the predicate doesn't suit the more plausible subject,
therefore neither the less plausible subject³⁶

A minori

If the predicate suits the less plausible subject, *then* also the more plausible subject

But the predicate suits the less plausible subject

Syllogistical confirmation:

Major — Minor

Therefore the predicate suits the less plausible subject

Since the predicate suits the less plausible subject, *therefore* also the more plausible subject³⁷

C. Induction (ὁ ἐξ ἐπαγωγῆς συλλογισμός)

Aristotle relates to the hypothetical strategy a rather surprising subject substitution mode: he delegates its inferior in universality, as a legitimate representative.

a) The particular (ὁ διὰ τῆς κατὰ μέρος ἐπιβλέψεως ἐξ ὑποθέσεως συλλογισμός)

The process is similar to the one that invokes a similar subject. The similitude is actually greater from one species to its genus, or from one individual to its species, than between subjects similar because they share a few accidents. If what one learns from a

³⁶ "If one doesn't suit to what should suit it more, it's obvious that it won't suit either to that to which it should suit less". (*Ibid.*, 1397b15-16)

³⁷ "If the less plausible suits, the more plausible suits too". (*Rhet.*, II, 23, 1397b18)

similar has the potential to inform us about the other, what we learn of a species has even more potential to inform us about its genus. Here too, indeed, the discourse remains fragile: the species also have differences; that's why they are distinct species, and the genus must abstract those differences away, not let them be predicated of itself universally. We therefore cannot grant without some explicit authorization, that if we show the suitability of one predicate to a particular, we'll have shown its relevance to the genus. To give this authorization, we need to be dealing with a close consequent: element of definition, proper, necessary accident, not just any superficial and transient accident. In any case, *the passage to the universal will never be done otherwise than through the granted hypothesis, never based on a rigorous syllogism*. Aristotle couldn't be clearer about this³⁸.

If the predicate suits a species, then also the genus

But the predicate suits a species

Syllogistical confirmation:

Major — Minor

Therefore the predicate suits a species

*Since the predicate suits a species, therefore also the genus*³⁹

b) Induction (ὁ ἐξ ἐπαγωγῆς)

If the intimacy of the relation sensed between an inferior and its superior legitimizes the hypothesis which universally grants the inferior's predicate to the superior, this legitimacy increases with the numbers of inferiors observed or proved, and peaks when the proof reaches all cases. Induction therefore represents the highest attainable perfection of this use of the hypothetical syllogism. The two parts of the hypothetical process clearly appear in the induction. The hypothetical part colors the properly inductive part: it's always a hypothesis, i.e. an immediate judgment on the concerned matter's nature and firmness, which recognizes the enumeration as sufficient

³⁸ "It is possible to establish some of them syllogistically in another way, e.g. universal problems by the inquiry which leads up to a particular conclusion, with the addition of an hypothesis". (*Prior Anal.*, I, 29, 45b22-23)

³⁹ For a concrete Aristotelian example, see *On The Heavens*, II, 11, 291b17ss. Aristotle syllogistically proves that the Moon is spherical, once granted that "if one celestial body is spherical, then they all are".

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to universally extend an observation made in several cases. Even when all the cases have been visited! This is because the judgment that all cases are so is immediate; it's not a syllogism's conclusion, and it doesn't syllogistically follow from the proof grounding each case of the enumeration, which is the eventual syllogistical part. We say eventual, because the judgment on each case is more often based on a direct and immediate observation: the process is then devoid of a middle term, without a syllogism, immediate. Induction is a hypothetical *syllogism*, and it's a syllogism *insofar only as we grant the cases, on which the universal judgment is based, as conclusions of syllogisms*⁴⁰.

If the predicate suits all species, *then* also the genus

But the predicate suits all species

Syllogistical confirmation:

Major — Minor

Therefore the predicate suits such, and such, and such, and thus all the species

Since the predicate suits all species, *therefore* also the genus

⁴⁰ "Nor [...] is the method of division a process of inference at all, since at no point does the characterization of the subject follow necessarily from the premising of certain other facts: division demonstrates as little as does induction. For in a genuine demonstration the conclusion must not be put as a question nor depend on a concession, but must follow necessarily from its premisses, even if the respondent deny it". (*Posterior Anal.*, II, 5, 91b12-17) — "The Philosopher has compared with enough congruence division and induction. In both cases, we must suppose we've assumed everything that is placed under a common term (*oportet supponere quod accepta sint omnia quae contineantur sub aliquo communi*); otherwise, neither he who induces could conclude from the assumed singulars to the universal, nor he who divides could conclude from the withdrawal of parts to what remains. When we induce, it's obvious; once we've made the induction that Socrates runs, then so Plato and Cicero, we cannot necessarily conclude that all men run, unless the opponent grants that nothing else is placed under man, beyond the listed cases". (*In II Posterior Anal.*, 6, #446) — See also *Prior Anal.*, II, 23, 68b15-24.

D. Reductio ad absurdum (ὁ διὰ τοῦ ἀδυνάτου συλλογισμός)

Final surprise, Aristotle classifies even *reductio ad absurdum* as a hypothetical syllogism⁴¹. On which hypothesis or concession it rests isn't immediately apparent, since it seems to get along quite well without having the opponent grant us anything. Also, employing *reductio ad absurdum* to show the rigor of syllogistical uses, is a recognition that it's exterior and prior to the syllogism. So if it has neither hypothesis nor syllogism, what relationship could it have with the hypothetical syllogism? what hypothesis characterizes it? what concession does it expect from the opponent? toward which aim, more amenable to argumentation, does it shift the discussion?

First of all, the syllogism via the impossible shows a due form, with a perfectly-located middle term, generating an impeccable form⁴². Moreover, it differs from a pure and simple categorical syllogism only by the layout of its elements. It's always no more nor less than the conversion of a categorical syllogism which would directly conclude the initial aim, with the same materials⁴³. How could such a categoric argumentation present the form of a specific hypothetical syllogism?

a) Argumentation strategy

First common aspect: *Reductio ad absurdum* doesn't primarily signify a special form of reasoning, but an *overall argumentation strategy* adapted to a given problem's special difficulty. Normally, we seek to directly conclude the aim: a problem is raised, an initial position is taken, we start looking for premisses that attack it directly, and we conclude the contradictory. Sometimes, the short-

⁴¹ "Reasoning by *reductio ad absurdum* is a part of the one which depends on a hypothesis". (*Prior Anal.*, I, 23, 40b25)

⁴² "*Reductio ad absurdum* can be analysed, since it shows by a syllogism". (*Ibid.*, 44, 50a30-31)

⁴³ "For what is proved ostensively may also be concluded syllogistically *per impossibile* by means of the same terms; and what is proved *per impossibile* may also be proved ostensively". (*Prior Anal.*, *ibid.*, 45a26-28) — "These are the same reasonings than by conversion which are done [...] Obviously, any problem can be demonstrated in two ways, whether *per impossibile* or ostensively; one and the other cannot be separated". (*Ibid.*, 63b16-21)

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age of such premisses suggests that we substitute the initial aim with an antecedent or consequent more fertile in argumentation principles: that's the opportunity for the hypothetical syllogism by aim substitution (κατὰ τὸ μεταλαμβανόμενον). But sometimes the person we're speaking with, because of imperfect moral or intellectual dispositions, won't easily grant the available direct premisses: that's the opportunity for the *reductio ad absurdum* (διὰ τοῦ ἀδυνάτου). A reasoning needs two premisses; a stubborn speaker might not even grant that much. We'd already be happy if he granted an absolutely endoxal or even obvious premiss, whose usefulness for the refutation of his initial position wouldn't be too apparent. The strategy via the absurd lets us avoid begging him for the second premiss. On the contrary, we'll use his own position, which he has already declared and can't refuse. The trick is fragile. If it conceals for a moment where the argument is heading, it depends on a conclusion that will be impossible, in a sufficiently obvious way, so the speaker won't stubbornly refuse its absurdity. That's how we'll nevertheless depend a bit on his concession⁴⁴.

b) Aim substitution

Second common aspect: *Reductio ad absurdum* has an aim substitution. Here also, the reasoner intends an aim which he expects to be able to conclude more easily: *he concludes a statement as perfectly absurd as possible*⁴⁵. This is at the same time a difference with the ordinary hypothetical syllogism: *insincerity essentially colors the reductio ad absurdum*. Reasoning, by its nature, seeks the manifestation of truth, and leads to adoption of its conclusion. Here, on the contrary, the debater neither adopts nor tries to make anyone adopt the conclusion of his argument! quite the contrary, his desire is that his opponent will adamantly refuse it!

⁴⁴ This is the meaning of the *Topic's* warning which emphasizes the fragility of this approach: "In argument with another reasoning *per impossibile* should be avoided. For where one has reasoned without the reduction *per impossibile*, no dispute can arise; if, on the other hand, one does reason to an impossible conclusion, unless its falsehood is too plainly manifest, people deny that it is impossible, so that the questioners do not get what they want". (*Top.*, VIII, 2, 157b34-158a2)

⁴⁵ "For all who effect an argument *per impossibile* infer syllogistically what is false" (*Prior Anal.*, I, 23, 41a23)

This insincerity can be seen right from the start, in the proposal of a premiss which we half-heartedly accept: we base the search precisely on what we're trying to discredit⁴⁶.

c) A decisive hypothesis

Third and fundamental similarity: *Reductio ad absurdum* depends on a hypothesis, on a statement where we grant that to rigorously conclude the substitute aim — here the absurd statement — will be the same as having directly concluded the initial aim — the contradictory of the opponent's position. Basically, *the fundamental mechanism of reductio ad absurdum isn't a reasoning*⁴⁷, but the direct concession of a statement which asserts that "if an absurdity rigorously follows the initial position, its contradictory will be proved"⁴⁸. Strikingly, the hypothesis thus worded is literally how Aristotle defines it himself: "Τὸ δ' ἐξ ἀρχῆς ἐξ ὑποθέσεως δεικνύουσιν, ὅταν ἀδύνατόν τι συμβαίνει τῆς ἀντιφάσεως τεθείσης. — Their initial aim, they show it using a hypothesis, when something impossible follows from the fact of having assumed the contradictory"⁴⁹. We can easily discern this approach in Aristotle's favorite example: "Whether odd numbers are equal to even numbers", because we deny the diagonal's incommensurability, "then the diagonal is incommensurable"⁵⁰. It's incidentally that this process will still use a strict categorical syllogism, analysable in one

⁴⁶ "For the ostensive syllogism differs from the *reductio ad impossibile* in this: in the ostensive syllogism both premisses are laid down in accordance with the truth (κατ' ἀλήθειαν), in the *reductio ad impossibile* one of the premisses is assumed falsely (ψευδῶς)". (*Ibid.*, 29, 45b8-11)

⁴⁷ "The same holds good of arguments which are brought to a conclusion *per impossibile*. These cannot be analysed either". (*Prior Anal.*, I, 44, 50a29-30)

⁴⁸ "Reasonings that proceed *per impossibile* also show based on a hypothesis. In their case, the reasoning isn't grounded either on what is shown; rather, the reasoning [...] is grounded on what is false. Afterward, we establish the thesis because of the impossible shown by the reasoning, without first having formed any reasoning which concludes it". (Alexander, *ibid.*, 50a16, 386, 22-27)

⁴⁹ *Prior Anal.*, I, 23, 41a24-26.

⁵⁰ "One proves hypothetically (ἐξ ὑποθέσεως δεικνύουσιν) the incommensurability of the diagonal, since a falsehood results through contradicting this". (ἐπεὶ ψεῦδος συμβαίνει διὰ τὴν ἀντίφασιν) (*Ibid.*, 41a28-30)

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of the three figures: just as in any hypothetical syllogism, its conclusion will establish the substitute aim, not the initial aim⁵¹.

We'll better see this, by putting the *reductio ad absurdum* in the overall hypothetical syllogism's schema:

If an absurdity follows (from the denial of the initial aim), *then* the initial aim is thus shown

But an absurdity follows (from the denial of the initial aim)

Syllogistical confirmation:

Major — Minor (one of them being the initial aim's contradictory)

Therefore an absurdity

Since an absurdity follows (from the denial of the initial aim), *therefore* the initial aim is thus shown

A concrete example will help us grasp the concept:

If some good is not to be encouraged (following the denial that all virtue is to be encouraged),

then all virtue is to be encouraged

But some good is not to be encouraged (following the denial that all virtue is to be encouraged),

Syllogistical confirmation:

Some virtue is not to be encouraged [initial granted position]

But all virtue is a good

Therefore some good is not to be encouraged

Since some good is not to be encouraged (following the denial that all virtue is to be encouraged),

then all virtue is to be encouraged

Aristotle emphasizes a peerless advantage of the *reductio ad absurdum*, among the hypothetical syllogisms: its basic hypothesis is so powerful, obvious, irresistible, that we don't need ask for its concession, nor even say it.

There is, with the reasonings we've previously spoken of, a difference: in those, there is something which we must first have granted, to be forced to concede the aim... Here, on the other hand,

⁵¹ "The reduction to what is impossible can be analysed since it is proved by syllogism, though the rest of the argument cannot, because the conclusion is reached from an hypothesis". (*Ibid.*, 50a30-32)

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even without having granted anything ahead of time, we must concede the aim, from the fact that the falsehood is obvious⁵².

Nobody can sincerely assert that a statement is true, if it rigorously leads to an absurd consequence. We could deny that it leads to it; the form of the developed argument and the second premiss' legitimacy block this possibility. We could deny the consequence's absurdity: so, to succeed, we must arrive at an absolutely obvious absurdity. This is what Aristotle says: "from the fact that...", we could say: "*under the condition that* the falsehood be obvious!" This is like his example: no one will deny that it's absurd to claim odd and even numbers are equal. But the hypothesis, the obligation of adopting a statement whose contradictory leads to an absurdity, *nobody can refuse it*. It's based on the deep nature of contradiction; it embodies an indissociable corollary of the non-contradiction principle.

For the *reductio ad absurdum*, without any intervening concession, from the simple fact of showing the impossible, we are led to assume its opposite, *because of the necessity related to contradiction*⁵³.

Finally, another difference: normally, he who argues doesn't have to judge the conclusion ahead of time, nor foresee its quality, affirmation or negation. It's precisely because he can't, because the matter causes a problem, that he looks for premisses and an argument to judge it. The person striving for a *reductio ad absurdum* sees things differently. He must know the falsehood of his conclusion ahead of time, whether absurd or paradoxical. He doesn't need the reduction he's cooking up to judge of this; it's precisely because he already knows its conclusion is absurd that he's interested and that he wants to conclude it!⁵⁴

Conclusion

We can now better see the injustice done to Aristotle, when he's accused without proof of being clueless about the hypothetical

⁵² *Prior Anal.*, I, 44, 50a32-38.

⁵³ Alexander, *ibid.*, 50a32 (389, 13-14).

⁵⁴ "In one case, the conclusion doesn't need to be already known; we must not either assume in advance that it's such or not, whereas, in the other case, we must already assume that it's not such". (*Ibid.*, II, 14, 62b35-37)

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sylogism's nature. We can also see the insolent fraud which credits Stoics for a "new Logic", just because they can't tell the difference between mediate and immediate inferences.

Nevertheless, some may underestimate the variety of hypothetical strategies which my presentation didn't cover. With the qualitative syllogism and induction, the hypothesis required the concession of imperfectly rigorous consequences: from the less plausible to the more plausible, from the similar to the similar, from the particular to the universal. It will eventually dare to demand even less valid consequences. Experimental Science offers a spectacular case, since it progressively confirms its theories by asking — implicitly — the concession of the consequent as substitute for the antecedent: *if the consequent, then the antecedent*. Science does this undoubtedly when, while questioning a theory, it draws consequences from it — if the theory is correct, such and such events will occur in such circumstances —, to then find, in the verification of such consequents, the *temporary* confirmation of the theory.