

## The Status of Conditional Syllogism in Syllogistics

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*Abstract:*

The form of the conditional syllogism resembles that of the categorical syllogism, while its subject matter is at least a conditional premise, but its conclusion is always conditional conjunctive or disjunctive. This mixed structure to which we apply the rules of the categorical syllogism, is a structure of which Aristotle did not have an idea, and which the Stoics did not conceive, and which the non-Arabian logicians did not know until in modern times. But what we have to notice here is the putting of a conditional matter in the form of the categorical syllogism, and it is this kind of hybridization, if we dare to say, which generated this mixed structure which appeared for the first time in the history of logic in the treatise on the logic of Ibn Sina and which can be considered a discovery by this author until proof to the contrary, and that the ancient Arabian logicians have taken the habit of exhibiting in their treatises.

*Keywords:* Ibn Sina, conditional syllogism, categorical syllogism, al-rissala, al-chamssiya, Arabian logicians, structure of conditional syllogism.

We believe that everyone who sufficiently knows the questions of logic and has an exact idea about the structure of the syllogistic conditional would perceive easily that that syllogism has a different structure from the so-called categorical syllogism and hypothetical syllogism.

In fact, the structure of the former always contains a conditional premise (major or minor) according to the special structure of each of its five categories, while its conclusion is

always a conjunctive or disjunctive conditional proposition. And the fact of always having a conditional conclusion represents the distinctive trait which differentiates it from the categorical syllogism whose conclusion is always categorical, and from the hypothetical syllogism whose conclusion is also always categorical.

In addition, the mechanism of deduction in the conditional syllogism differs from the one that operates in the two others, because the deduction in the categorical syllogism is done by inclusion of the terms in each other according to the form convenient to its four figures. Concerning the deduction in the hypothetical syllogism, it is done by implication.

Now, the relation utilized from the conditional syllogism is the relation of implication between components of the premises, one of which, either the antecedent or the consequent, is mentioned in the two premises in order to function as a middle term which plays its same rule which it plays in the categorical syllogism, while the other two components take the appearance of the major (grand) term and the minor (petit) term.

Thus, the form of the conditional syllogism resembles that of the categorical one, while its matter is constituted at least of a conditional premise, but its conclusion is always conjunctive or disjunctive conditional.

This mixed structure on which one applies the rules of categorical syllogism is a structure about which Aristotle did not have an idea, and of which the stoics did not conceive, and which the non-Arab logicians did not cognize until modern times.

But what should be noted here is the implementation of a conditional matter disguised in the form of categorical syllogism, and it is this sort of hybridization, if one can call it, which gave rise to that mixed structure that appeared for the first time in the history of logic in Ibn Sīna's treatise on logic (*al-Šhiḫā'* – Logic-Syllogism, chapters 5-7) [3, p. 381], and which could be considered a discovery by that author until there would be a contrary evidence, and which the ancient Arab logicians used to expose in their treatises.

This curious structure was questioned, and one asked whether the categorical syllogism could not be substituted for the conditional syllogism as long as the latter is governed by the rules of the former, as if there were no difference between saying:

Every animal is mortal  
Every man is animal  
Therefore, every man is mortal,

and:

Whenever  $x$  is animal, it is mortal  
and whenever  $x$  is man, it is animal  
Therefore, whenever  $x$  is man, it is mortal

However, the critics of conditional syllogism have found that categorical syllogism is simpler and faster to conclude, and it seemed to them that there is no difference between a categorical conclusion and another which is conditional.

It is certain that the comparison of the two syllogisms aroused controversies between the defenders and detractors who had had no interest in occupation by conditional syllogism which does not settle a conclusion and only suspends a judgment upon another. Thus, conditional syllogism would not be able to settle differences.

What confirms this disagreement between the ancient Arabian logicians of the same period, and attests at the same time that they were freed from the Aristotelian yoke, is what is found mentioned by the logician ('Omar Ibn Sahlane al-Sawī, d. 450 A.H.) in his treatise of logic (*al-Baṣā'ir al-Naṣiriyya*):

One could retort and say that one does not need these conditional syllogisms because the conditional propositions even those that are not all obvious and those that do not have need syllogism, could be reduced to categorical propositions, and one could say that a conjunctive (C is D) is a consequent of (A is B) and formulate a disjunctive as an alternative, and be content with categorical syllogism in order to demonstrate them. Against this objection we reply that if it were necessary to alleviate, in logic, the pain of multiplying the syllogisms which give the same conclusion so as to satisfy oneself with what replaces them, one should have been satisfied with the first figure that gives the four conclusions, or better with figures which have positive or negative conclusions, because one could reduce positive propositions to negative ones and these to indefinite positive ones. But one was not satisfied with it, and one determined for each conclusion what is right to get, in agreement with the perfection of logical art, and for not making change to the natural state of the propositions. Why then do we prefer here to abbreviate and fix in a single way whose usage is only possible at the cost of changing the propositions away from their natural state, while it is for us to prepare the way for conditional conclusions conditional, whereas categorical syllogisms do not give us such propositions. Now, the most part of geometrical questions are conditional. Thus, the objection turns out to be specious [4, p. 187].

As one can see, the foundation of al-Ssawī's reply is based on a scientific reason which testifies to his knowledge of mathematics. This is what couldn't be contested other than by a person who ignores algebra and geometry even in their practice by the ancient mathematicians. Anyway, this was not a tempest which passed without leaving effects. In fact, the employment of conditional propositions in the form of categorical syllogisms continued but always sustained controversies until the time of al-Šhrīf al-Jūr Jānī (740-816 A.H.) the author of *al-Ta'rīfāt* "who said in his notes on Qoṭb al-Dīn al-Rrāzī's *Commentary on al-Risāla al-Šhamsiyya* the following:

As there are among categorical propositions those which do not need proof and those which need it, there are also conditional propositions which do not need proof, as when one says: whenever the sun rises it is a day, and those which need it such as one which says: whenever there is a possible being there has to be a necessary one, hence the need to know conditional syllogisms mainly in respect to Euclid's' geometry. And because Aristotle did not deal with this problem in his teachings, some people pretended that one does not need them, given that the knowledge of categorical syllogisms compensates them. Now, this point of view is worthless because there is a notable difference between the two genres of syllogisms [3, p. 231].

Thus, it is very interesting to note in this context that there is in the expression of al-Šharīf Al-Jūr Jānī something which gives the impression that there was a cleavage which split the ancient Arabian logicians into those who hold the legacy of Aristotle in quantity and in quality, and those who had freed themselves from it and treated logical questions according to what the art of thinking allowed and not according to the temperament of Aristotle and his knowledge, because the history of logic proves that Aristotle knew only the logical operations of his time or those which were advanced to him in the Greek language in which he expressed himself and discovered his syllogistics without having invented them from scratch as we take pleasure in asserting all the time.

That because all what he wrote concerning the reflexive forms and the rules of reasoning was accessible to him only by means of a priori, anterior, implicit and innate logic, which he spontaneously was employing as well as his native logic and all other peoples. Anyway, one cannot deny his merits as the first theoretician of reasoning embedded in human nature, and that he determined its rules both normal and specious.

Thus, by our reference to his (first analytics) where he exposed his theory of categorical syllogism, we find his leading form:

If A is affirmed about all B  
And B about all G  
Necessarily A is affirmed about all G

Which one currently writes under this form:

Every M is T  
Every *t* is M  
Therefore, every *t* is T

But he did not realize the conjunctive syllogism which was in common usage in his environment and elsewhere:

If *p* then *q*  
But *p*  
Therefore, *q*

Nor the disjunctive syllogism which was also in common usage in his environment and elsewhere:

Either *p* or *q*  
But *p*  
Therefore, not *q*

This hypothetical syllogism (conjunctive or disjunctive) discovered by the Stoics became a second form of syllogism which enriched the theory of deduction.

Thus, deduction after Aristotle was being presented under two forms: (1) that of categorical syllogism which consists of three terms that combine two by two into two premises which have in common one of the three terms called the middle term that joins the two premises which give a categorical conclusion. And (2) that of hypothetical syllogism which consists of a conditional proposition (major) and a categorical one (minor) and a categorical conclusion.

And without our being enforcing to try what is beyond our reach by engagement in the labyrinth of psychologism, in order to know the reasons which prevented Aristotle from discovering hypothetical syllogism, and the reasons which diverted the attention of Stoics to find out conditional syllogism to which they were very close, we shall content ourselves with marking the differentiae between the three kinds of syllogism. Categorical syllogism does not include conditional propositions, while hypothetical syllogism includes only one as major and a categorical conclusion.

These two kinds of syllogisms are, if one dares to say, the only syllogisms inherited from ancient Greek logic so that – and until a proof of the contrary – one could assert that it

did not exist at ancient Greeks one indication of another form of syllogism other than categorical and hypothetical ones.

Moreover, even al-Fārābī (d. 339 A.H.) did not know other forms as testified from his writings that have reached to us. At anyway, it is not deniable that Ibn Sīna was the first to expose the form of deduction via two conditional premises having in common one of the two components – the antecedent or the consequent – and that would give a conditional conclusion composed of two other components not common at the two premises.

Up to new information, nothing prevents us from considering Ibn Sīna (370-428 A.H.) as the first one to have conceived the deduction by two conditional premises generating conditional conclusion, which deduction became for the ancient Arabian logicians the object of study, elaboration and improvement by which it acquired the form we found in the later logic treatises like Mohamed Ibn Yūsuf Al-Sinūsī's (832-895 A.H.) “Al-Mu Kḥṭaṣar fī Al Mantiq.” The manuscript book was written by Ibn Arafa and explained by Ibn Yusuf Al-Ssenussi, achieved and published by M-Yagoubi in 2019. We have already exposed this form of deduction in a previous paper to which we ask the reader to refer.

Now it is perfectly legitimate to ask from where did Ibn Sīna get the idea of the constructing conditional connective syllogism? By conceiving the possibility of treating the two members of the conditional proposition, the antecedent and the consequent, as one treats the two terms of a categorical proposition, the subject and the predicate, also the possibility of applying the rules of categorical syllogism on the conditional one, and this in the nineteen conclusive modes of categorical syllogism.

However, although Ibn Sīna is indebted to al-Fārābī for his mastery of the philosophy of Aristotle, it is nonetheless true that nearly a century separates the two philosophers, and it seems to me this period was large enough for jurists to the development of the rules of applying of Islamic law that were generally presented in the form of chains of judgments which perfectly resemble conditional syllogism via their combination in two judgments which have a component in common which acts as a middle term and authorizes a third conditional judgment as a conclusion. This can be illustrated by the following example:

When dawn rises, one call for prayer  
And when one call for prayer one must perform the prayer  
Therefore, when dawn rises one must perform the prayer

Where we see that the antecedent of the major forms with the consequent of the minor third condition that is the conclusion of this conditional syllogism in good and due form.

It is quite possible that the syllogisms of jurists are the origin of conditional syllogisms of which he made a happy theory.

From all the above, it turns out that there is a genus of syllogism which neither Aristotle nor the Stoics knew and which neither al-Fārābī nor Ibn Ruṣd mentioned because they were being confined in commenting on the *Organon* of Aristotle, which enforces the idea that it was Ibn Sīna who conceived and developed a syllogism (*sui generis*) to which he gave the name of conditional connective syllogism.

This innovation due to Ibn Sīna and which one finds only in the ancient treatises of logic written by Arabs since its creator until Yūsuf Al-Sinūsī's, was ignored during the middle ages by the Europeans who had not had the chance to consult the Arabian logicians oeuvres and were bounded by studying the *Organon* of Aristotle into believing that they could come to pass any other work on logic having discovered it in its original language.

Even if we do not need to repeat what we said in a previous paper on the same matter, we need, however, to emphasize that conditional connective syllogism cannot be underestimated by any professional logician, European or Arabian, who has only learnt logic

by European treatises. But the strange thing in the contemporary era is that some Arabian logicians have ignored this genus of syllogism, failing to discover it in the ancient treatises of logic which they never consulted and that may be disdained.

Thereby we will have attracted the attention of all those who are occupied with philosophy and in particular with logic, concerning the existence of a form of deduction that gives honor to the ancient Arabian logicians and primarily to Ibn Sīna, similar to the categorical syllogism that gave honor to Aristotle, and similar to the hypothetical syllogism that gave honor to the Stoics.

Unfortunately, one can not overlook the point of view of some people who underestimated conditional syllogism and did not give it the quality of citation alongside the other kinds of syllogisms, on doubting that Ibn Sīna may was the initiator, without providing argument to support their doubt. Unfortunately, this was the point of view expressed by Dr. Ibrahim Madkour in his presentation of the edition of Ibn Sīna's *al-Šhifā* (Logic-Syllogism) where he said there: "he [Ibn Sīna] dedicated, without doubt, in his book "qiyās" like his predecessors, chapters for conditional syllogisms. These chapters, so abundant, provide little interest. They represent about three sections and occupy more than one hundred and forty pages" [2, p. 14].

We think that such a statement cannot be made by someone who has taken the pain of studying closely these syllogisms by to a scaled logician with undeniable talent like Ibn Sīna. Because these conditional syllogisms which have escaped the notice of western logicians up to our present day attracted the attention of Jean Piaget (1896-1980), this great contemporary European thinker who is distinguished by his studies concerning the formation of logical operations by children and adults, and who studied the foundation of reasoning based on concepts such as the case with categorical syllogism, incidentally made this note in his "Essai de Logique Opératoire":

But one can also establish his reasoning on the only inter-propositional combination of judgments:  $(p \supset q) \cdot (q \supset r) \rightarrow (p \supset r)$ . This is to say: if  $p$  then  $q$  and if  $q$  then  $r$  imply if  $p$  then  $r$ . Such reasoning largely ignored in this general form by classical logic is then of a higher level of formalism than those of syllogistics, as symbolic analysis shows clearly [1, p. 35].

## Conclusion

We have mentioned this declaration, not to support our estimate for conditional syllogism, but rather to confirm that European logicians have overlooked this kind of syllogism with which the best formulation of *scientific laws is made*.

Finally, we would like that today's Arabian logicians become aware of the need to make an inventory of all the works of logic which we inherited from our very numerous logician ancestors, to analyze, to verify and to edit them, in the hope of finding in them what has not been found elsewhere.

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