The meanings of Logical Constants in al-Fārābī's and Avicenna's theories

Abstract:

In this talk, I will examine al-Fārābī's and Avicenna's conceptions of the logical constants presented in their respective hypothetical logics. My problem is the following: how are the disjunction and the conditional defined by both logicians? How do they view the other constants such as the negation, the conjunction and the biconditional? What are the meanings of these constants in both systems? Are there any differences between these definitions?

By answering these questions, I will show that there are significant differences between the two logicians, except with regard to the negation which is classical in both systems. Al-Fārābī's hypothetical logic is comparable to the Stoïc logic. He distinguishes between a complete disjunction, exclusive and non truth functional such as "water is either cold or warm or hot", and an incomplete one, expressed by the negation of a conjunction such as "Zayd is not both at home and in the market". This second kind is incomplete because the syllogism involving it as its first premise and containing a negative proposition as its second premise is non conclusive, for from "Zayd is not both at home and in the market" and "Zayd is not at home", one cannot deduce "Zayd is in the market", because he could be somewhere else. Both disjunctions contain semantically incompatible elements. While Avicenna presents many kinds of disjunctions, which do not all involve incompatible propositions, for he sometimes talks about a kind of inclusive disjunction, for instance, "The savant either adores God or is generous with people". Al-Fārābī never expresses the De Morgan laws, but he equates between '$\sim(p \wedge q)$' and '$p \supset \sim q$' (and also '$q \supset \sim p$'); while Avicenna seems to be aware of at least one of them, namely: $\sim(p \wedge q) \equiv (\sim p \vee \sim q)$, for he uses it implicitly. As to the implication, it is also either complete or incomplete in al-Fārābī's system. When it is complete, it is an equivalence (mutual implication), when incomplete, it does not convert. In both cases, the link between the antecedent and the consequent is semantic, and the relation is not truth functional. In Avicenna's theory, some conditionals are called "chance connection" and others are considered as the "real implications". While in the real implication, there is a semantic and causal link between the antecedent and the consequent, in the chance connection, there is no such link. This chance connection is thus closer to a conjunction than it is to the conditional. In Avicenna's system, the strong implication and the exclusive disjunction are universally quantified, while the chance connection and the inclusive disjunction are particular. The intuition behind these quantifications is clearly semantic, for the universal disjunctions express a semantic incompatibility, which makes it hold in all situations, for instance, 'in all Ss, either x is odd (in s) or x is even (in s)', while it is the semantic link between its elements that makes true the following sentence: "in all Ss, if the sun rises (in s), then it is daytime (in s)". By contrast, the elements of the particular disjunctions and implications are not strongly related, so that these disjunctions and implications may be true only in some situations. Both universal and particular implications and disjunctions can be negated so that we have four propositions, formalized as: $\mathbf{A}_C$, $\mathbf{E}_C$, $\mathbf{I}_C$, and $\mathbf{O}_C$, when they are conditional and as: $\mathbf{A}_D$, $\mathbf{E}_D$, $\mathbf{I}_D$, $\mathbf{O}_D$, when they are disjunctive. These quantifications give a modal connotation to Avicenna's disjunctions and implications.