Logical Oppositions in Avicenna's Hypothetical Logic

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In his hypothetical logic, Avicenna introduces new kinds of hypothetical propositions by using quantifications ranging over situations (or times) and distinguishing between universal and particular, affirmative and negative, conditionals or disjunctives. For instance, the conditionals are expressed thus: **A**-hypothetical conditional: "Whenever A is B, then C is D", **I**-hypothetical conditional: "Maybe when A is B, then C is D", **E**-hypothetical conditional: "Never if A is B then C is D" and **O**-hypothetical conditional: "Not whenever A is B, then C is D". In these propositions the elements are predicative but simple. However, in section 7 of al-Qiyās (pp. 361–384), he goes further by considering hypothetical propositions where the elements are themselves quantified propositions of the form **A**, **E**, **I**, and **O**. These propositions have structures like the following ones: "Whenever every A is B, then every C is D" ("whenever $\mathbf{A}_1$ then $\mathbf{A}_2$" for short) or "Never when every A is B, then Some C is D" ("Never if $\mathbf{A}_1$ then $\mathbf{I}_2$" for short), and so on. In chapter 1 of section 7 (pp. 361–372), he provides sixteen different **A**-hypothetical conditional propositions by combining their **A**, **E**, **I** or **O** elements in all possible ways. In the same way, he provides 16 **E**-hypothetical conditionals, 16 **I**-hypothetical conditionals and 16 **O**-hypothetical conditionals by combining their quantified elements in all possible ways, and in chapter 2 (pp. 373–384), he makes the same thing with the disjunctive hypothetical propositions. He also says that the logical relations of contradiction, contrariety, subcontrariety and subalternation hold between all these propositions.

In this contribution, I will consider only the hypothetical conditional propositions listed in chapter 1 of section 7, and will analyse the logical relations between all of them. Now, in Avicenna's frame, all **A**-conditional and **I**-conditional propositions, whether categorical or hypothetical have an import (i.e. they require the truth of their antecedents to be true), while all **E**-conditional and **O**-conditional propositions, whether categorical or hypothetical do not have an import. As a result, the 16 **A**-hypothetical conditionals are different from the 16 **E**-hypothetical ones, while the 16 **I**-hypothetical conditionals are different from the sixteen **O**-hypothetical ones. So the total number of distinct propositions is 64. This gives rise at first sight to 8 octagons, each containing two **A**-hypotheticals and two **I**-hypotheticals and their contradictories. These octagons are comparable to Buridan's modal octagons with regard to their structures. In addition, we can also construct 8 further octagons containing two **A**-hypotheticals (such as "Whenever $\mathbf{A}_1$ then $\mathbf{A}_2$" = '$\mathbf{A}_1 \supset (\mathbf{A}_1 \wedge \mathbf{A}_2)$') and two corresponding **E**-hypotheticals (for instance "Never if $\mathbf{A}_1$ then $\mathbf{O}_2$" = '$\mathbf{A}_1 \supset \sim\mathbf{O}_2$' = '$\mathbf{A}_1 \supset \mathbf{A}_2$') and their contradictories. The octagons can also be grouped two by two, which gives rise to several figures containing 16 vertices and allows for more relations between the propositions. This shows the richness of the theory.