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ALFARABI ON CONDITIONALS

KAMRAN KARIMULLAH
Institute of Islamic Studies, McGill University, 3485 rue McTavish Montreal, QC H3A 01E, Canada
Department of Classics and Ancient History, University of Manchester, Oxford Road Manchester, M13 9PL, United Kingdom
Email: kamran.karimullah@mail.mcgill.ca

Abstract. I examine the theory of conditional propositions (*qaḍāyā šarṭiyya muttaṣila*) and conditional syllogisms (*qiyāsāt šarṭiyya*) in the logical works of Alfarabi (d. 950). I contextualize Alfarabi's logical doctrines related to conditional reasoning against the backdrop of the context-theory of logic, which was developed by Aristotle's ancient commentators. I show that Alfarabi thought that conditional propositions have truth-conditions. I provide conjectural truth-conditions for conditional propositions, and conjectural validity-conditions for connective conditional syllogisms. These truth-conditions and validity-conditions are shown to be sensitive to the pragmatic conditions in which conditional propositions and arguments are deployed. I end by suggesting that Alfarabi's logical pragmatism is a consequence of his adoption of the late antique context-theory of logic rather than a result of his developing Aristotle's formal syllogistic theory adumbrated in the *Prior Analytics*.

Résumé. Dans cette étude j'examine la théorie des propositions conditionnelles (*qaḍāyā šarṭiyya muttaṣila*) d'Alfarabi (m. 950) et son système des syllogismes conditionnels (*qiyāsāt šarṭiyya*). J'établis qu'Alfarabi a formulé sa théorie des propositions conditionnelles et syllogismes conditionnels comme une extension d'une théorie de langue dans laquelle le contexte dialectique demeure au centre de l'analyse des propositions et des syllogismes (appelée 'context-theory'). Je démontre que selon l'avis d'Alfarabi les propositions conditionnelles ont conditions de vérité. Je fournis des conditions de vérité conjecturales et des conditions de validité conjecturales. Je suggère que ces conditions de vérité et ces conditions de validité sont sensibles aux conditions pragmatiques dans lesquelles les prémisses conditionnelles et les arguments conditionnels sont utilisés. Je conclus que le pragmatisme logique d'Alfarabi est une conséquence de son adoption d'une théorie logique sensible au contexte dialectique d'antiquité tardive plutôt qu'une conséquence de développement de la théorie syllogistique formelle d'Aristote dans les *Premiers Analytiques*.

1. INTRODUCTION

Unlike Avicenna (d. 1037), at no point in his extant logical works does Alfarabi (d. 950) give a systematic account of 'if … then' sentences.[1]

[1] On Avicenna's theory of conditional propositions and conditional syllogisms, see Avicenna, *The Propositional Logic of Avicenna*, trans. N. Shehaby (Dordrecht/Boston, 1973);

Alfarabi discusses conditional syllogisms (*qiyāsāt šarṭiyya*) in some of his epitomes of the books of the *Organon*.[2] However, these brief discussions are not accompanied by an exposition of the syntactic or semantic properties of conditional sentences. Strictly speaking Alfarabi cannot be said to propound a proper logical doctrine of conditional propositions. Yet, conditionals appear frequently, and at crucial junctures, in many of Alfarabi's treatises on logic. Despite the importance of conditional syllogisms in Alfarabi's overall theory of the syllogism, as well as the importance of Alfarabi's doctrines of conditional syllogisms to Avicenna's own syllogistic theory,[3] scholarly literature has not accorded much importance to this aspect of Alfarabi's logical thought.[4] As such, this article sets out to discuss important aspects of Alfarabi's development of conditional reasoning by examining several key texts from Alfarabi's logical canon that are relevant to his thinking about conditional propositions and conditional inferences. Unlike many historical accounts of syllogistics, whether of Aristotle or Avicenna, in this article I want to highlight the powerful influence exerted on the development of Alfarabi's conditional propositions and syllogisms by the context theory of logic, which the classical Islamic philosophers inherited from Greek late antiquity. In Section 2, I discuss the importance of the different grades of assent (*taṣdīq*, *inqiyād al-ḏihn*) that a reasoner gives to a proposition according to the argumentative context in which the proposition appears. The truth of conditionals, as well as the type of assent the reasoner gives to them, is based on the notion of connection (*ittiṣāl*) that does (or does not) exist between the antecedent and consequent. Regardless of whether or not the antecedent and consequent are true in themselves, the fact that there is a connection between them such that the consequent is true given the antecedent is true determines whether the conditional is true or false. The strength of this

M. Maróth, *Ibn Sīnā und die peripatetische* "*Aussagenlogik*", trans. J. Till (Leiden/New York, 1989); H. Gätje, 'Zur Lehre von den Voraussetzungsschlüssen bei Avicenna', *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften*, 2 (1985): 140–204. In this article I will refer to 'if … then' sentences as 'conditional sentences' or simply as 'conditionals'.

[2] Alfarabi, *Al-Manṭiq* '*inda al-Fārābī*, vol. 2, ed. R. Ağam (Beirut, 1985), pp. 11–64. Hereafter, I refer to this work as follows: Alfarabi, *Madḫal*; *id*., in *Al-Manṭiq* '*inda al-Fārābī*, vol. 2, pp. 65–93. Hereafter, I refer to this work as follows: Alfarabi, *Qiyās*.

[3] T. Street, "The eminent later scholar' in Avicenna's *Book of the Syllogism*', *Arabic Sciences and Philosophy*, 11 (2001): 205–18.

[4] In Joep Lameer's superb work on Alfarabi's syllogistic, there are chapter length treatments of Alfarabi's categorical syllogisms, induction, example (*tamṯīl*), which Lameer translates as 'paradigm', analogy from the present to the absent (*istidlāl bi-al-šāhid* '*alā al-ġā'ib*), and legal deduction (*qiyās fiqhī*). Not four pages are given conditional syllogisms; cf. J. Lameer, *Al-Fārābī and Aristotelian Syllogistics: Greek Theory and Islamic Practice* (Leiden/New York, 1994), pp. 44–7.

connection is also central to eliciting assent to the conditional from the audience. Section 3 discusses features of Alfarabi's conditional propositions that arise out of their use in demonstrative, dialectical and rhetorical argument, and, in particular, how this argumentative background affects Alfarabi's thinking about conditional propositions and conditional inferences. This section provides further evidence that the semantics of Alfarabi's conditionals must be understood in terms of connection, rather than the truth of the antecedent and consequent. In addition, due to the strong influence exercised by the argumentative context that shaped Alfarabi's thinking about conditionals, the atomic sentences that constitute conditional propositions must be categorical propositions. In other words, he does not develop a conditional syllogistic of nested conditionals, nor one that yields conditionals as conclusions, despite the fact that such doctrines were developed by late antique Peripatetics. Nor does Alfarabi explicitly develop a doctrine of conditional contradiction, which would be required for a ramified theory of conditional syllogisms that allowed nested conditionals. Section 4 tries to provide a reasonable conjecture about what Alfarabi thought makes a conditional sentence true in a context, and how this context affects the level of assent the reasoner gives to the conditional. This is done by examining Alfarabi's treatment of implication (*luzūm*) in his paraphrase of the *Categories* of Aristotle (APCA). This conjecture attempts to take into account one of Alfarabi's basic logical insights, namely, that there is no single, monolithic reading of conditionals that captures their use in all the argumentative contexts in which they can be meaningfully deployed. Rather, the conditions under which a conditional elicits the reasoner's assent vary according to the pragmatic assumptions and expectations of the interlocutors. In the language of the context theory of logic, this means that the mind gives different strengths of assent to conditionals according to whether the conditional is being deployed in demonstrative, dialectical, or rhetorical contexts. Finally, in Section 5 I will show that the variable strength approach to the strength of the implicative relation between antecedent and consequent developed in Section 4 requires a notion of syllogistic validity for conditional syllogisms that is context-sensitive also. Again, unlike many well-known, contemporary accounts of inferential validity, Alfarabi holds that, depending on the argumentative context, interlocutors will require assent to the conclusions to follow in various strengths from assent to the premises. In the language of context theory, this means that interlocutors tend to give their assent to the conclusion in a non-demonstrative context according to less rigorous standards than in demonstrative contexts. Once again, I try to provide a reasonable conjecture about what Alfarabi might have thought about the variation in the way the conclusion follows from the premises in

different argumentative contexts. I conclude with some comments about how Alfarabi's conditionals compare to some contemporary accounts of the semantics of conditionals, followed by brief remarks about how Alfarabi's conditional syllogisms relate to Aristotle's discussion of arguments from a hypothesis in *Prior Analytics* A44.

2. THE 'CONTEXT THEORY' OF LOGIC: TRUTH, ASSENT, AND CONDITIONALS

Alfarabi's use of conditional sentences is shaped in crucial ways by the rich legacy of the 'context theory' of logic, which he inherited from late antique, Greek commentary tradition on Aristotle's *Organon*.[5] Alfarabi, like other classical Islamic philosophers, developed many concepts lying at the foundations of his logical doctrines as solutions to, or extensions of, a constellation of problems surrounding the question of how each of the books of the *Organon* deal with a unitary subject called 'logic',[6] as well as the question of how each of the books of the *Organon* can be distinguished from each other despite this underlying unity. At the risk of schematizing a delicate textual history,[7] we could say that the classical Islamic philosophers accounted for the ultimate unity of the *Organon* by claiming that the formal theory of the syllogism developed by Aristotle in the *Prior Analytics* provided the formal principles for demonstrative (*Posterior Analytics*), dialectical (*Topics*), rhetorical (*Rhetoric*), poetical (*Poetics*), and sophistical (*Sophistici Elenchi*) modes of argumentation. For Alfarabi, as well as other classical Islamic philosophers, logic *was* syllogistic.

Yet, by Alfarabi's day, though perhaps as early as Alexander of Aphrodisias (*fl.* 200),[8] it was recognized that conditional (also called 'hypothetical [*waḍʿī*]')[9] syllogisms were an important subset of the set of the valid deduction schema available in philosophical debate.

[5] D. Black, *Logic and Aristotle's* Rhetoric *and* Poetics *in Medieval Arabic Philosophy* (Leiden, 1990), pp. 17–51.

[6] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, p. 52.

[7] *Ibid.*, p. 79: 'The development by the Islamic philosophers of an alternative solution to the problem of how to divide and classify the logical disciplines seems to be closely linked to their resolution of another key issue in the Alexandrian versions of the context theory, that of the degree to which all the logical arts, including rhetoric and poetics, are syllogistic in their structures. In this regard, there is general agreement among the Islamic philosophers that both rhetoric and poetics are syllogistic in some way, although there remains considerable diversity in the syllogistic interpretation provided for them'.

[8] A. Speca, *Hypothetical Syllogistic and Stoic Logic* (Leiden, 2001). Citing Boethius, Miklós Maróth reports that a hypothetical syllogistic of some sort was developed by Aristotle's students Theophrastus and Eudemus; Maróth, *Aussagenlogik*, pp. 33ff. Cf. J. Barnes, *Terms and Sentences: Theophrastus and Hypothetical Syllogisms* (London, 1984). Maróth must be referring to Theophrastus' theory of "prosleptic syllogisms", in which one premise appears in the form of a conditional sentence; see C. Lejewski, "On prosleptic syllogisms", *Notre Dame Journal of Formal Logic*, 2–3 (1961): 158–76.

[9] Lameer, *Al-Fārābī and Aristotelian Syllogistics*, p. 45.

Thus, in his epitomes of the books of the *Organon*, we find Alfarabi making extensive use of conditional syllogisms in the rhetoric, dialectic, and demonstration. That being said, the formal properties of conditional premises and syllogisms developed by Alfarabi had to be elastic enough to accommodate their use in a wide variety of argumentative contexts in which the interlocutors engage in debate while harbouring different goals. In a rhetorical exchange between a speaker and an audience, the aim is persuading (*qanā'a*, *iqnā'*) an audience;[10] in a dialectical exchange, the aim is to discover and then refute (*tabkīt*, *ibṭāl*) the position of an opponent if one is the questioner or to defend a position from refutation if one is the respondent;[11] in poetics it is stimulating the listener's imagination (*taẖyīl*);[12] in demonstration, the aim is eliciting in one's self or in another certainty of the objective truth (*burhān*) of a proposition. Deborah Black has noted that the classical Islamic philosophers moved away from using premises' modality, truth-values, or the part of the soul from which premises originate as a way of distinguishing between these syllogistic arts. Black sees Avicenna as the culmination in a trend, in which the distinction between the five syllogistic arts was made to rest on the strength of the audience's assent (*taṣdīq*) or, more generically, acquiescence (*iḏ'ān*), to the proposition rather than the proposition's content corresponding to states of affairs or not corresponding to them.[13] However, as Black also notes, there is evidence from *Kitāb al-Alfāẓ* that Alfarabi also formulated a doctrine that distinguishes between the syllogistic arts according to the different grades of the 'mind's compliance (*inqiyād al-ḏihn*)' with the propositions in a syllogistic process of reasoning.[14] Thus, it also seems to be Alfarabi's view that syllogism, especially as developed by Aristotle in the *Prior Analytics*, is a genus for the different species of the syllogism developed in the other five syllogistic books of the *Organon*. This should be seen as Alfarabi's attempt at providing a partial solution to the problem of the unity of the syllogistic arts, the terms of which Alfarabi largely inherited from the late antique Greek logical commentary tradition.[15]

[10] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, p. 103.
[11] Alfarabi, *Al-Manṭiq 'inda al-Fārābī*, vol. 3, ed. R. 'Aǧam (Beirut, 1985), pp. 13–96. Hereafter, I refer to this book as follows: Alfarabi, *Ǧadal*. There are two dissertation-format translations of Alfarabi's *Kitāb al-Ǧadal*. The first is by Dominique Mallet, "La dialectique dans la philosophie d'Abū Naṣr al-Fārābī", PhD diss., Université de Lille III, 1992. The second is by Michael DiPasquale, "Alfarabi and the starting point of Islamic philosophy: a study of the *Kitāb al-Jadal* (Book of Dialectic)", PhD diss., Harvard University, Harvard University, 2002.
[12] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 181–92.
[13] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, p. 76. For a thematically related treatment of *taṣdīq* (and *iḏ'ān*), see also W. C. Smith, 'Faith as taṣdīq', in P. Morewedge (ed.), *Islamic Philosophical Theology* (Albany, 1979), pp. 96–119.
[14] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 75f.
[15] *Ibid*., pp. 36–51.

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The "horizontal" distinction between each of the syllogistic arts (*e.g.* what distinguishes demonstration from dialectic), as well as the "vertical" distinction between the species of the syllogism and its genus (*e.g.* in what sense is the syllogism of the *Prior Analytics* different from the syllogism described in the *Topics*) rest on Alfarabi's analysis of the mental act of compliance or assent that attaches to propositions in a syllogism-formatted argument. All of the syllogistic arts share in the fact that a mental act of assent, which varies in strength according to the context in which the proposition is expressed, attaches to the propositions from which the premises and conclusion of the syllogism are composed.[16] These sentences are, thus, composed of two parts. One part of the sentence is the *mental act* of assent; the other part is the proposition (*e.g.* 'X is Y') that is the object to which the mind gives its assent. As a consequence of this distinction, it is possible to say that it is ultimately the variation in the ways in which we give assent to propositions, and not necessarily the propositions themselves, that allows us to differentiate among the syllogistic arts. For example, Alfarabi says that there is a generic notion of the syllogism, alluding to the syllogism as outlined in the *Prior Analytics*, just to the extent that it leads to an unqualified (*muṭlaq*) act of mental assent. On the other hand, there is a poetic syllogism, which is distinguished from all the other kinds of syllogism, just to the extent that it leads the mind to what Alfarabi calls 'poetical assent (*al-inqiyād al-šiʿrī*)'. It is reasonable to take Alfarabi to be claiming that the proposition 'X is Y' can be common to both the poetic and demonstrative modes of assent, but what distinguishes the conclusion of a poetic syllogism from a demonstrative syllogism is the modality, or strength, of the mental act itself, not necessarily the propositional content of the judgment.

(Text 1) The generic and unqualified things that lead the mind to give unqualified assent are called 'syllogisms'. The subclasses of these generic items, wherein each subclass leads the mind to a subclass of mental assent, are called 'subclasses and species of syllogisms'. Thus, those subclasses [of syllogism] that lead the mind to poetical assent are 'poetical syllogisms'. Those that lead the mind to rhetorical assent are 'rhetorical syllogisms', and supplementary considerations are added by which these syllogisms are brought to conclusion. Those that lead the mind to sophistical acts of assent that come across [the mind] are 'sophistical syllogisms', and supplementary considerations are added by which these syllogisms are brought to conclusion – *e.g.* ruses that are used [by the questioner] to trick the

[16] Alfarabi, *Kitāb al-Alfāẓ al-mustaʿmala fī al-manṭiq*, ed. M. Mahdi (Beirut, 1968), p. 96.2–3. It is important to note that it is not until §55 that Alfarabi finally explicitly identifies as 'syllogisms' those things he refers to prior to §55 as 'the ways and things' that lead the mind to give its assent to something. Alfarabi's words suggest that, in his view, logic and syllogism are coextensive.

respondent in such a way that the location of the sophistry is obscured from him, and what the respondent must use to learn the sophistries that will refute him, and guarding his views from suspicion of their falsehood or from being misled by a sophistry. Those that lead the mind to dialectical assent are dialectical syllogisms, and supplementary considerations are added by which these syllogisms are brought to conclusion – *e.g.* ruses that trick the respondent in such a way that the opinion [that the questioner seeks to] oppose is obscured so the respondent does not take precautions [against the questioner's attack], and ruses that the respondent uses to learn from the questioner what opinion of his is being refuted so he can take precaution and prevent the questioner from employing his syllogisms [against him]. Those that lead the mind to give its assent to that which is certain truth are called 'demonstrations' and 'certain syllogisms'. Supplementary considerations are added by which demonstrations are brought to conclusion, and ways that make it easier for the mind to investigate demonstrations, as well as those non-logical considerations a person relies on in order to arrive at the truth. Yet, the foremost aim of logic is the study of demonstrations. As for the other kinds of syllogism, when one becomes acquainted with them and comes to distinguish them from demonstration, one learns by virtue of [studying the non-demonstrative syllogisms] what must be used when one's aim is true belief, and what must be avoided.[17]

We can find, therefore, in Alfarabi too a tendency to move away from 'the objective truth of the proposition which is known, towards the knowing act of evaluating and accepting it as true'.[18] In other words, in the context of an argument the modality of the mind's assent to the proposition 'X is Y' is just as important to the logical analysis in the thinking of the classical Islamic philosophers as the proposition 'X is Y' itself. This is by no means to deny the centrality of objective truth values in Alfarabi's logic, nor should it be taken as denying that all propositions are either true or false (bivalence). Indeed, by insisting, along with the majority of late antique Greek Peripatetics that demonstration represents the telos of logical inquiry despite the existence of other species of syllogism,[19] there clearly remains in Alfarabi's mind an ineluctable relation between the act of assent and the assignment of truth-value to a proposition. Indeed, as Black notes in her discussion of Avicenna's 'imaginative syllogism', the above passage shows that in Alfarabi's thinking 'the primary focus of assent remains the determination of what is true. To give one's assent to any proposition necessarily presupposes the prior consideration of whether the proposition is true or false'.[20] Rather, in Alfarabi as well as Avicenna there is a 'shift of emphasis from the veracity of the cognitive

[17] Alfarabi, *Alfāẓ*, pp. 98.11–100.2.
[18] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 76f.
[19] *Ibid.*, p. 34.
[20] *Ibid.*, p. 181.

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act as a representation of some object to the way in which the cognition itself is accepted by the knower'.[21] Unlike contemporary accounts of propositions that theorize them as "disembodied" objects that can be assigned objective truth values removed both from the argumentative context and from the speaker who spoke them, to say that a proposition P is true is only to say that a reasoner says that P is true. That being said, a reasoner will say that P is true but entertain different truth-criteria in different argumentative contexts. After considering what relation the proposition P bears to the state of affairs it represents within the particular speech context in which the reasoner places himself, the speaker will then tailor the degree of his assent, or the force with which he says "P is true", according to the demands of the speech context. Of course, this makes the reasoner's saying 'P is true' ambiguous. In Alfarabi's way of thinking, we are able to disambiguate the speaker's context-sensitive assignment of truth to propositions by examining the nature and strength of his assent to the proposition in question.[22]

In order to illustrate the complex relationship between assent or the mind's compliance to a proposition (*taṣdīq*, *inqiyād al-ḏihn*) on the one hand and the proposition's objective truth on the other, it would be helpful to examine what Lear has called the 'argumentative role' of each of the propositions in a generic conditional syllogism. Jonathan Lear pointed to the importance of appreciating the argumentative role each premise plays for understanding Aristotle's brief treatment of hypothetical syllogisms in the *Prior Analytics*. However, since context theory puts perhaps even greater emphasis on the argumentative context, an analysis of the argumentative role of propositions in conditional syllogisms is indispensible.[23] Lear says that Aristotle's categorical syllogistic does not recognize the argumentative role of sentences in a deduction. For example, Aristotle's syllogistic does not distinguish between a sentence in a deduction that is merely supposed to be true by two opponents for the sake of argument, or for the sake of probing the logical implications of accepting the sentence as true, and a sentence that is true as such, *e.g.* a necessary first principle of a science. Aristotle's categorical syllogistic identifies which arguments are valid according to purely formal characteristics of the premises (quantity, quality, etc.). Aristotle does not aim to analyze deductions according to the argumentative role played by each sentence in the deduction. Thus, in *Prior Analytics* A23, when Aristotle claims that hypothetical syllogisms "are brought about through

[21] *Ibid.*, p. 76.
[22] I will return to this important point with respect to the truth of conditionals in particular in Section 4.
[23] J. Lear, *Aristotle and Logical Theory* (Cambridge, 1980), p. 36.

syllogistic figures", his claim is that this is so only to the extent that such a hypothetical syllogism contains a *categorical* syllogism as a proper part of the deduction.[24] This may be illustrated by considering the following schematized hypothetical argument borrowed from Lear:

(H) You agree to accept *Q* if *P*; but … so *P*; but you agreed to accept *Q* if *P*; therefore, you must accept *Q*.[25]

In the above hypothetical argument, the part of the argument "but … so *P*" is a direct syllogism that is formally reducible to one of the valid figures of Aristotle's categorical syllogistic, where "…" represents a series of premises and *P* represents a categorical proposition that serves as a conclusion of a categorical syllogism of the A-, I-, E- or O-type. Lear believes that Aristotle does not intend to formalize into his syllogistic the act of agreement between the opponents that they accept *Q* as a necessary result of *P*'s being deduced from a categorical syllogism.

In contrast to Aristotle, there is good reason to believe that Alfarabi developed his theory of conditionals as a way of formalizing the argumentative role that the prior agreement between the opponents plays in a dialectical exchange. Indeed, Alfarabi formalizes both the act of prior agreement between two opponents and the mental act of supposition as a conditional proposition, in the sense that the propositions from which a conditional are composed are given or conceded (*waḍʿ*) by one or more of the interlocutors. The first sense of *waḍʿ* relates primarily to a prior act of agreement between *two opponents*. This sense of *waḍʿ*, which might be translated as positing or laying down, does not necessarily connote a particular type of mental activity that accompanies the act of positing or laying down of premises. However, Alfarabi assimilates *waḍʿ* to the notion of *farḍ* or *iftirāḍ*, *viz.* supposition, which does connote a mental process. Thus, the specific meaning of *waḍʿ* as a prior act of agreement between two opponents to entertain the existence of a connection between an antecedent and consequent can also take on the meaning of mental supposition. In *Ǧadal* Alfarabi says:

(Text 2) As for the connective conditional [syllogism],[26] the connection in it may be clear in itself (*bayyin bi-nafsihi*), or it may not be clear in itself (*ġayr bayyin bi-nafsihi*), and thus require demonstration of the truth[27] (*ṣiḥḥa*) of the connection in it, for it is a fact that the chief consideration (*malāk al-amr*) in the connective conditional [syllogism] is the truth of the

[24] *Ibid.*, p. 34.
[25] *Ibid.*
[26] *Sc. al-qiyās al-šarṭī al-muttaṣil.*
[27] Reading '*tatabayyanu*' for '*yatabayyanu*'.

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connection (*ṣiḥḥatu al-ittiṣāl*) and the truth of the repeated proposition (*ṣiḥḥatu mā yustaṯnā*). As for the truth (*ṣiḥḥa*) of the antecedent and the consequent, no conditional expression (*qawl šarṭī*) signifies [their truth, *sc.* *ṣiḥḥa*] and it may happen that neither of them is true (*ṣaḥīḥan*). Rather, a conditional expression only signifies (*yataḍammanu*) the soundness of the connection (*ṣiḥḥata al-ittiṣāl*).[28] Even if neither the antecedent nor the consequent is true (*ṣaḥīḥan*), the expression's being a conditional is not undermined.[29] The proof of this is that the truth-value (lit. 'the matter' or 'the actual state of affairs', *al-amr*) with regard to the antecedent and consequent rests on the asserted proposition (*i.e.* the minor premise, *al-mustaṯnā*). Thus, the contradiction of the consequent can be asserted (*yustaṯnā*) due to the fact that it is true (*ṣaḥīḥ*), yielding thereby the contradiction of the antecedent. If, however, [the antecedent and consequent] were true because of what was posited about them, then it would be impossible to assert the contradictory of the consequent by virtue of the fact that it is true and yields thereby the contradictory of the antecedent, since the two contradictories cannot be true simultaneously (*iḏ kānā al-naqīḍāni lam yumkin an yaṣduqā maʿan*). Rather, the antecedent and the consequent are supposed (*yafruḍu*) to have the quality (*kayfiyyatihimā*) that they have only in so far as they are taken to be so by hypothesis (*bi-al-waḍʿ*), not in so far as they are ineluctably true in themselves (*lā ʿalā annahumā ṣaḥīḥāni fī anfusihimā lā maḥāla*). It is for this reason that every conditional syllogism (*qiyās šarṭī*) is also a syllogism from a hypothesis (*qiyās bi-al-waḍʿ*), since the two components of the conditional particle – the antecedent and the consequent – are hypothesized in such a way that neither one of them has to be true according to the one who hypothesized them.[30]

According to Alfarabi, the syllogism from a hypothesis described by Aristotle in A23 is a genus for conditional syllogisms generally. The feature that relates them is the fact that in both kinds of syllogism, the antecedent (*muqaddam*) (or the hypothesis [*waḍʿ*] in a syllogism from a hypothesis) and the consequent do not have a definite truth values insofar as they are parts of the conditional proposition. Of course, the antecedent and consequent may be objectively true in

[28] Some authors (S. Afnan, *Avicenna: His Life and Works* [London, 1958], p. 93; Avicenna, *Remarks and Admonitions, Part One: Logic*, trans. S. Inati [Toronto, 1984], p. 13) have translated 'taḍammun' as 'implication', which, if adopted, would be a source of great confusion. 'Taḍammun' is used to talk about the way in which terms signify meanings; in the way that, for example, the term 'human' signifies animal. It is for this reason that Ahmed (Avicenna, *Avicenna's Deliverance: Logic*, trans. A. Ahmed [Karachi, 2011], pp. 10f, 174) translates 'taḍammun' as 'inclusion', *viz.* a concept such as human includes the concept of animal in it because of the genus-species relation between them. Similarly, Goichon (Avicenna, *Livre des directives et remarques*, trans. A.-M. Goichon [Paris, 1951], pp. 82f) takes 'taḍammun' to mean the way in which a term (nom, *lafẓ*) such as 'triangle' *refers* (se refère, *yadullu ʿalā*) indirectly to a concept such as 'figure', which is a constitutive part of the concept to which the term properly belongs, *viz.* 'three-sided figure'. Obviously, none of these is quite the sense that Alfarabi intends to convey here.

[29] Reading '*lam yubṭal bi-himā*' for '*lam tubṭal bi-himā*'.

[30] Alfarabi, *Ğadal*, p. 103.

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themselves (*fī anfusihimā*) when considered on their own. But if the reasoner gives his assent to the conditional (or the hypothesis) as a whole, this does not entail that he gives his assent to the parts of the conditional (or to the hypothesis and what follows from it). In Alfarabi's analysis, the reasoner's assent is given to, or there is compliance of the reasoner's mind with, the propositions that are objectively true (*ṣaḥīḥ*), which in the case of a conditional syllogism are the conditional itself as a major premise and the minor premise. As a premise, assent can be given to the conditional as a whole, based on the fact that the connection expressed by conditional sentence corresponds to the actual state of affairs. The minor premise *as far as its propositional content* is identical to antecedent of the conditional or it is the contradictory opposite of consequent. In the case of modus ponens, what distinguishes the antecedent of the conditional and the minor premise is not their propositional content. Rather, the reasoner attaches his assent to the proposition expressed by the minor premise, but does not give assent to the proposition expressed by the antecedent *qua* member of the conditional (the same proposition is expressed in both instances). In other words, giving assent to a conditional involves the reasoner simultaneously adopting a definite attitude toward the truth of the connection signified by the conditional proposition, *and* the suspension of his mind's compliance with the antecedent or consequent of the conditional. To justify his view, Alfarabi asks us to consider a situation in which this is not the case, *viz.* assume for the sake of argument that giving assent to the conditional as a whole is also to give assent to the antecedent and the consequent. Say it is night time and reasoner wants to reason about it being day or night. The reasoner executes a syllogism in modus tollens, with a conditional major premise 'if the sun is up, then it is day'. Since it is obviously night out, we then want to assert 'but it is not day' in order to conclude 'Therefore, the sun is not up'. However, our assumption has blocked our ability to assert the minor premise, since, having given our assent to the conditional, we have also thereby given our assent to the fact that the sun is up. This leaves us in the undesirable position of having given our assent to a proposition and its contradictory opposite. Though Alfarabi does not mention it, a similar argument can be made for modus ponens. If the conditional 'if the sun is out, then it is day' means nothing more than 'the sun is out, and it is day', then modus ponens is, technically speaking, nothing more than a petitio principii. Thus, in order not to make nonsense of valid deduction schema, Alfarabi shows that a sharp distinction must be made between the proposition when it is a member of a conditional and when it is not. When it is a member of a conditional that a reasoner has given his assent to, the reasoner has not, in fact, given his assent to the proposition itself, but to the connection between it

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and the other member of the conditional. However, when the proposition expressed by the antecedent or the consequent appears as a minor premise or a conclusion, then the reasoner's assent does attach to the proposition itself.

On Alfarabi's view assent does not attach to the antecedent and consequent *qua* constituent parts of a conditional sentence. The reasoner will give his assent to a conditional proposition P saying "P is true" once he has verified that the nature of the connection between the antecedent and consequent is of a strength required by the speech-context. Considerations involving the reasoner's assent are distinct from the question of P's truth-value. The conditional is true just in case there is a certain type of connection (*ittiṣāl*) between the antecedent and the consequent. As we will see, in Alfarabi's view this connection may be *per accidens* or *per se*. If it is *per accidens*, then the connection between antecedent and consequent is completely coincidental. (P1) "if Dion is walking, then Theon is leaving" is a true conditional *per accidens*. One type of *per se* connection is called 'for-the-most-part'. Read *per se* with for-the-most-part connection P1 is false, but (P2) "if the sky is clear in winter, then it will be colder" is true. There is also *per se* necessary connection. P1 and P2 would both be false on this reading of the conditionals, but (P3) "if there is a man, then there is an animal" is true. As I will discuss in greater detail below, it seems that Alfarabi has in mind that the degree or strength of assent given to a conditional proposition "if *A*, then *B*" must be in line with the strength of the connection between antecedent and consequent. If the speaker considers P1, he will perhaps notice that the connection between antecedent and consequent is *per accidens*, and also that P1 is false when read as having *per se* connection. With these truth-values in hand, depending on the requirements of the speech-context, the reasoner will give assent to P1 "it is true that if Dion is walking, then Theon is leaving". Yet, his assent will not have the strength of certitude as required by a demonstrative speech-context, but perhaps he would give his assent to P1 with strength appropriate to a rhetorical speech-context. There is, thus, a parity in emphasis in mental representation (truth as correspondence) and mental act (assent-giving) in Alfarabi's account of conditional proposition, which reflects the argumentative backdrop against which the context theory of syllogism was developed by classical Islamic philosophers. Awareness of this backdrop is particularly important when we consider Alfarabi's theory of conditionals and conditional syllogisms. If logic is to give shared, objective criteria for the validity of, for example, demonstrative inferences as well as poetic and rhetorical inferences – *viz.* in argumentative contexts where the speakers very often lie, tell half-truths, and generally dissimulate, then naturally the aim of our analysis of propositions and syllogisms

in such contexts will be aimed less toward the objective truth of the propositions expressed in the argument and more toward what propositions will the audience give its assent to. In non-demonstrative contexts, on the other hand, a wedge is opened up between the proposition's objective truth and the audience's compliance with it. In such contexts, there will be propositions to which assent attaches but whose correspondence to contingent states of affairs is not exact.

In none of these types, however, is the truth of the conditional determined by the straightforward determination of the antecedent and consequent's correspondence to current or possible states of affairs, or the antecedent's and consequent's straightforward assertibility or deniability.[31] There is no question that the objective truth of the antecedent and the consequent is determined by the correlation (or non-correlation) of what it expresses to the state of affairs. However, in the context theory of logic developed by the classical Islamic philosophers, the correlation of the proposition to the state of affairs is not the exclusive unit of analysis. Rather, along side the question of the antecedent's and consequent's being true (or false) sits the question of whether, how, and to what end the listener actively *gives his assent* to the them. In the non-demonstrative syllogistic arts, what you can *get your audience to give* its assent to is more important than whether the antecedent and consequent are true or not. The aim of the five syllogistic arts is as much the production of *attitudes* of different strengths toward a particular proposition as it is the production of a proposition as a conclusion. Nor is there only one attitude that a reasoner attaches to propositions amenable to truth and falsity. Rather, the strength of the reasoner's assent to a proposition varies according to the argumentative context in which the proposition is used. The attaching of different grades of assent to propositions in dialectical and rhetorical contexts is due to the listener's recognition of the contingency of the matter of these propositions. It is often the case that propositions expressed by the conditionals can be said to correspond to the state of affairs, but to a greater or lesser extent, and as a

[31] Grice's view (P. Grice, 'Indicative conditionals', in *Studies in the Way of Words* [Cambridge, Massachusetts, 1989], pp. 58–87) that material conditionals as *the* logical interpretation of how conditionals are used in natural language has been shown to be indefensible; see E. Adams, *The Logic of Conditionals: An Application of Probability to Deductive Logic* (Dordrecht/Boston, 1975); for psychological studies showing empirically that indicative conditionals are not normally understood as material conditionals, see J. Evans, D. Over, *If* (New York, 2004), p. 38. See also J. Bennett, *A Philosophical Guide to Conditionals* (Oxford/New York, 2003), pp. 20–33. For possible worlds semantics of counterfactual conditionals, see R. Stalnaker, 'A theory of conditionals', in R. Stalnaker, W. Harper, G. Pearce (eds.), *Ifs: Conditionals, Belief, Decision, Chance, and Time* (Dordrecht/Boston, 1981), pp. 41–56; D. Lewis, *Counterfactuals* (Malden, Massachusetts, 2001). For conditionals as conditional assertions, see G. Von Wright, *Logical Studies* (London, 1957), pp. 127–65; C. Gauker, *Conditionals in Context* (Cambridge, Massachusetts, 2005).

consequence, the mind's compliance with them will be similarly graduated.[32]

The importance of assent in determining in what senses a conditional is said to be true by an audience has implications in how we think about the syllogistic validity of arguments with conditional premises. For example, an argument constructed according to the schema modus ponens is valid in the truth-valuation sense, if there is no value assignment to the sentences of the premises and the conclusion that makes the former all true but the latter false. If there is such a value assignment, then the argument is invalid. Analogously, an argument in the scheme of modus ponens is valid in the sense of assertibility, if there is no value assignment to the premises and the conclusion that makes all the premises assertible, but the conclusion is either not assertible or is deniable. And, once again, the argument is invalid if there is such a value assignment.[33] The difficulty with applying this criterion for validity to Alfarabi's conditional syllogisms is that, depending on the context in which the argument takes place, a listener will give his assent, will be induced to *say that* a conclusion is true, *viz.* to say that it corresponds to the state of affairs, given his assent to the premises, but only to a greater or lesser degree. This is especially true in non-demonstrative arts such as dialectic and rhetoric. In dialectical and rhetorical discourses the conclusion may not necessarily follow *necessarily* from the premises, but it follows in enough cases that a listener will be convinced to give his assent to the conclusion, given that he gives his assent to the premises. In arguments from premises about contingent events or, for example, about ethical analyses of the good and the just that are known to have many exceptions, a listener may be induced to give his assent to propositions talking about what the good and the just are, in spite of his knowledge of exceptions that might otherwise be

[32] Cf. Evans and Over, *If*, pp. 38f.

[33] Aristotle's notion of validity (*i.e.* what conditions must be fulfilled to be a syllogism) are formulated for categorical syllogisms only. However, George Boger's work on Aristotle (G. Boger, 'Aristotle's underlying logic', in J. Woods, D. Gabbay (eds.), *The Handbook of the History of Logic*, vol. 1 [Amsterdam/Boston, 2004], pp. 101–246, p. 234) can be taken to show that, loosely speaking, Aristotle's notion of validity is close enough to contemporary ones that it can be used here without too much violence being done to the text and context. John Woods and Andrew Irvine (J. Woods, A. Irvine, 'Aristotle's early logic', in *The Handbook of the History of Logic*, vol. 1, pp. 29–99, p. 38) make what I think is a helpful distinction between Aristotle's notion of categorical syllogistic validity and syllogistic simpliciter. While the former is very different from contemporary ideas about deductive validity, the latter is rather closer. For accounts of Aristotle's notion of syllogistic validity, *viz.* what it means to be a syllogism, see T. Smiley, 'What is a syllogism?', *Journal of Philosophical Logic*, 2/1 (1973): 136–54; J. Corcoran, 'A mathematical model of Aristotle's syllogistic', *Archiv für Geschichte der Philosophie*, 55/2 (1973): 191–219.

considered as falsifying the premise.[34] Analogously, a listener might consider a syllogistic argument good despite his knowledge that in certain instances the conclusion sometimes does not follow from the premises.

3. CONDITIONALS IN ARGUMENTATIVE CONTEXTS

Two of the richest sources for Alfarabi's thoughts about conditionals are two epitomes of Aristotle's *Topics*, *Ğadal* and *Taḥlīl*.[35] In these two works, Alfarabi gives a precise account of the structure of a dialectical exchange between a questioner (*al-sā'il*) and a respondent (*al-muğīb*). As we will see, these pragmatic conditions determine to a large extent some of the syntactic and semantic properties of Alfarabi's conditional propositions.

Unlike a rhetorical argument, which has the structure of a single individual addressing a passive audience in order to convince them to act in a certain manner,[36] a dialectical exchange is one involving a single questioner (Q) and a single respondent (R).[37] The exchange between Q and R is closer to a competition with a winner and a loser than a straightforward deduction. Q's aim in the argument is to discover the view that R has been tasked with defending, and then showing that that view is logically inconsistent.

(Text 3) The activity of this art (*ṣinā'a*) is debate (*al-muğādala wa-al-ğadal*). It is addressing another (*muḫāṭaba*) with widely-accepted statements (*aqāwīl mašhūra*) by which the person, if the questioner (*sā'il*), seeks to show the falsity (*ibṭāl*) of whichever of the disjuncts of a contradictory pair (*al-naqīḍ*) the questioner obtains from a respondent (*muğīb*) who is tasked with defending it. If [the person] is the respondent, then he seeks to defend by means of [these statements, *sc.* *aqāwīl mašhūra*] whichever of the disjuncts from a pair of contradictories the questioner is tasked with refuting. Thus, the aim of the questioner is to refute [the statement] of the respondent who has been tasked with defending it, in which case the questioner gains victory over the respondent. The aim of the respondent is to defend the statement against the questioner who has been tasked with refuting it, in which case the respondent gains victory over the questioner. Aristotle was of the opinion that dialectic was primarily meant for showing that statements are false, according to which showing a statement to be false is to produce

[34] Alfarabi, *Ğadal*, p. 20.
[35] Alfarabi, *Al-Manṭiq 'inda al-Fārābī*, ed. 'Ağam, vol. 2, pp. 95–129. Hereafter, I cite this work as follows: Alfarabi, *Taḥlīl*. Roughly speaking, *Ğadal* seems to be a summary of books I and VIII of the *Topics*, whereas *Taḥlīl* seems to be related to *Topics* II to VII but also to *Prior Analytics* 27–32; see D. Mallet, "Le *kitāb al-Taḥlīl* d'Alfarabi", *Arabic Sciences and Philosophy*, 4/2 (1994): 317–35.
[36] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 103f.
[37] Alfarabi, *Ğadal*, p. 14.

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(*yuntiğ*) the opposite of the statement we seek the falsity of [as a conclusion of a syllogism]. However, this discipline is meant primarily for showing the falsity [of certain statements]. [Dialectic] is only meant for substantiating statements (*iṯbāt*) in a secondary sense.[38]

A dialectical exchange may be characterized as a dialectical competition, the aim of which is primarily refutation. The quaesitum (*maṭlūb*) – *viz.* a question in the form of a disjunction of a pair of contradictory or contrary statements whose 'subject terms are universal' – organizes the exchange.[39] For example, the quaesitum may be in the form of '*Aab or Oab*', *e.g.* 'Is all killing injustice or is some killing is not injustice?', or '*Aab or Eab*', *e.g.* 'Is all killing injustice or is no killing injustice?'.[40] Once R concedes to Q one of the disjuncts of the quaesitum, say *Aab*,[41] by means of question and answer, Q's objective for the rest of the exchange is to elicit further concessions from R. Only these concessions and no others may be used by Q as his set S of premises by means of which he refutes R. Q successfully refutes R's claim '*Aab*' when a subset of the premises conceded by R S* can be combined into a syllogism, the conclusion of which is identical to the other disjunct of the quaesitum. In this particular case, Q refutes R by constructing a syllogism from S* whose conclusion is '*Oab*'. On the other hand, R successfully defends '*Aab*' by not conceding premises that, when taken together, Q can use to construct just such a syllogism. Thus, R's objective is to allow Q a set of premises S, no subset of which can be combined to form syllogisms whose conclusion is '*Oab*'. In other words, Q shows R's position is 'logically inconsistent' in the sense that he is able to derive from R's set of conceded premises

[38] Alfarabi, *Ğadal*, p. 14.2–9: *wa-al-ğadalu huwa muḥāṭabatun bi-aqāwīla mašhūratin yaltamisu bihā al-insānu iḏā kāna sā'ilan ibṭāla ayyi ğuz'in min ğuz'ayi al-naqīḍi ittafaqa an yatasallamahu bi-al-su'āli ʿan muğībin taḍammana ḥifẓahū, wa-iḏā kāna muğīban iltamasa bihā ḥifẓa ayyi ğuz'in min ğuz'ayi al-naqīḍi ittafaqa an ʿaraḍahu li-sā'lin taḍammana ibṭālahu. fa-ibṭālu al-sā'ili ʿalā al-muğībi mā taḍammana ḥifẓahu huwa ġaraḍu al-sā'ili wa-ḍālika huwa ġalabatuhu li-al-muğībi, wa-ḥifẓu al-muğībi mā taḍammana al-sā'ilu ibṭālahu huwa ġaraḍu al-muğībi wa-ḍālika huwa ġalabatuhu li-al-sā'ili. wa-Arisṭūṭālīsu yarā anna ša'na al-ğadalī awwalan ibṭālu al-aqāwīli ʿalā anna al-ibṭāla innamā huwa bi-intāği muqābili mā yaltamisu ibṭālahu wa-lākinna ša'nahu ʿalā al-qaṣdi al-awwali huwa al-ibṭāli wa-ammā al-iṯbātu fa-huwa min ša'nihi ʿalā al-qaṣdi al-ṯānī.*

[39] See Alfarabi, *Ğadal*, p. 13.6.

[40] For this form of the quaesitum (*maṭlūb*), see Alfarabi, *Taḥlīl*, p. 96.

[41] The argument format is simplified here in order to focus on the formal logical aspects of the debate. In reality, Q does not know the thesis R is trying to defend. As a consequence, Q uses devices to try to get R to reveal the thesis to be overthrown. On the other hand, R tries to prevent Q's discovering the thesis he has been tasked with defending by dissimulation, ambiguity, and misdirection. In fact, perhaps the majority of the debate is given to this sort of jockeying for position. In the post-classical period, the analysis and formalization of these methods became a scientific discipline in its own right called *adab al-baḥṯ wa-al-munāẓara*. For now and in the rest of the article, I systematically suppress these combative prolegomena. See also Section 2, Text 1 above.

according to the rules of categorical or hypothetical syllogisms the contradictory or the contrary of the thesis R is tasked with defending.

To illustrate, consider the following highly implausible exchange – in fact, all the examples in this article are highly implausible – between R and Q. R concedes "All killing is injustice" (*Aab*). It thus falls upon Q to have R concede enough premises that allow him to construct a syllogism that concludes, "So, not all killing is injustice" (*Oab*). The argument, whatever its plausibility or implausibility, might go as follows:

Q: All killing is injustice or some is not? What do you say (Quaesitum: '*Aab* or *Oab*')?

R: I will allow you that all killing is injustice (R concedes: *Aab*).

Q: Will you allow that everything is by God's decree?

R: Certainly.

Q: Then, will you allow that *this* act of killing was by God's decree?

R: I must (Universal Instantiation (UI)).

Q: Do you concede, then, that some act of killing is by God's decree.

R: Certainly (Existential Generalization (EG), R concedes: *Iaf*).

Q: I think you will also concede that all that God decrees is justice; will you not?

R: I do (R concedes: *Afb*).

Q: Then you must concede also that nothing that God decrees is injustice. Is that right?

R: It is (R concedes: *Efb* by rule of obversion, *Axy* entails $Ex\bar{y}$, for any *x* and *y*).

Q: But, if you concede that some act of killings is God's decree (*Iaf*) and you also concede that nothing of God's decree is injustice (*Efb*), then it seems you must concede that some act of killing is not injustice (*Oab*, by Ferio); is this not so?

R: You are right.

In the above scenario, R concedes the following set of statements S1 = {*Aab*, *Iaf*, *Afb*, *Efb*} as well as the concessions that S2 = {for all x, x is by God's decree}, from which immediately follows S3 = {*this* act of killing is by God's decree} by UI, from which *Iaf* in S1 follows immediately by EG. Thus, in the above exchange, R concedes all of S = {S1, S2, S3}, but of these Q only needs {*Iaf*, *Efb*} to yield the other disjunct of the original quaesitum *Oab* by Ferio, {*Iab*, *Ebc*} entails *Oac* for any *a*, *b*, and *c*.

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Let us now examine how the above considerations affect Alfarabi's thinking about conditional propositions and conditional syllogisms. This will be accomplished primarily by examining Alfarabi's recommendations for how to construct premises and syllogisms, a task which Alfarabi assigns to the topoi (*al-mawāḍiʿ*).

The topoi (*mawāḍiʿ*, sing. *mawḍiʿ*) occupy an important place in Alfarabi's logical theory.[42] Alfarabi does not restrict their use to dialectical investigation. In fact, they are, in his view, central to all of the intellectual disciplines (*al-ṣanāʾiʿ al-fikriyya*). Alfarabi opens *Taḥlīl* with the following words:

(Text 4) It is incumbent on us now to say how we find a syllogism for every quaesitum that we hypothesize in any discipline, from where the syllogism is obtained, from which things we generate the premises of each syllogism that is sought for quaesitum, and the way [to generate them]. Above all, this is accomplished by familiarity with the topoi, *viz.* the universal premises whose particulars are used as major premises in each and every syllogism and in each and every discipline. [This is so] since each one of the universal topoi includes many particular premises, some of which are used in dialectic, some in rhetoric, some in the demonstrative sciences, and some in other intellectual disciplines.[43]

Thus, despite their application in practically all of the philosophical disciplines, in Alfarabi's view the topoi still provide no more than rules of thumb for constructing premises that are easily adopted into categorical or conditional syllogisms. In this passage, the topoi are called 'universal premises (*muqaddimāt kulliyya*)', but this does not mean that the terms from which they are composed pick out individual objects subsumed under the categories, in the way that 'animal' and 'men' in the universal premise 'all men are animals' pick out individual men and animals. Rather, the topoi are universal in the sense that they are intended as rules for constructing any number of premises, which are likely to gain the assent of the opponent. In making use of the topoi, the speaker is not necessarily interested in constructing true premises, as much as he is interested in constructing premises that are probable, or instill enough conviction in the

[42] There is not a great deal of secondary literature on dialectic and the topoi in the Arabic philosophical tradition. Nevertheless, see: M. Maróth, 'Die Rolle der Topik Avicennas in den arabischen Wissenschaften', *Acta Antiqua Academiae Scientiarum Hungariae*, 29 (1981): 33–41; *id.*, *Aussagenlogik*, pp. 88–99. See also N. Rescher, *The Development of Arabic Logic* (Pittsburgh, 1964), 15–32; *id.* 'Al-Kindī's sketch of Aristotle's Organon', in *Studies in the History of Arabic Logic* (Pittsburgh, 1963), 32–7; *id.* 'The logic chapter of Muḥammad ibn Aḥmad al-Khwārizmī's Encyclopaedia, Keys to the sciences (c. A.D. 980)', *Studies*, pp. 74f; Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 156–7; Lameer, *Al-Fārābī and Aristotelian Syllogistics*, p. 149; H. Hugonnard-Roche, A. Elamrani-Jamal, 'Les topiques', in R. Goulet (ed.), *Dictionnaire des philosophes antiques*, vol. 1 (Paris, 1989–2003), pp. 524–6.

[43] Alfarabi, *Taḥlīl*, p. 95. See Alfarabi's characterization of the topoi in Alfarabi, *Ǧadal*, p. 68.

mind to gain the opponent's assent. In order to gain the opponent's assent, these rules rely on the different ways that a predicate attaches to a subject. Often the topical rule is stated in terms of the five predicables, which for Alfarabi (though not necessarily for Aristotle)[44] are five ways a universal predicate (*maḥmūl kullī*) Y attaches to a subject (*mawḍūʿ*) in response to the question "What is X?" (where X is some individual such as Zayd whom we see from afar and ask "What is that?"; Y is a universal predicate if two or more things share in the fact that Y is predicated of them).[45] If, to the question "What is X?", we respond "X is Y", then Y is predicated of X in five different ways. The predicate Y is called a "genus [*ǧins*]" when Y constitutes the substance (*ǧawhar*) of two (or more) things X_1 and X_2, in the most generic sense of what it is to be X_1 and what it is to be X_2. The predicate Y is called a "species [*nawʿ*]" when Y constitutes the substance of two (or more) things X_1 and X_2 in the most specific sense of what it is to be X_1 and what it is to be X_2. The predicate "animal" is, thus, called the "genus" of both Zayd and ʿAmr, because both share in the fact that "animal" is said of both of them in the most generic sense of the questions "What is Zayd?" and "What is ʿAmr?". The predicate "human" is called the "species" of both Zayd and ʿAmr because both share in the fact that "human" is said of both of them in the most specific sense of the question "What is Zayd?" and "What is ʿAmr?". On the other hand, if X_1 and X_2 share in the fact that both are called Y but not in way that we are speaking about the substance of X_1 or X_2, then predicate Y is called an "accident [ʿ*araḍ*]".[46] If the predicate Y is used to respond to a question about what X_1 is, *i.e.* a question about X_1's substance, in such a way that the substance of X_1 is distinguished from the substance of X_2 by the fact that the substance of the former has Y and the latter does not, then Y is called a "differentia [*faṣl*]". Thus, "rational" is called a "differentia" because it is a predicate that distinguishes what Plato is from what Bucephalus is, though both are animals. If the predicate Y is used to respond to a question about what distinguishes X_1 from X_2, but not in a way that is connected to the substance of X_1 or X_2, then Y is called a "proprium [*ḫāssa*]". The predicate "risible" is a proprium because it is a predicate that is used to distinguish Plato from Bucephalus, though the difference is not at the level of the substance of the individual.

Alfarabi uses topoi to generate categorical as well as conditional premises for a syllogism in a dialectical exchange. First, consider

[44] Cf. S. Abed, *Aristotelian Logic and the Arabic Language in Alfārābī* (Albany, NY, 1991), pp. 2f.
[45] Alfarabi, *Al-Manṭiq ʿinda al-Fārābī*, vol. 1, ed. R. ʿAǧam (Beirut, 1985), pp. 55–62, p. 60.
[46] *Ibid*., p. 61.

the following prescription for generating universal affirmative or negative categorical premises from "topoi from definition" in *Taḥlīl*.

(Text 5) Among [the topoi] are those that are derived in the manner of definition. First, we find the subject [of the quaesitum, *sc*. *maṭlūb*] and then see if the predicate of the quaesitum is in its [the subject's] definition [*ḥadd*]. If it is, then it necessarily follows [*lazima bi-al-ḍarūra*] that the predicate is in all of the subject. It is plain, then, that a first-figure syllogism is formed. Alternatively, if we find that [the predicate in the quaesitum] is absent from [*maslūban ʿan*, *viz*. the subject's definition], it necessarily follows that the predicate is negated of all of the subject [of the quaesitum] and a syllogism in the first figure is formed.[47]

We can schematize the scenario described by Alfarabi in the following way. The reasoner is debating a quaesitum such as "either bats are hairy or bats are scaly". The reasoner is charged with getting his opponent to give his assent to "some bats are hairy". In order to do so, he looks at the definition of bat, which is "winged mammal". Finding "mammal" in the definition of bat, the reasoner knows that, in fact, the predicate "mammal" applies not only to some bats but to everything referred to by the term "bat". This yields the universal affirmative categorical premise "(all) bats are mammals". This premise is then used as the minor premise in the following first-figure syllogism Barbara (following the premise-order in the Arabic tradition where the minor premise generally appears first) with "all bats are hairy" as the conclusion, the speaker reasons as follows "if (all) bats are mammals and (all) mammals are hairy, then (all) bats are hairy". If the reasoner is charged with refuting the quaesitum's other disjunct, he needs a syllogism that yields the contradiction or the contrary of the other disjunct in the quaesitum, *viz*. the conclusion can be "some bats are not scaly" or "no bats are scaly". Following Alfarabi's prescriptions, the reasoner proceeds as follows. He peruses the definition of "bat" and finds that the term "scaly" is not to be found in "winged mammal". From this, he is able to construct a universal negative "no mammal is scaly", which is used as the major premise in the following first-figure syllogism, which yields the contrary of the quaesitum's second disjunct "no bats are scaly" as a conclusion: (Celarent, with minor premise appearing first): "if (all) bats are mammals and (no) mammal is scaly, then no bat is scaly". The important point to notice in Text 5 is that the topical rules are set out based on relations of inclusion and exclusion that hold between terms falling under the five predicables. The reason why the above "topoi from definition" work is because the definition states the genus (*ǧins*) "mammal" and differentia (*faṣl*) "winged", which allows us to generate a

[47] Alfarabi, *Taḥlīl*, p. 101.

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universal affirmative premise based on the fact that genus terms are those that are shared univocally among the species belonging to the genus. Analogously, the fact that "scaly" is not an element in the definition of "bat" entails that "scaly" is neither an element of the substance (*ǧawhar*) of "bat" that it shares with other objects (*viz.* it is not the genus of bat), nor is it an element of the substance of "bat" that distinguishes it from other members of the genus (*viz.* it is not the differentia). From the facts generated by the relations between genus and differentia, we can conclude that no bat is scaly, with the implicit assumption being that no bat is *essentially* scaly, though it may be scaly accidentally (*bi-al-ʿaraḍ*).[48]

Consider a topos that generates a conditional premise, an example of which appears in *Ǧadal*: 'if X is in Y, then the contrary of X is in the contrary of Y'. Possible instantiations of this rule include any number of premises such as the following: 'if pain is evil, then pleasure is good', 'if God is perfect, then creation is deficient', and 'if men incline to injustice, then women incline to justice'.[49] In this case, the use of this topos has generated a conditional sentences, which, despite the fact that the antecedent and consequent are indefinite categorical propositions, might reasonably be interpreted as universally quantified; thus, *e.g.* (P1) 'if all pain is evil, then all pleasure is good'. Consider a scenario in which Q and R agree to debate the quaesitum 'is all pain evil or not?' In this, R decides to defend 'all pain is evil, in which case Q takes on the task of constructing a syllogism or series of syllogisms that conclude (C) 'some pain is not evil' only from premises obtained from R. Using this topos, Q might proceed in the following way. He will try to convince R to concede P1, and then to concede further premises that allow Q to construct a categorical syllogism with (P2) 'some pleasure is not good' as the conclusion. With P1, P2 and modus tollens in hand, Q can then directly refute R by forcing him to concede C. It is this use of the topoi that Alfarabi seems to have in mind when he says near the beginning of *Taḥlīl*:

(Text 6) Once we have thoroughly familiarized ourselves with the topoi, then we analyze the quaesitum into a pair of contradictories, and we place each of

[48] I am grateful to Stephen Menn for encouraging me to rethink my analysis of how Alfarabi uses the topoi. I had originally claimed that the variables used to state the topoi are simply "linguistic entities" such as "terms" that we can attach universal quantifiers to. I now realize that what makes the topoi work, so to speak, are the relations of inclusion and exclusion (partial and complete) that the topical rules assume to hold between the terms that the topical rules take as objects. These relations of inclusion and exclusion are the basis for the theory of the five predicables as Alfarabi seems to have understood it.

[49] *in kāna al-šayʾu mawǧūdan fī amrin mā fa-ḍiddu ḏālika al-šayʾ mawǧūdun fī ḍiddi ḏālika al-amri*; literally, 'if the thing is in something else, then the contrary of that thing is in the contrary of that something else'; Alfarabi, *Ǧadal*, p. 68.2–3. The examples listed above are not Alfarabi's.

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them on its own as a thesis (*waḍʿ*) for which we seek to substantiate it (*iṯbātahu*) by producing it as a conclusion [of a syllogism], or show its falsity (*ibṭālahu*) by producing its opposite (*muqābil*) as a conclusion [of a syllogism].

Then we analyze the thesis (*al-waḍʿ*) into its predicate and subject, and we consider each of them in turn on its own. Then we sort carefully through (*nastaqriʾu*, *istiqrāʾ*) the topoi until we have gone through all of them. If we then find in the thesis we hypothesized or among its parts (*sc.* the predicate or subject) something that is characteristic of a topos familiar to us, then we have found the syllogism by which we show the thesis is true or show that it is false.[50]

As in the imaginary exchange between Q and R in this section, Q analyzes the thesis defended by R 'All pain is evil' into its subject and predicate parts. The subject and predicate are found to be suited to have the topos 'if X is in Y, then the contrary of X is in the contrary of Y' applied to them. Applying this topos to the subject 'pain' and predicate 'evil' generates a premise 'if all pain is evil, then all pleasure is good', which is the key step in constructing the conditional syllogism that refutes R's conceded statement. As alluded to above, the antecedent and the consequent of the conditional are *theses* obtained from the opponent in a dialectical exchange, and neither R nor Q needs to be committed to their being true or false. Said differently, since they are either hypotheses or derived from hypotheses, Q and R do not take the antecedent and the consequent, as a result of their use in a dialectical context, as being subject to assent or denial, *taṣdīq* and *takḏīb*. In particular, Q's interest in the conditional is chiefly as providing a way of constructing a conditional syllogism (in this case, modus tollens) that allows him to falsify R's concession. The conditional does this by providing a connection between the hypothesis (antecedent) and another sentence (consequent). Q rests assured that R will accept the conditional 'if all pain is evil, then all pleasure is good' because it is authorized by the topos that 'if X belongs to Y, then the opposite of X belongs to the opposite of Y'. Nor does it concern Q that this topos generates quite a large number of clearly sophistical conditionals. Yet, in dialectical and rhetorical exchanges it is not of chief importance that the conditional or its parts be true; they only need to be convincing to R so that he will concede them.[51]

However, it is not the case that the topoi are applied exclusively to the thesis' subject and predicate. In *Taḥlīl*, which is Alfarabi's most exhaustive treatment of the topoi, the 'topos from implications' does not analyze the thesis into its subject and predicate elements.

[50] Alfarabi, *Taḥlīl*, pp. 95–6.
[51] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, p. 105.

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Instead, it operates directly on the thesis, generating a variety of forms of conditional proposition according to what purpose the conditional premise and syllogism will serve in the dialectical exchange.

(Text 7) And among the topoi are those derived from implications, *viz.* the topoi of existence and elimination (*wuǧūd wa-al-irtifāʿ*). This is when we look into each of a pair of theses making up the quaesitum and consider: 'by virtue of what P (lit. 'thing [*al-šay'*]') is the thesis; or 'what P is by virtue of the thesis' being'? So whatever kind of P we come across, we select it. Then, [1] if the topos that we selected is of the kind that the thesis is by virtue of P, we make P the antecedent and the thesis the consequent. We then assert (*nastaṯnī*) the antecedent to produce the thesis as it is, whether it is affirmative or negative. [And the deduction] will be in the first figure of the connective conditional syllogisms (*viz. modus ponens*).

[2] If, on the other hand, what we find is that P is by virtue of the thesis, then we make the thesis the antecedent and P, *i.e.* the thing that we have come across, the consequent. Then we assert the opposite (*muqābil*) of the consequent, *viz.* that is the opposite of the thing we come across (*viz.* P), producing thereby the opposite of the thesis. [The conclusion of this syllogism] is the other part that is disjuncted to [the thesis] in the quaesitum.

Or, [alternatively], we consider: by virtue of the elimination (*irtifāʿ*)[52] of what P is the thesis eliminated; or what P is eliminated by the elimination of the thesis? Then, if we come across P, by virtue of whose elimination the thesis is eliminated, we make P's elimination the antecedent and we attach it (*ardafnāhu*) to the thesis. We then assert the antecedent, yielding the elimination of the thesis, in such a way that, if the thesis were affirmative (*mūǧib*), it would become negative and if the [thesis] were negative (*sāliban*), it would become affirmative. In general, the conclusion will be the opposite [quality] of P. Thus, [by virtue of the deduction] P is shown to be false. This latter topos is used to show every thesis that one hypothesizes is false.

[52] The adjective 'negative (*salbī*, *sālib*)' describes the quality of the sentence, indicating that the sentence is such that it possesses a negative particle in its logical structure. Contradiction (*tanāquḍ*) and contrariness (*taḍādd*), and opposition (*taqābul*) generally, are best understood as characterizing the quality of the logical relation *between two sentences* and in relation to each other. Thus, a single sentence might be described as 'negative', but only a pair of sentences can be contradictory or contrary, each with respect to the other. On the other hand, *irtifāʿ*, literally 'elimination' and similar in its import to the phrase 'negated of (*maslūban 'an*)', is a cognitive or linguistic act carried out by the reasoner on a sentence of a given quality that converts the quality of the sentence to its opposite. To this extent, 'negation' would be an appropriate translation of *irtifāʿ*, which conveys Alfarabi's intended meaning, if we keep the following point in mind. Though *irtifāʿ* behaves in some ways like propositional negation, it should not be understood a purely linguistic unary function that takes a sentence as an operator and generates a sentence as a value. It often has, though not necessarily in this particular passage, a metaphysical counterpart. Sometimes, when we say about something that it has been eliminated or negated (*e.g.* 'elimination of the thing [*irtifāʿ al-šay'*]'), we do not mean exclusively that a *sentence* has been negated, but sometimes, the *absence* of a condition outside the soul that is in line with what the sentence expresses about it. In a complementary way, the *presence* of the thesis (*wuǧūd al-waḍʿ*), say, means the presence of a condition outside the soul that is in line with what the thesis expresses about it.

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If we come across a P that is eliminated by virtue of the elimination of the proposition (*qaḍīya*, *i.e. sc.* the thesis, *al-waḍʿ*) we hypothesized, then we make the elimination of the proposition the antecedent, and the elimination of P the consequent. Then we assert (*nastaṯnī*) the opposite of the consequent to produce the existence of the thesis. So the previous topos was for showing a thesis is false (*ibṭālihi*), and this latter one is for showing that a thesis is true (*iṯbātihi*).[53]

In this topos, the subject and predicate play no role at all. Instead of the predicate 'belonging to' a subject as in a categorical thesis, this topos describes the thesis as 'being by virtue' of something else, or being absent or eliminated by virtue of the presence or absence of something else. Whereas the former approach relates terms from the categories to terms from the categories, the latter is a way of relating facts, conditions or events to each other, in the way that (the fact, condition or event of) its being day *is* by virtue of the (fact, condition or event of the) sun's being out. 'Implications', between antecedent and consequent for Alfarabi are best expressed using conditionals because they are a linguistic form that speakers conventionally use to express the way in which the presence or absence of a fact, condition, or event is somehow *by virtue of* (*i.e.* connected to, responsible for, related to, causally associated with, prior or posterior to) the presence or absence of another fact, condition, or event. Indeed, Alfarabi mentions that this topos is used most often to argue – often speciously in Alfarabi's view – about causal relations between events (*e.g.* the cutting of this or that nerve being the cause of paralysis) or between substances (*e.g.* the sense in which the being of animal causes the being of human). Thus, it seems that the chief virtue of the 'topoi from implications' in relation to arguments like this is that they allow us to formalize arguments about causes as conditionals that are then used to construct conditional syllogisms. Thus, Alfarabi's presentation of the 'topoi from implications' might be used in a dialectical context in the following way.

Q and R are out for a walk at noon. What they can only make out as a small, black object flies past them quickly some distance off. They agree to clarify the kind of which the object might be a member according to these argumentative parameters: quaesitum: 'it is either a bat or not'; R opts to defend 'it is a bat'. Q then peruses the zoological data related to bat behaviour available to him, and proposes that R concede (P1) 'if it is a bat, then night has fallen'. R, rashly, concedes, but before he realizes his error (he conceded P1 without considering his current circumstances, *viz.* that it is noon), Q quickly asserts (P2) 'but it is noon so night cannot have fallen'. Too late to retract his concession, R grudgingly concedes P2. Q triumphantly produces the contradiction of R's thesis ('it is not a bat' from P1 and P2 by modus tollens).

[53] Alfarabi, *Taḥlīl*, p. 102.

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As usual, in the dialectical context described above, this topos from implication is being used negatively, *i.e.* in order to show that the thesis defended by R cannot be correct. Clearly, R and Q are hardly any closer to discovering what the object is, though they are that much closer to knowing what the object is not. The 'implications' that Q peruses in this example are data about phenomena that bear some sort of connection to the phenomenon expressed in the thesis. Though Alfarabi says that this topos is usually used to talk about causes,[54] nightfall *causes* bats to appear in the sky only in a secondary or derivative sense. If the fact that bats come out at night is due to features of their physiology or their nocturnal feeding patters, then perhaps these are more accurately called 'causes' of bats taking wing at nightfall. If this is so, then nightfall might be called an inseparable yet accidental concomitant of bats flying at night rather than a cause as such. The point here, however, is that in both cases R intuitively accepts the conditional 'if bats are out, then night has fallen' because he recognizes (without necessarily knowing why) that the phenomenon expressed in the antecedent somehow or other *is by virtue of* the existence of the phenomenon expressed in the consequent. This topos is thus not concerned with investigating the nature of connection between the phenomena (causal, purely accidental, inseparable accidental, relational, mathematical, etc.), but simply takes advantage of conventional intuitions to generate conditional propositions. Throughout, the aim of the opponents in the schematic argument described above is investigating the phenomena expressed in the antecedent and consequent, not with the connection expressed by the conditional sentence as a whole. R gives his assent to the conditional because it expresses a real connection that exists between the phenomena expressed in the antecedent and consequent. This connection, however, is taken at face value, and does not itself become the object of investigation in the debate.

With respect to the foregoing discussion of dialectic and the topoi with respect to conditional sentences, the argumentative context in which conditional sentences are used endows Alfarabian conditionals with peculiar, but deeply-ramified formal properties. As we observed in §2, the reasoner does not give his assent to the antecedent and consequent qua parts of a conditional when he gives assent to the conditional as whole. However, after examining the structure of dialectical and rhetorical argument, we can see the reason for this seeming peculiarity. As we have observed in this section, conditionals arise in argumentative contexts in which the interlocutors debate a particular thesis that is subject to dispute. The interlocutors may harbour

[54] Alfarabi, *Taḥlīl*, pp. 104ff.

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motives for engaging in argument that are geared more toward getting an audience, or a single listener to give its assent to a desired opinion rather than showing that the opinion is true. In the arguments with conditional syllogisms described above, it is usually the case that the disputed thesis or the thesis we want the listener to give his assent to is the antecedent, the consequent, or their contradictory opposites. Thus, as we saw in the case of conditional topoi, assent to the antecedent, the consequent, or their contradictory opposites is usually the very point under dispute. To that extent, it would be circular to expect the parties to the debate to give their assent to the conditional based on their prior knowledge of the truth of either the antecedent or the consequent. Rather, the parties to the debate will be induced to give their assent to the conditional based on their recognition that the *connection between* the antecedent and the consequent, the nature of which is usually dictated by the topoi, corresponds to the states of affairs. Consider the two conditionals generated from the two topoi discussed above: (a) 'if all pain is evil, then all pleasure is good', and (b) 'if bats are out, then night has fallen'. The advertised purpose of the topoi is to generate premises that are, if not true, then at least engender some sort of compliance in the listener's mind; that is, they do not at first glance strike the listener as so implausible as to be rejected outright. As for (b), the reason why R might be tempted to accept it is due to his observations of bat behaviour in the past. In particular, he has no doubt observed that, without exception, bats never fly while the sun is up. In Alfarabi's technical language, this could be expressed by saying that the bats' being (*wuǧūd*) implies the sun's elimination (*irtifāʿ*). In the examples explicitly discussed by Alfarabi, the reasons that justify R's belief about why, say, bats only come out at night, are not important in the course of the argument. The point is that it is R's recognition of a connection between the phenomena that leads R to concede the conditional sentence expressing this connection. In fact, since Q and R are trying to settle what exactly the black shape flying in front of them is, their assent to the conditional cannot be based on their assent to the antecedent or consequent, or their knowledge that they are true or false. In (a), the topoi 'if Y belongs in X, then the opposite of Y belongs in the opposite of X' describes a certain connection that a reasoner might *reasonably* accept as existing between two things, events, states, or conditions which are expressible in a subject-predicate format. The point of the argument between Q and R with (a) as a major premise is to settle, even if negatively, whether all pain is evil. R is thus not likely to give assent to the conditional 'if all pain is evil, then all pleasure is good' based on his conviction that the consequent is true without any consideration given to the truth of the antecedent. In this case, R might feel justified in conceding 'if all pain is evil, then all pleasure

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is good' is due to a certain, obviously specious but no less convincing, connection we recognize to exist between opposites such as pain/pleasure and evil/good. Thus, in Alfarabi's way of thinking, the use of conditionals in a dialectic, and presumably *a fortiori*, in a rhetorical, context is not interpretable as the speaker asserting, or adopting a definite cognitive attitude toward, either the antecedent or the consequent. Rather, he gives his assent to the conditional to the extent that he recognizes that the connection between the antecedent and consequent that the conditional signifies really does exist, *viz.* that the antecedent and consequent are connected in such a way that the listener will give his assent to the consequent given his assent to the antecedent. Clearly, then, Alfarabi's view of conditionals is not amenable to an interpretation in which the truth or falsity of the conditional is in any way dependent on the truth or falsity of its constitutive parts. This is not merely to say, however, that Alfarabi's conditionals do not appear to be amenable to a truth-functional interpretation of 'if…then…' sentences as material implication. Material conditionals are true in all cases in which the antecedent is false. By contrast, in the context of a dialectical or rhetorical exchange, it does not make sense for two interlocutors to make a hypothesis (*waḍ*ʿ) about something they already know to be false or impossible. It seems that in Alfarabi's way of thinking about the use of conditionals in dialectical exchanges, a conditional with a false or impossible antecedent violates a pragmatic assumption that conditionals be useful in debate. Nor are Stalnaker-Lewis interpretations appropriate either. In order to evaluate whether or not an Alfarabi conditional is true, we are not required to look to see whether the consequent is true according to a 'stock of beliefs' that are hypothetically altered to make the antecedent true.[55] Rather, the focus is on what the listener will give his assent to given that he gives his assent to the antecedent.[56] In non-demonstrative contexts, for example, what is objectively true and what the audience gives its assent to are not coextensive.

Finally, it is also important to realize that the most common form of atomic sentences that serve in the antecedent and consequent position in a conditional are categorical propositions of the form *Aab*, *Eab*, *Iab* or *Oab* for any distinct *a* and *b* that can be plausibly located

[55] Stalnaker, 'A theory of conditionals', p. 44.

[56] *Ibid.*, p. 43 says: 'According to this line of thought, a conditional is to be understood as a statement which affirms that some sort of logical or causal connection holds between the antecedent and consequent. [In order to determine whether a conditional understood in this way is true], you should look, not at the truth values of the two clauses, but at the relation between the propositions expressed by them'. As we will see, the connective scheme to conditional evaluation is what informs Alfarabi's thoughts about conditionals.

in one of the ten categories. Nor is there any reason to believe that Alfarabi would disallow singular terms as subjects: '**s** is *b*' or '**s** is *not b*', where **s** is a *this* and *b* is plausibly located in one of the ten categories. What is more, we find in APCA that Alfarabi allows fact-like or event-like propositional contents to be expressed by the antecedent and consequent of a conditional. For example, the following 'event-like' propositions are used as antecedents and consequents: 'Zayd comes', "Amr departs', 'Sirius rises in the morning', 'the day will be hot and the rain will cease', 'it is day', and 'the sun is out'.[57] While none of these propositions is obviously expressible in the form of a universal or particular categorical proposition, it is easy to see how they could serve as one part of a dialectical quaesitum, *e.g.* 'Either Zayd comes or he doesn't', or 'the rain will cease or it won't'. Thus, despite Alfarabi's claim in *Ğadal* that 'the only thing sought from a quaesitum is whether the predicate belongs to the subject or not', which, if taken strictly, would restrict the types of quaesitum to disjunctions of subject-predicate categorical propositions, practically speaking, Alfarabi does not seem strictly committed to such a view.[58] What such a view does exclude, however, is the very possibility that we can have a debate or argue about the truth and falsity of a conditional, or that we can try to elicit assent to a conditional *as the main objective of an argument*. This is true to the extent that Alfarabi does not seem to consider the case in which the quaesitum itself is composed of conditionals, *i.e.* that the quaesitum can be of the form 'either if P, then Q, or not-(if P, then Q)'. In order to develop such an argumentative scheme, Alfarabi would have to develop, one, a conditional syllogistic that allows nested conditional; two, a conditional syllogistic that can yield conditional conclusions; and three, a doctrine of conditional contradiction. In the logical structure of the dialectical exchange, the disjuncts of the quaesitum circumscribe the choice of opinions R can defend and Q can refute. Say, for instance, that R decides to defend 'if P, then Q'. Then Q's task is to get R to concede premises that allow Q to construct a *conditional* syllogism that yields the *contradictory* of 'if P, then Q' as a *conclusion*. This single requirement requires that Q know what the contradictory of a conditional is, that he be able to construct a conditional syllogism in the moods of modus tollens or modus ponens whose antecedent and consequent are the conditional 'if P, then Q' or its contradiction, and that he be able to generate the contradictory opposite of 'if P, then Q' as a

[57] Alfarabi, 'Al-Fārābī's paraphrase of the *Categories* of Aristotle', trans. D. Dunlop, *The Islamic Quarterly*, 5 (1959): 21–54, p. 34. Hereafter, I will cite this work as follows: Alfarabi, APCA.
[58] Alfarabi, *Ğadal*, p. 82.

conclusion. But Alfarabi does not theorize at any length about any of these three items in his extant logical works.

This is not to say that Alfarabi did not formulate or discuss such doctrines in other works that we no longer possess. Indeed, it is highly unlikely that this could be the case. Alfarabi must have been aware that there were late antique logicians, such as Galen and Boethius,[59] who espoused the view that the conditionals 'if A, then B' and 'if A, then not-B' are logically inconsistent, in the sense that the speaker will never assert both simultaneously.[60] Indeed, Avicenna explicitly mentions the existence of such a view (and goes to great lengths to refute it) in book 5 of *Qiyās* of *Šifā*'. Similarly, it is well-documented that late antique Peripatetics like Boethius developed hypothetical syllogistics that allowed conditionals and nested conditionals as premises and conclusions. The truly perplexing question in my view is this: why was not Alfarabi sufficiently impressed by the importance of these issues to include them in his epitomes, even if only to mention them in passing? The above discussions in this section and the last perhaps provide at least a partial explanation. In Alfarabi's use of conditionals, it seems to be the case that the nature and purpose of the quaesitum determines what formal features of conditionals are developed and what formal features are not. Not only in *Ǧadal*, but also in *Taḥlīl*, which presents practical guidelines for constructing arguments in *all* of the sciences, arguments tend to be limited to disputes about predicable-type relationships (species/genus, definition, differentia, property accidental or otherwise, individual substance (*i.e. this*-es), and existence/non-existence). As a consequence, Alfarabi consistently presents the quaesitum, a disjunction of two opposite sentences with interrogative force, in the form of a categorical proposition such as 'is *Aab* or *Oab*?' Of course, the purpose of the quaesitum is to provide the basic standard by which a thesis is overthrown in an argument, and to organize the initial conditions of

[59] C. Martin, 'The logic of negation in Boethius', *Phronesis* 36/3 (1991): 277–304, p. 279; *id.*, 'Denying conditionals: Abaelard and the failure of Boethius' account of the hypothetical syllogism', *Vivarium*, 45 (2007): 153–68; cf. R. Stalnaker, 'A defense of conditional excluded middle', in Harper, Stalnaker, Pearce (eds.), *Ifs*, pp. 87–104.

[60] This is how the contradiction of indicative conditionals is sometimes interpreted for natural language, *e.g.* E. Adams, 'The logic of conditionals', *Inquiry*, 8 (1965): 166–97, p. 184. In this article Adams is interested in giving an analysis of indicative conditionals as they are used in natural language. In Adams' view, a conditional expresses the probability that a reasoner will assert the consequent given a certain probability that the antecedent. One pragmatic assumption in this theory is that a speaker will never be justified in asserting a consequent when he knows that the antecedent is false. Adams says (*ibid.*, p. 178) "a pair of conditional statements of the form 'if *p* then *q*' and 'if *p* then not *q*' are seldom if ever justifiably asserted on the same occasion. When such a pair of statements is made on the same occasion, it is usually the case that one is asserted in contradiction to the other, and this carries the implication that the contradicted statement is false or at least that it may be justifiably denied (and non-vacuously)".

the inquiry (what Q aims to derive, what R thesis defends). Yet, the formal property of the disjuncts as exclusively categorical propositions circumscribes the scope of the types of question that can be asked in such exchanges. In other words, it is difficult to ask questions about causes, for example, which are, as we saw in the discussion of the 'topoi from implications' best formalized in conditional sentences. Yet, the quaesitum-based dialectical exchange which focuses on arguments organized around predicable-type questions makes it so that conditionals do not appear as elements of the quaesitum. But the placement of conditionals in the quaesitum demands the explicit formulation of both a rule about the formal contradiction of a conditional, and a doctrine of conditional syllogism that, at the very least, could countenance conditionals as conclusions of conditional syllogisms. It is one thing for R to concede 'if A, then B' as a thesis, but Q must know, at least with regard to form, what is required to contradict such a conditional in order to refute R's concession. Also, the quaesitum-based argument format requires that Q refute R by producing the contrary or contradictory of R's thesis as a *conclusion* of a conditional syllogism. Thus, Alfarabi would also be required to develop a conditional syllogistic that can not only take conditionals (and nested conditionals) as premises, but also produce conditionals (and nested conditionals) as conclusions. Alfarabi's silence on these important points is, at first glance, surprising. It seems, however, that when we consider the dialectical backdrop in which conditionals are used, we see that the quaesitum-based argumentative structure that focuses on predicable-type topoi and arguments makes the development or discussion of such doctrines unimportant if not unnecessary.

4. CLASSIFICATION OF IMPLICATION (*LUZŪM*) IN APCA: CONDITIONS OF ASSENT, CONTRADICTION

In APCA §58 Alfarabi directly links the notion of necessary implication (*luzūm bi-al-ḍarūra*) to the formation of connective conditional propositions.

(Text 8) Things between which there is necessary following (*mutalāzimāt*) are the things from which connective conditionals are composed. Things between which there is opposition are the things from which disjunctive conditionals are composed. It is an additional feature of [the propositions] that are characterized by complete following that if either the antecedent or the consequent is asserted (*yustaṭnā*), then the other follows from it (*lazima ʿanhu al-āḫar*, *sc.* as conclusion), and if the opposite of one of them is asserted, then necessarily the opposite of the other follows from it. As for [the propositions] whose following is incomplete, it is only appropriate to assert the antecedent or the opposite of the consequent in order for it (*sc.*

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the set of premises, *i.e.* the conditional major and repeated minor) to become a syllogism.[61]

It is difficult to overemphasize the importance of this move since it allows (1) all implication relations to be formalized in the language of conditional propositions; and (2) it allows us to construct valid syllogisms based on the standard schema, primarily modus tollens (MT) and modus ponens (MP), with conditional major premises; finally, (3) it allows us to reason demonstratively about sentences between which relations of necessary implication exist. Nevertheless, this should not make us lose sight of the fact that Alfarabi also recognizes types of implication that are not necessary. In other words, Alfarabi says that an antecedent implies a consequent even if the connection between them is not necessary. Thus, in this section, out task will be to explore how Alfarabi speaks about the different grades of implication that exist according to the different strengths of connection between antecedent and consequent. In Alfarabi's treatment of conditionals, the conditional sentences (1) 'if Paul comes, Peter goes', (2) 'if it is windy, then it is cool', and (3) 'if this shape is square, then it has four sides' are formalized indifferently as 'if P, then Q'. However, Alfarabi would also say that (1) signifies accidental implication (*luzūm bi-al-ʿaraḍ*), (2) implication for the most part (*ʿalā al-akṯar*), and (3) necessary implication. Thus, the notion of connection underlies each of these types of conditional, but the nature of the connection in each is different.

In fact, we are already quite familiar with Alfarabi's discussion of implication from his development of the 'topoi from implication' from *Taḥlīl*. The 'topoi from implications (*mawāḍiʿ min al-lawāzim*)' are rules for forming conditional sentences that rely on common intuitions about *by-virtue-of* relations – these are, as Alfarabi notes, often causal relations[62] – that hold between pairs of events, states, substances, accidental or essential properties, or phenomena, taken broadly. These topoi rely, in particular, on the reasoner's intuitions about how some Y (be it a state, event, substance, property or

[61] Alfarabi, APCA, §58, 35.10–14.

[62] The important relation between the notion of causality as a basis for our use of conditionals in everyday speech is recognized in the philosophical literature. For example, speaking about counterfactual conditionals, Dorthy Edgington says: 'it is worth adding that subjunctive conditionals are supposed to do a lot of work for us within philosophy, as well as in ordinary life. They have been used to 'analyse' causation, dispositions, laws, and play a large part in some accounts of perception and knowledge. On the first, causation, I think we need to appeal to causal notions to get subjunctive conditionals right, and the order of explanation goes that way round'; D. Edgington, 'On conditionals', in D. Gabbay, F. Guenthner (eds.), *Handbook of Philosophical Logic*, vol. 14 (Dordrecht, 2007), pp. 127–221, p. 216. See also J. Collins, 'Counterfactuals, causation, and preemption', in D. Jacquette (ed.), *Philosophy of Logic* (Dordrecht, 2007), pp. 1127–43; J. Williamson, 'Causality', in *Handbook of Philosophical Logic*, vol. 14, pp. 95–126.

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phenomenon) *is* somehow or other 'by virtue of (*bi*. . .)' X (be it some other state, event, substance, property or phenomenon). With this intuition in hand, the reasoner is then justified in constructing a conditional sentence where the sentence expressing Y is the consequent and the sentence expressing X is the antecedent. These topoi allow us to say 'X implies Y', to the extent that it is possible to say that Y is (or is not) by virtue of the being (or non-being) of X.

Alfarabi does not take the notion of implication as the object of investigation in *Taḥlīl*, but he does, and in quite some detail, in APCA.[63] As we have seen in previous sections, Alfarabi's classification of the types of implication in APCA is sensitive to the argumentative contexts in which conditionals expressing implicative relations appear as premises. Alfarabi's tendency to give pride of place to what he calls 'necessary implication (*luzūm bi-al-ḍarūra*)' is characteristic of the well-known, if not somewhat problematic, Peripatetic lionization of demonstration and demonstrative premises, while still attempting to maintain a place for dialectical, rhetorical and even poetical reasoning.[64] As such, Alfarabi's classification of implication also includes subdivisions such as '*per accidens* implication (*luzūm bi-al-ʿaraḍ*)' and implication for the most part (*ʿalā al-akṯar*), which, based on the examples Alfarabi provides, seem to correspond to types of implication in rhetorical and dialectical conditional syllogisms respectively. Thus, despite Alfarabi's giving pride of place to necessary implication, it is important to keep in mind that, for

[63] The motivation for his discussion of implication appears to arise out of questions surrounding the meaning of the Greek expression *hē tou einai akalouthēsis*, which is consistently translated in the Arabic *Categories* as 'luzūm al-wuǧūd' (K. Georr, *Les Catégories d'Aristote dans leurs versions syro-arabes* [Beirut, 1948], p. 243) and in English as 'implication of existence' (*e.g.* Aristotle, *Aristotle's* Categories *and* De Interpretatione, trans. T. Ackrill [Oxford, 1963]). This expression, which is found at *Categories* 14a30, 35, 14b15, 30, 15a9, is used in the chapters on priority, posteriority, and simultaneity. In this context, 'implication of existence' is often said to be 'reciprocal (*pros antistrephonta*, *bi-al-takāfu*')' or not (Georr, *Les Catégories d'Aristote*, p. 241), and 'of necessity (*bi-al-ḍarūra*, *ex anagkēs*)' (*ibid*., p. 230) or not, *i.e.* 'accidentally (*bi-al-ʿaraḍ*, *kata sumbebēkos*), (*ibid*., p. 233). Alfarabi's wording in his epitome of the *Categories* closely matches Sergius of Rašaina's (d. 536) Arabic translation of Aristotle, often word for word; on Sergius of Rašaina, see *ibid*., pp. 17–24. As we will see, Alfarabi moves substantially beyond Aristotle's text just when he explicitly connects the discussion about the being of something following from something else with the construction of conditional and disjunctive premises and syllogisms in a way that strongly recalls his discussion of the 'topoi of implications' in *Taḥlīl*. Though al-Ḥasan b. Suwār's (born in 942) marginal notes on the *Categories* make no mention of this constellation of issues, such an obvious concern with showing the intertextual consistency in between the *Categories*, *Topics*, and the late antique discussion of hypothetical syllogisms suggests that Alfarabi's ideas in APCA grew out of a late antique commentary tradition that seems to have existed no later than Proclus (d. 485). As noted by Fritz Zimmermann (Alfarabi, *Long Commentary*, p. 128, n. 3), in his long commentary on *De Interpretation*, Alfarabi's condemnation of Proclus' incomprehension of Aristotle's doctrine of metathetic sentences adopts Proclus' use of reciprocal and nonreciprocal implication (*ibid*., pp. 123–31) in order to clarify Aristotle's meaning (at *De Interpretatione* 20a20–3).

[64] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, p. 35.

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Alfarabi, there is no single "correct" reading of conditionals of the form 'if P, then Q'. Rather, the sort of implication expressed by conditional sentences, divided according to the weakness or strength of the connection between the antecedent and consequent, depends crucially on the argumentative context in which the conditional is deployed.

As in *Taḥlīl*, in APCA two things are called implicates (*mutalāzimān*), or to stand in a relation of implication, when 'if one of them is, then the other is by virtue of the being [of the first] (*iḏā wuǧida aḥaduhumā wuǧida al-āḫaru bi-wuǧūdihi*)'.[65] As we saw in the previous two sections, Alfarabi does not strictly delimit the types of sentential content that can be expressed by implicates, in the sense that he allows content that is amenable to expression in subject-predicate sentences, and content that is not, *e.g.* sentences talking about facts and states of affairs. Nevertheless, as we discussed in the last section, Alfarabi does not deem it important to consider in what sense an *implication* might be by virtue of the being of *another implication*, *i.e.* a relation of implication between pairs of implications. In general then, the types of thing that are said to imply something else are, broadly speaking, states of affairs on the one hand and predicable-type objects on the other.

Alfarabi's analysis of implication begins with a division of the types of implication according to whether the antecedent implies the consequent *per se* (*bi-al-ḏāt*) or *per accidens* (*bi-al-ʿaraḍ*). This analysis of implication, in the final analysis, reduces to an examination of the strength of the connection between the antecedent and the consequent. The antecedent's implying the consequent *accidentally* signifies the weakest form connection between antecedent and consequent (if there is any connection at all), whereas the antecedent's implying the consequent necessarily signifies the strongest connection between antecedent and consequent. As an example of *per accidens* implication, Alfarabi gives us the conditional proposition 'if Zayd comes, then ʿAmr departs'. In this case, there is not any clear principle that gives insight into why ʿAmr's departure, as expressed in the consequent, should be *by virtue of* Zayd's arrival, as expressed in the antecedent. Alfarabi's words suggest that it simply happens to be the case that ʿAmr's departure and Zayd's arrival coincide. Thus, it seems that Zayd's arrival implies ʿAmr's departure in a purely accidental way, in the sense that there is no underlying principle requiring the inseparability or perpetual concomitance of ʿAmr's departure and Zayd's arrival. In this weakest sense of implication, it would be unintuitive, but no less correct, to say that, for example, 'Socrates is white' *implies* 'the sun is round'.

[65] Alfarabi, APCA, p. 34.

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(Text 9) The consequent may follow *per accidens* (*qad yakūnu lāziman bi-al-ʿaraḍ*), as when we say 'if Zayd arrives, then ʿAmr departs' – in the case that this happened to occur at some moment. For ʿAmr's departure is a consequent of Zayd's arrival, but [a consequent] *per accidens*.[66]

On the other hand, an antecedent implies the consequent *per se* when the following of the latter from the former is not accidental, in the sense that there is presumably some underlying principle, or set of them, that determines that when the antecedent is, the consequent is by virtue of the antecedent.

(Text 10) A consequent [that is implied by the antecedent] *per se* may be implied [1] for the most part (*ʿalā al-akṯar*). For example, in the statement 'if Sirius reaches the zenith in the morning, then the heat will intensify and the rains will cease', this (*viz.* the intensity of the day's heat and the cessation of rain) is a consequence of Sirius appearing on the horizon (*lāzimun li-ṭulūʿi al-šiʿrā*), but one that happens for the most part. Or, [2] a consequent [that is implied by the antecedent] *per se* may follow of necessity (*bi-al-ḍarūra*). This [type of consequent] is implied perpetually (*al-dāʾim al-luzūm*) and it is inseparable from the thing by virtue of whose existence it exists (*lā yumkinu an yufāriqa al-šayʾa allaḏī bi-wuǧūdihi wuǧida*). Whenever the thing is, the consequent is, and it is never at any moment unaccompanied by [the consequent].[67]

It is clear that the two types of *per se* implication presented here, namely, implication for-the-most-part and implication of necessity, do not hold between antecedent and consequent out of chance. The consequent's (the intensification of heat and cessation of rain) being implied by the antecedent (Sirius' passing the zenith in the morning) for-the-most-part seems to be due to the fact that astronomical phenomena have some sort of regular, law-like, though not entirely determinative effect on the weather and other natural processes in the world. In other words, implication *per se*, but for the most part, seems to be due to physical laws that are, nevertheless, not entirely deterministic. For example, as a matter of fact, cloudless winter days in Montréal are generally colder than days where there are clouds. Of course, it happens that sometimes a winter day is clear and unusually warm. Yet, in spite of knowledge of these exceptions, Alfarabi would not say that someone who says 'it is a clear, winter day in Montréal' implies 'it is a cold' has spoken wrongly. Rather, Alfarabi wants to include conditional premises, likely in dialectical arguments, that while not true eternally and unchangingly, are true often enough to be acceptable in non-demonstrative contexts. The

[66] Alfarabi, APCA, §56, 34.9–11.
[67] Alfarabi, APCA, §55, 34.11–16. Note Alfarabi's explicit identify of alethic and statistical necessity.

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connection between the antecedent and consequent in this type of implication is strong enough to be 'widely-accepted', but not so strong that it is falsified by an instance or instances of the antecedent not coinciding with the consequent.

On the other hand, necessary implication, which is also classified under the *per se* division, represents the strongest type of implication between the antecedent and consequent envisioned by Alfarabi. Furthermore, just as demonstrative *categorical* syllogisms must have premises in which the predicate's being in the subject is necessary, Alfarabi likely envisioned conditionals with a necessary connection between antecedent and consequent as being primarily suited to demonstrative *conditional* syllogisms. In a general sense, necessary implication represents a type for which it is impossible that the antecedent ever be without being accompanied (or not accompanied) by the consequent. However, Alfarabi subdivides *per se* necessary implication into complete implication (*luzūm tāmm*) and incomplete implication (*luzūm ġayr tāmm*). Alfarabi describes the former in the following words:

(Text 11) Two things between which is complete following are such that if either of them is, then the other necessarily is by virtue of it, *viz.* if the first of them is, then necessarily the second is, and if the second is, then necessarily the first is.[68]

It is important to note that the order of the antecedent and consequent in this type of implication relation is unimportant. Whichever of X or Y happens to be (*ittafaqa*), then the other is by virtue of it. This is not the case with incomplete following, in the sense that which proposition is treated as the given is important. Alfarabi says:

(Text 12) Two things between which is incomplete following are such that if the first is, then the second necessarily is, but if the second is, it does not follow of necessity that the first is (*lam yalzam ḍarūratan wuǧūdu al-awwal*). These are two things for which the being of one does not follow from the being of the other reciprocally (*humā allaḍānī lā yatakāf'āni fī luzūm al-wuǧūd*). This is like man and animal. For if man is, then animal is of necessity, but if animal is, it does not follow of necessity that man is.[69]

With respect to incomplete following, the order in which the antecedent and consequent are spoken is important, since if X is given, then it is necessary that Y is, though the converse does not follow. Consider, for example, two of Alfarabi's favourite examples: (a) 'if the sun is up, then it is day', and (b) 'if human is, then animal is'. In (a), the antecedent and the consequent stand in a complete relation of implication. This means that the connection between the

[68] Alfarabi, APCA, §57, 34.17–19.
[69] Alfarabi, APCA, §57, 34.20–35.4.

antecedent and consequent is such that it is impossible for the consequent to not be when it is given that the antecedent is. But since the implication is complete, it does not matter which of 'it is day' or 'the sun is up' is given to be. This means that in complete implication the antecedent and consequent are convertible, meaning that switching the order of the antecedent and consequent – whichever of the pair of propositions is hypothesized as the given – will not affect the truth of the conditional. In (b), on the other hand, the ordering of the antecedent and consequent is important insofar as it is important which of 'human is' and 'animal is' is assumed to exist. If human is taken to be, then it is impossible that human is but there is no animal. However, on the assumption that animal is, it is possible for an animal to be and it not be a human. Thus, for (b) to be true, the antecedent must be 'man is'. For (b) to be false is just for the assumption (in this case, that 'animal is') to leave it open to a situation in which, given that the antecedent is, the consequent still is not.

Although conversion does not hold for incomplete implication, contraposition does. As in *Taḥlīl*, in APCA Alfarabi also enlists the aid of the notion of the removal (*irtifāʿ*) as an alternative way of talking about necessary types of implication.

(Text 13) [Of a pair of things between which is incomplete following,] they are such that the being of one implying the being of the other is not reciprocal. If the consequent is removed, then of necessity the thing implying it is removed. For example, consider man and animal. If animal is removed, then it follows of necessity that man is removed. For if animal were removed and man were not removed, but, rather, remained in existence (*baqiya fī al-wuǧūd*) while [still accepting the premise that] by virtue of man's being, animal is, then it follows necessarily that if animal is removed, then at the time that it is not, it is. Then there is something that is and is not at the same time, and in exactly the same manner. But that is absurd (*muḥāl*). Based on this example, with regard to two things, the being of one of which follows reciprocally from the being of the other, it follows that the removal of either one of them entails the removal of the other.[70]

By an ad absurdum argument about man and animal, Alfarabi suggests, without formally proving it, that contraposition holds for incomplete implication, *viz.* X's incompletely implying Y entails that Y's not being incompletely implies that X is not ('if X is, then Y is' entails 'if Y is not, then X is not'). It is perhaps worth dwelling on Alfarabi's proof of contraposition of incomplete implication at length. The proof runs as follows. Assume X incompletely implies Y, *i.e.* assume 'if X is, then necessarily Y is'. Then, in order to generate a contradiction later, assume further that *it is not the case that* Y's not being

[70] Alfarabi, APCA, §57, 34.23–35.4.

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incompletely implies X's not being, *i.e.* assume 'not-(if Y is not, then necessarily X is not'). This step forces Alfarabi to give voice to his intuitions about what the contradictory of conditional is. According to Alfarabi, the conditional sentence 'if animal is not, then human is not' signifies a connection of incomplete necessity between the antecedent and the consequent, or, said differently, signifies that the antecedent incompletely implies the consequent. Thus, the meaning of this conditional is that it is impossible that human be and animal not be, or, informally, it is impossible for there to be something outside the soul called 'human' but not 'animal'.[71] To contradict this statement is to say that it is possible at one and the same moment that animal is not but, somehow, human is. Informally, this would be to say that it is possible for there to be an object outside the soul that is simultaneously a human but not an animal. Thus, it seems that Alfarabi's intuition about the contradictory of a conditional is that it is in the form of a conjunction in which the leading conjunct is identical to the original antecedent and the final conjunct is the contradictory of the original consequent. And the conjunction itself signifies, as Alfarabi says, temporal coincidence. This conclusion, *viz.* that the contradiction of a conditional sentence in Alfarabi is formally a conjunction rather than another conditional as in the contradiction of indicative conditionals, is borne out by the rest of Alfarabi's "proof" of the validity of the rule of contraposition. The ad absurdum assumption allows Alfarabi to construct a conditional syllogism with (P1) the original assumption 'if human is, then animal is', and (P2) 'human is' which he obtains from the ad absurdum assumption that there is in fact something that is human.[72] P1 and P2 with modus ponens yields 'animal is', whereas the other conjunct 'animal is not' was assumed ad absurdum, yielding the desired contradiction. Alfarabi could not have reasoned in the way he does here in order to generate this ad absurdum argument if the contradiction of a conditional were another conditional. On the other hand, it is perfectly consistent with Alfarabi's way of talking here to say that, in general, the contradiction of a conditional 'if P, then Q' is the conjunction 'P and not-Q'. Yet, the formal similarity of Alfarabi's rule of conditional contradiction with the negation of the material conditional should not make us lose sight of the fact that they could not be more different with respect to their semantics. The material conditional 'if P, then Q' is false just when its contradictory is true, *viz.* when P is true and Q is false. Alfarabi's conditional 'if P,

[71] S. Menn, 'Al-Fārābī's *Kitāb al-Ḥurūf* and his analysis of the senses of being', *Arabic Sciences and Philosophy*, 18 (2008): 59–97.

[72] Perhaps, strictly speaking, in two steps of this "proof" Alfarabi would have had to rely on conjunction elimination, *viz.* 'P and Q' entails 'P' and 'P and Q' entails 'Q'. It seems likely, however, that took the elimination steps to be obvious.

then Q' is also false just in case its contradiction is true. But the contradiction of 'if P, then Q' will be true when it is possible that the state of affairs expressed by P coincide with absence of the state of affairs expressed by Q. In this case, the modality makes the current truth-value of P and Q irrelevant. It is the consistency of the state of affairs expressed by P with the absence of the state of affairs expressed by Q that is signified by the contradiction of Alfarabi's conditionals.

Having considered Alfarabi's comments in APCA, *Ǧadal*, and *Taḥlīl*, we are now in a position to provide a reasonable conjecture about the truth-conditions for conditionals. As I discussed in Section 2, to say that a conditional is true is to say only that a reasoner says that the conditional is true. As we have noted throughout this paper, however, a reasoner harbours different criteria for calling a conditional true in different contexts. Thus, the onus for making suitable distinctions between the notions of truth in context falls on the strength with which the mind's assent attaches to the conditional in question. Broadly speaking, the context-sensitivity of the modality of the reasoner's mental assent to a conditional makes room for a variety of different attitudes that the reasoner can adopt towards it. For a theory of conditionals, this means that the ambiguity of the reasoner's assessment that a conditional is true is resolved by looking to the different strengths of the implication relation between antecedent and consequent. The weaker the connection between the antecedent and consequent, the weaker the mental assent to the conditional composed of them. In determining whether or not to give assent to a proposition, the reasoner looks to see if, and to what extent, the connection between antecedent and consequent correspond to what is the case. However, the *current* truth-values of the antecedent and consequent are not necessarily relevant to the reasoner's decision to call a conditional true or false. Rather, it is his observation of the variation in the *frequency* with which the connection between the antecedent and the consequent mirrors what is the case that accounts both for the variation of the strengths of implication in Alfarabi's conditionals, and for the variation in the grades of assent to those conditionals. As we saw at the beginning of this section Alfarabi does not feel the need to consistently use an overt linguistic marker that indicates the modality of implication between antecedent and consequent signified by the conditional expression. On the face of it, there is no overt linguistic indicator that when the reasoner says that 'if human is, then animal is' and 'if it is December in Montreal, then it is cold out' are true, he holds each conditional to different criteria.[73] Yet, for the

[73] See Text 9 and Text 10 for Alfarabi's statistical reading of the modalities. In his so-called Short Treatise on Aristotle's *De Interpretatione*, Alfarabi is more explicit about the

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reasoner to say that a conditional is true means different things in different argumentative contexts. When the reasoner says that a conditional is true in a demonstrative argument, this means that he has observed that the consequent is always true given the truth of the antecedent. This means that there is necessary implication between the antecedent and consequent, and further, that the reasoner gives the strongest form of assent to the conditional in question. On the other hand, the reasoner also says that a conditional is true in a dialectical argument. But in this context, this should be taken to mean that he has observed that the consequent is almost always true given the truth of the antecedent. There is, thus, for-the-most-part implication between the antecedent and the consequent, and further, that the reasoner gives fairly strong assent to the conditional. And when he says a conditional is true in a rhetorical argument, this means only that he has observed that the consequent was true at least once when the antecedent was true. This also means there is a *per accidens* type of implication between the antecedent and consequent, and further, the reasoner gives the weakest form of assent to the conditional.

Truth-Conditions for Alfarabi's necessary, for-the-most-part, and per accidens conditionals[74]

For any sentence *A* and *C* expressing some state of affairs, the conditional sentence 'if *A*, then *C*' is true…

[1] with *necessary implication* if and only if there is no instance in which *A* is true and *C* is not true. Thus, 'if *A*, then *C*' is false when there is such an instance;

[2] with *for-the-most-part implication* if and only it is more often the case that *C* coincides with *A* than not-*C* coincides with *A*. Thus, 'if *A*, then *C*' is false when *A* coincides with *C* and not-*C* with equal frequency, or *A* coincides with not-*C* with greater frequency; and

interdefinability of the 'primary modes' of necessity and possibility and statistical/temporal modalities: 'Necessary is what exists permanently, not having ceased nor going to cease, and cannot not exist at any time. Possible is what does not exist now but is apt to exist and apt not to exist at any time in the future. The absolute is of the nature of possibility, but has come to exist now after having had the possibility of existing and the possibility of not existing, though it has the possibility of not existing again in the future'; Alfarabi, *Alfarabi's Commentary and Short Treatise on Aristotle's* De Interpretatione, trans. F. Zimmermann (London, 1981), p. 242. On the notion of primary or basic modalities, and its role in the development of Avicenna's division of existence into necessary and possible, see R. Wisnovsky, *Avicenna's Metaphysics in Context* (Ithica, NY, 2003), pp. 219–25.

[74] Technically speaking, the locution 'necessary conditional' means that it is a conditional sentence with necessary implication, 'for-the-most-part conditional' means that it is a conditional sentence possessing for-the-most-part implication, and '*per accidens* conditional' means that it is a conditional sentence possessing *per accidens* implication.

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[3] with *per accidens implication* if and only if there is an instance in which *A*'s being true and *C*'s being true coincide. Thus, 'if *A*, then *C*' is false when there is never such an instance, in which case 'if *A*, then not-*C*' will be true in the sense of [1].

It might seem amiss to claim that the sentence 'if it is December in Montreal, then it is cold out' is true with the explicit admission that the antecedent may very well be true and the consequent come out false. Yet, it is not amiss when we realize that the conditional is not true according to the conditions required for necessary conditionals, but is according to the conditions for 'for-the-most-part' conditionals. This fact is corroborated by the observation that 'if it is December in Montreal, then it is cold out' will likely draw the interlocutor's assent in a dialectical or rhetorical debate because it is *rarely* the case that the antecedent is true and the consequent false. On the other hand, since the conditional signifies a statistical rather than a sempiternal connection between two states of affairs, the conditional is false when read as a necessary conditional, and the connection indicated by the conditional is not likely to elicit assent from the respondent in the case that the interlocutors are engaged in a demonstrative argument. In short, a true conditional is a conditional that a reasoner calls true *in a context*. The reasoner calls a conditional true according to the observed frequency with which the consequent is true given the antecedent. Without inconsistency, he may call one and the same conditional true in one context and false in another. This ostensive inconsistency is resolved by looking to the degree of assent the reasoner gives to the consequent given the truth of the antecedent. He may call a conditional such as 'if human is, then animal is' and 'if it is December in Montreal, then it is cold out' true, but his assent to the former is strong, whereas his assent to the latter is significantly weaker. Alfarabi prefers to speak about the strength and weakness that inheres in propositions generally and conditionals in particular in terms of the notion of the 'site of opposition (*mawḍiʿ al-ʿināḍ*)' to the proposition, which may be characterized as the doubt or reservations that the reasoner has about the proposition in question. In the case of conditionals, the basis of this site of opposition will be the frequency with which the reasoner observes the consequent coming out false while the antecedent is true. In the case of necessary conditionals, this never happens so there is no site of opposition to such a conditional. In the case of rhetorical conditionals, the site of opposition is potentially much greater, since in a rhetorical argument the audience may be induced to say that a conditional is true based on a single instance in which the antecedent and consequent coincide.

5. CONDITIONAL PROPOSITIONS AND INFERENTIAL VALIDITY

Consistent with Alfarabi's lionization of demonstrative methods, Alfarabi is less concerned with *per accidens* implication and *per se* implication for-the-most-part than with necessary implication, whether complete or incomplete. The reason for this is that Alfarabi seems to believe that these types of following are not suited to carrying out deductions in which a true conclusion follows *of necessity* from a set of true premises. Yet, it is only natural for Alfarabi to entertain such a view of syllogisms given Aristotle's generic definition of the syllogism at the opening of the *Prior Analytics*, which states that a discourse is a syllogism if, inter alia, it is *impossible* that the conclusion be false given that the admission that the premises are true. But if this is so, then there is a problem. Consider an example of *per se* implication of the for-the-most-part variety in the following conditional: (P1) 'if Sirius passes the zenith in the morning, then it will be hot'. For Alfarabi, this means that there is a 'for-the-most-part' implication relation between the sentences, 'Sirius reached its zenith in the morning' and 'it will be hot'. An antecedent implies a consequent for-the-most-part if the connection between the state of affairs expressed by the antecedent and the consequent holds with law-like regularity. Observing this fact, a reasoner gives assent to the conditional when he sees that the consequent is true in most cases in which the antecedent is true. Say that in the course of an argument a respondent gives his assent to P1. This means that the respondent, seeing that it is hardly ever the case that Sirius reaches its zenith in the morning but the temperature remains mild, gives his assent to the conditional. Then, as it turns out the questioner and respondent observe that today is a day that Sirius reached its zenith in the morning, and thus the respondent also feels obliged to assert (P2) 'but Sirius passes the zenith in the morning'. Now, Alfarabi classes modus ponens, along with modus tollens, as conditional syllogistic figures in *Qiyās* and *Madḫal*,[75] and, thus, given that the respondent has conceded that both P1 and P2 are true, the canonical notion of syllogistic validity tells us that it should be impossible that the conclusion be false. If we take impossibility statistically, as Alfarabi normally does, the inferential validity of modus ponens requires that there never be a case in which P1 and P2 are true and the conclusion is false, *i.e.* there is never a situation in which Sirius passes the zenith in the morning and yet the day is rainy and mild. Yet, consider the truth conditions for for-the-most-part conditionals like P1 above. P1 is true if and only if it is statistically more frequent that Sirius reaches

[75] Alfarabi, *Qiyās*, pp. 82f; cf. Alfarabi, *Al-Fārābī's Short Commentary on Aristotle's* Prior Analytics, trans. N. Rescher (Pittsburgh, 1963), pp. 74–7. Alfarabi, *Madḫal*, pp. 31ff.

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its zenith in the morning and it is a hot than it is that Sirius reaches its zenith and it mild or cold. So P1 will still be true and an interlocutor will still give his assent to P1 knowing that there are cases in which Sirius reaches its zenith in the morning and the weather remains cold, rainy or mild. Such a notion of implication makes room for the following scenario: Sirius reaches its zenith in the morning and the weather remains cold. Thus, P1 is true and the respondent will give his assent to it because its truth is based on statistical frequency and he will also be willing to give his assent to P2 since he observed Sirius reach its zenith in the morning. Yet the respondent will still not give his assent to the conclusion that it is a hot day, for the simple reason that it is not. So modus ponens with conditional premises read 'for-the-most part' (and, *a fortiori*, *per accidens*) is classically invalid.

What are we to make of this result? Deborah Black has observed that Alfarabi, like other classical Islamic philosophers, countenanced the use of fallacious inferences schemes such as 'denying the antecedent' (DA) and 'affirming the consequent' (AC) in rhetorical, and especially, enthymemic forms of reasoning.[76] Thus, one approach might be to bite the bullet, so to speak, and admit that in arguments in rhetorical or dialectical contexts in which for-the-most-part conditionals are admissible, arguments in modus ponens are just as invalid as arguments in which we deny the antecedent or affirm the consequent. This approach would be consistent with the general tendency in Alfarabi to hold up demonstration as the genuine form of syllogistic, and to hold up the other species of syllogism as inferior. On this reading, rhetoric and dialectic are inferior to demonstration because they produce 'variable opinions' rather than certainty,[77] admit premises of contingent rather than necessary matter,[78] false premises rather than eternally true premises,[79] premises derived authority and sense perception rather than from first principles,[80] and now also because they admit the use of fallacies in syllogistic argumentation.[81] Yet, this would ignore important distinctions that Alfarabi explicitly makes in *Kitāb al-Ḫaṭāba* between syllogisms that are genuinely productive such as modus ponens and modus tollens, and those that are only ostensibly (*fī al-ẓāhir*) productive such as DA and AC. In reference to conditional enthymemic reasoning, Alfarabi notes that valid inferences and ostensibly valid inferences are rhetorically persuasive only if we suppress the asserted minor premise (*mustaṯnā*, lit. the

[76] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 170f.
[77] *Ibid.*, p. 108.
[78] *Ibid.*, pp. 86ff.
[79] *Ibid.*, p. 87.
[80] *Ibid.*, p. 98.
[81] *Ibid.*, p. 170.

"repeated" premise) in each.[82] Yet, the reason for withholding the asserted minor in each case is different. In the case of modus ponens and modus tollens, syllogisms which will be recognized as genuinely valid (*ṣaḥīḥ*) by the audience, the asserted minor is withheld. For example, the minor is suppressed in the case of modus ponens so the speaker avoids further questioning about the propriety of asserting the antecedent in the minor premise.[83] The minor is withheld in the case of modus tollens, the validity of which will also be recognized by the audience, so that the locus of opposition (*mawḍiʿ al-ʿināḍ*) to the view being argued over, the persistence of which is necessary to the process of persuading one's audience, is not revealed.[84] For if the locus of opposition to the viewpoint stands exposed, the audience will turn to view the viewpoint with a more critical eye, changing the modality of their assent to the opinion from persuasion to refutation.[85] By contrast, Alfarabi says that the assertion of the minor premise must be suppressed in the case of fallacious arguments such as DA and AC because the audience will realize that the arguments are, in fact, formal fallacies – in Alfarabi's words, the particular combination of premises is 'unsound' or 'corrupt', *sc. fāsid* – and, as a consequence, the arguments will lose their persuasive power.

(Text 14) If the conclusion (*natīǧa*) is the opposite of the consequent, then the asserted minor premise is the opposite of the antecedent. This combination

[82] Alfarabi, *Deux ouvrages inédits sur la Rhétorique*, ed. J. Langhade, M. Grignaschi (Beirut, 1986), p. 95.6–13: 'Connective conditional syllogisms are only persuasive (*muqniʿa*) when the conditional proposition is stated explicitly, the asserted [minor] premise is withheld, and one simply sets forth the conclusion. In this art (*i.e.* in rhetoric) the conclusion of a connective conditional syllogism may be the opposite of the consequent, or the opposite of the antecedent. [Whatever conclusion the speaker decides to work with] will depend on what the speaker feels will be most beneficial to him. By withholding the asserted [minor] premise, the locus of the sophistry in each of these conclusions will be obscured, for at first glance (*fī bādiʾ al-raʾī*) most people (*ǧumhūr*) can hardly tell what must be asserted, or which assertion will produce the conclusion. For all of this is obscure to the majority of people'. Hereafter, I will cite this work as follows: Alfarabi, *Rhétorique*. Cf. Alfarabi, *Kitāb fī al-Manṭiq: al-Ḫaṭāba*, ed. M. Salīm Sālim (Cairo, 1976), p. 47.10–15. Hereafter, I will cite this work as follows: Alfarabi, *Ḫaṭāba*.

[83] Alfarabi, *Rhétorique*, p. 97.6–9; *id.*, *Ḫaṭāba*, p. 48.6–9.

[84] Alfarabi, *Rhétorique*, p. 97.4–6; *id.*, *Ḫaṭāba*, p. 48.4–6.

[85] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, p. 112: 'Since rhetorical assent is a form of decisive adherence to one contrary, in the face of an equally strong objective probability that the rejected contrary is the true one, the logician is left without any explanation of why the mind does indeed incline one way, rather than the other. The production of rhetorical assent cannot, therefore, be due solely, or even primarily, to the truth and modality of rhetorical propositions. The very nature of rhetorical acceptance is that it is primary and unhesitating, and thus able to subsist despite the awareness of the possibility that it is false, or that not everyone accepts it as true. As soon as doubts regarding these rhetorical premises reach the point that they make the believer feel the need for investigation, his assent has lost its innocence, the very innocence that made it rhetorical belief. Thus, as soon as the opposite of which the holder of a rhetorical belief is aware becomes an active force, the believer is thrust into the realm of dialectical investigation'. For more details on the 'locus of opposition (*mawḍiʿ al-ʿināḍ*)', see *ibid.*, pp. 111–13.

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[of premises] is only ostensibly (*fī al-ẓāhir*), not genuinely (*fī al-ḥaqīqa*), productive. If the asserted [minor premise] is explicitly mentioned, then there is no guarantee that the audience (*sāmiʿ*) will not perceive [the locus of the sophism *sc. mawḍiʿ al-muġālaṭa*)], and as a consequence, his conviction will vanish. For this reason, it is necessary that [the speaker] withhold [the asserted minor premise]. If the conclusion is the antecedent [of the conditional], then it is only presumed to produce [this conclusion, *i.e.* the antecedent (*muqaddam*)] by asserting the consequent as it was set down. This is also not productive in reality. This combination [of premises] is rarely used except when the speaker deems it likely that it will elicit conviction [in the audience]. In this case, it is also necessary to withhold the asserted minor premise so that [the audience] does not perceive the unsoundness of this combination of premises (*fasād taʾlīfihi*), and, the argument become thereby unpersuasive.[86]

Thus, even in argumentative contexts in which the interlocutors are willing to admit weaker forms of conditionals such as *per accidens* and for-the-most-part, Alfarabi still holds that the audience distinguishes between formally valid syllogisms such as MP and MT, and invalid premise combinations such as AC and DA. And the audience makes this distinction despite the fact that the conclusions do not follow necessarily from the premises in any of these schema, whether in classically valid schema such as MP and MT, or classically invalid schema such as AC and DA, when weaker forms of conditional are used as major premises. If the primary aim of employing syllogisms in demonstrative contexts is the generation of a conclusion from the premise set necessarily, the same cannot be said for syllogisms in non-demonstrative contexts. In employing syllogisms in these latter types of context, the primary aim is eliciting assent or compliance in the audience's mind with the conclusion rather than generating a true conclusion of necessity. The notion of validity aptly characterizes demonstrative arguments to the extent that the concern in a valid argument is with the *truth* of the conclusion given the *truth* of the premises. In dialectical and rhetorical arguments on the other hand the speaker is concerned with eliciting assent to the conclusion given that the audience gives its assent to the premises. It seems more appropriate, then, to speak about the 'success' and 'failure' or the 'felicity' or 'infelicity' of a rhetorical or dialectical argument, to the extent that calling an argument 'successful' or a 'failure', 'felicitous' or 'infelicitous' makes it clear that the aim of these types of argument is inculcating mental compliance in the audience rather than generating a true conclusion of necessity from a pair of premises.

Consider the inference with the for-the-most-part conditional major premise (P1) 'if it is December in Montreal, then it is cold out'. This

[86] Alfarabi, *Rhétorique*, pp. 95.14–96.3; *id.*, *Ḫaṭāba*, pp. 47.16–48.3.

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conditional is true because it is more often the case that it is December in Montreal and it is cold than it is December in Montreal and it is warm or mild. This is so, despite the explicit admission that there exists at least one case in which it is December in Montreal and it is not cold. As we observed above, however, if we demand that an argument in MP, which uses P1 as a major premise, satisfy the requirement of classical validity, then this argument will be invalid because given a warm December day in Montreal, the speaker may get his audience to concede P1 and P2 'but it is now December in Montreal', and the conclusion 'it is cold' may still be false. Yet, consider: there is a sense in which a mother who argues with her son about dressing for the cold during his visit to Montreal in December is making a good argument when she gets him to concede that, on the one hand, it is hardly ever the case that December in Montreal is warm, and, on the other hand, that he will soon be in Montreal in December. The fact that we feel, even if just intuitively, that this is a good argument is registered by our genuine surprise upon hearing that her son returned to inform her that he did not, in fact, need his jacket after all because the weather during his visit was unusually warm. Our reaction is not so much to say that her inference was invalid, but to remark at the exceptionality of Montreal's weather. Moreover, if her son were to be advised in the same fashion on another occasion, he would still likely be convinced to give his assent to the premises once more, since the connection between cold weather and Montreal in December still holds for the most part.

Alfarabi's discussion from *Kitāb al-Ḫaṭāba* suggests that we hold MP to be a good (or successful, or felicitous) argument, even if the argument is classically invalid because a for-the-most-part conditional is used as a major premise. It seems that at the heart of this issue is the requirement, as stipulated in Aristotle's generic definition of the syllogism in the *Prior Analytics*, that the connection between the premises and the conclusion is too stringent in all but the demonstrative syllogistic arts. This requirement brings schema like MP and MT to the same level as DA and AC, when it is intuitive in Alfarabi's eyes that arguments in the former are good and those in the latter are not. Speaking in reference to using formal fallacies such as AC in rhetorical debate, Deborah Black notes that despite the fact that rhetorical discourse often makes use of argument schema that 'do not formally entail their conclusions,

> there is some plausibility involved in the acceptance of those sorts of arguments. Given a sufficiently strong connection between the antecedent and the consequent, a context in which connections between the consequent and other conditions are few, it is not improbable that the presence of the

consequent does suggest the truth of the conditional, even if the entailment is not formally conclusive'.[87]

It seems that an analogous situation should be entertained with respect to MP and MT. That is to say, despite the fact that the truth of premises in a syllogism with a for-the-most-part conditional as a major premise do not *necessitate* the truth of the conclusion, there is still a sense in which the assent to the for-the-most-part conditional followed by the assertion of the antecedent as a minor premise will elicit, but in a weaker way, assent to the consequent as a conclusion of the syllogism, even if the entailment is not of the strength required by Aristotle in his generic definition of the syllogism.

In short, the context theory forces on the logician an analysis of conditionals in which the connection between the antecedent and consequent varies according to the dialectical context in which the conditional proposition is used. In a demonstrative context, the connection between antecedent and consequent is necessary; in a dialectical it is for-the-most part; in a rhetorical it is *per accidens*. Each of these conditionals is true *in suitable contexts* in the sense that the one's interlocutor is willing to admit that the connection between the antecedent and consequent expressed by the conditional proposition corresponds to the actual state of affairs in the way *required by dialectical context*. Thus, an interlocutor will not give his assent to a for-the-most-part conditional in a demonstrative context because the connection between the antecedent and consequent in such a context must be sempiternal. On the other hand, he will give his assent to a for-the-most-part conditional in a dialectical or rhetorical exchange where, for example, premises that the reasoner knows may be false elicit assent from the listener nevertheless.[88] Yet, our discussion above shows that not only does the context demand different grades of assent in relation to the actual state of affairs, but also a sensitivity to the dialectical context demands variable degrees in the strength of the connection between the *premises* and *conclusion* of the conditional syllogism. In other words, it requires the admission that dialectical contexts require different grades of syllogistic validity. MP is syllogistically (and classically) invalid with a for-the-most-part conditional because it may happen that it is admitted that the premises are all true and the conclusion still happens to come out false. However, it seems inappropriate to require a single, monolithic criterion of syllogistic validity in all dialectical contexts, as required by many

[87] Black, *Logic and Aristotle's* Rhetoric *and* Poetics, pp. 170f. Cf. Evans and Over, *If*, p. 32.

[88] Jonathan Evans and David Over (*If*, p. 38) note that when conditionals are used in natural language environments, people 'do not expect a "true" conditional to apply universally' which gives further evidence in the authors' view that people tend to 'interpret "all" fuzzily or vaguely to mean "nearly all"'.

contemporary formal accounts of logical validity. Ancient philosophers – and the classical Islamic philosophers are not exceptional in this regard – proved to be extremely adept at adapting the notion of the syllogism as developed in the *Prior Analytics* to the demands of the different species of syllogism that they took Aristotle to be developing in the five syllogistic arts of the *Organon*. I suggest, rather, that a conditional syllogism in MP executed in a dialectical or rhetorical context with a for-the-most-part conditional major entails its conclusion, but in a weaker sense than in a demonstrative argumentative context, for example. Alfarabi considers just such a possibility in *Kitāb al-Ḫaṭāba*. Once again returning to the question of the problem of how to distinguish between the five syllogistic arts in the face of their underlying syllogistic unity, Alfarabi moves to distinguish between unqualified (or 'simpliciter', *muṭlaq*) and qualified senses of the term 'syllogism' based this time on how strongly (or weakly) the premises entail the conclusion. In the face of claims that a wide variety of clearly distinct argument forms, such as enthymemes, induction, and analogy, can somehow all still meaningfully be grouped under the name 'syllogism',

(Text 15) logicians (*aṣḥāb al-manṭiq*) maintain that this name (*viz.* syllogism, *qiyās*) refers to the combinations of premises that produce necessarily, whether [these premise combinations] are categorical, conditional, or *per impossibile* (*ʿalā ṭarīq al-ḫulf*). Furthermore, they have designated [the premise combination that is necessarily productive] as a 'syllogism', and not the inductive [syllogism] (*istiqrāʾ*) or [the syllogism from] analogy (*tamṯīl*). According to them, enthymemes are more deserving of the name 'syllogism' than the syllogism from analogy, though this is the opposite of how the majority of logicians (*ǧumhūr*) have understood the matter, and it is also the opposite of how many of the scholastic theologians (*kaṯīrun min al-mutakallimīn*) have understood it (*i.e.* the Muʿtazilites).[89] Similarly, sophistical discourses (*al-aqāwīl al-sūfisṭāʾiyya*) they at times call 'syllogisms (*qiyāsāt*)', but not simpliciter (*lā ʿalā ṭarīq al-iṭlāq*). Rather, they call sophistical discourses '*sophistical* syllogisms', and [they call] the enthymeme a '*rhetorical* syllogism (*qiyāsan ḫuṭabiyyan*)'. As for the simpliciter sense of 'syllogism' (*wa-amma al-qiyās bi-al-iṭlāq*), they designate thereby the discourse (*qawl*) from which the conclusion follows necessarily. But the enthymeme includes [premise combinations] that are genuine syllogisms as well as those that are only ostensibly syllogisms.[90]

Alfarabi observes that 'syllogism', taken in its most generic sense, means a set of premises that necessarily entail the conclusion. In

[89] For Muʿtazilite ideas about the syllogism, see J. van Ess, *Die Erkenntnislehre des ʿAḍuaddīn al-Īcī* (Wiesbaden, 1966), pp. 382–94. For Muʿtazilite influence on the classical Islamic philosophers, see P. Adamson, 'Al-Kindī and the Muʿtazila: Divine attributes, creation and freedom', *Arabic Sciences and Philosophy*, 13 (2003): 45–77.

[90] Alfarabi, *Rhétorique*, p. 85.4–11; *id.*, *Ḫaṭāba*, pp. 41.14–42.3.

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terms of conditional syllogisms, this means that 'conditional syllogism' in an unqualified sense denotes a premise set composed of a conditional major premise and another, non-conditional minor premise, which, if asserted, necessitate the assertion of the conclusion. This generic sense is made to align exactly with the sense in which the premises in a demonstrative syllogism must entail their conclusion, namely, of necessity. In the case of a demonstrative syllogism, in order to ensure that the premises necessitate the conclusion, the connection between the antecedent and the consequent of the conditional major premise must be necessary too, whether of the complete or the incomplete variety. Thus, in the case of demonstrative syllogisms, *the strength of the connection between the antecedent and consequent indexes the strength of the premises' entailment of the conclusion*. Said differently, the strength of the following of the conclusion from the premises is limited by the strength of the connection between the antecedent and consequent of the conditional major premise. This observation may be generalized to the two other types of conditional discussed by Alfarabi in APCA. In a conditional syllogism with a for-the-most-part conditional major premise, the frequency with which the connection between the antecedent and consequent expressed by the conditional proposition corresponds to the actual state of affairs is the frequency with which the premises and the conclusion will be true together. In a conditional syllogism with a *per accidens* conditional major premise, the frequency with which the conclusion will be true given that the premises are true is just the frequency with which the consequent of the *per accidens* conditional is true given that the antecedent of the *per accidens* conditional is true.

In sum, for each argumentative context, *viz.* in each argument in which the interlocutors agree to use syllogisms that will elicit only a certain degree of assent, the context theory of logic assigns an appropriate syllogistic art. Alfarabi distinguishes between these syllogistic arts in various ways. At times he recognizes that the distinction between them is at the level of the premises' truth values; at other times he distinguishes between them at the level of the modality of their premises; at other times, he seems inclined to distinguish them, like Avicenna would after him, with the rank of assent that the premises and conclusion elicit from the listener. The result of the above discussion is to realize that he also distinguishes between the different syllogistic arts – regardless of whether the syllogism deployed in the argument is categorical, conditional, or *per impossibile* – according to the way in which the premises entail the conclusion. Depending on the pragmatic conditions under which the argument takes place, not only will the interlocutors come to an implicit or explicit agreement about the level of assent they require from their opponent's premises, but they will also expect or even explicitly

stipulate the suitable manner in which the conclusion follows from the premises vis-à-vis the context; in other words, they will implicitly expect or explicitly stipulate a suitable notion of validity vis-à-vis the context. Indeed, this result should strike us as intuitive: of course, we do not expect the premises of arguments in historical disciplines to entail their conclusions in the same way that premises in, say, mathematics.

Conditional syllogisms represent a special case of this general rule. In the case of conditional syllogisms such as MP and MT, the variability in the strength of the premises' entailment of the conclusion is entirely determined by the strength of the implication relation between the antecedent and the consequent. The stronger the connection between antecedent and consequent, the more circumscribed the locus of opposition to assent to the conclusion given truth of the premises. In a demonstrative syllogism, there is no locus of opposition to the connection between the antecedent and consequent since the connection is sempiternal, and as a consequence, there is strong assent to the conclusion given the premises. In rhetorical arguments, the locus of opposition to the connection between the antecedent and consequent is greater due to the weakness of the *per accidens* type of implication. And, as a consequence, the strength of assent to the conclusion given the truth of the antecedent is greatly diminished as well. Our degree of assent to a conclusion 'so it is not a triangle' is very strong given that we give our assent to 'if this figure is a triangle, then it has only three sides' and 'but it does not have only three sides'. But this is not chiefly due to the strength of our assent to the minor premise. Rather, we are willing to give a high rank of assent to the conclusion because we recognize that it is quite impossible for the consequent of the *conditional* to be false and the antecedent of the *conditional* to be true. On the other hand, if we are arguing about weather patterns, then we are strongly inclined to give our assent to the conclusion 'so it is not December in Montreal' given that we give our assent to the conditional major premise 'if it is December in Montreal, then it is cold' and the minor premise 'but it is not cold'. The locus of opposition to the conclusion, *viz.* the knowledge that the conclusion may, in fact be false, is magnified in this argument by our knowledge that there are instances when Montreal is warm in December, though rarely. Yet, in spite of this locus of opposition, the conclusion elicits our assent. A context theory-based concept of validity must take into account the fact that, unconsciously or consciously, two interlocutors will adopt different validity criteria based on the pragmatic conditions under which their argument takes place.

With these considerations in mind, call a syllogistic argument in a context in which the interlocutors agree, explicitly or implicitly, to

require that the conclusion follows necessarily from the premises, an argument in a *demonstrative context*. Call a syllogistic argument in a context in which the interlocutors agree, explicitly or implicitly, to require that the conclusion follow from the premises for the most part, an argument in a *dialectical context*. Finally, call a syllogistic argument in a context in which the interlocutors agree, explicitly or implicitly, to require that the conclusion follow from the premises *per accidens*, an argument in a *rhetorical context*. Since the aim of arguments executed in demonstrative contexts is generating a true conclusion from true premises, say that a conditional syllogism in a demonstrative context is valid when it is never the case that the conclusion is false and the premises are true; it is invalid if there is such a case. On the other hand, call a conditional syllogism in a dialectical context valid (in the sense of 'successful' or 'felicitous' discussed above) when it is hardly ever the case that the audience fails to give assent to the conclusion though it does give its assent to the premises; it is invalid (in the sense of 'infelicitous', 'fails') if it is often the case that the audience fails to give its assent to the conclusion but does give its assent to the premises. For similar reasons, call a conditional syllogism in a rhetorical context valid when there is at least one instance in which the audience gives its assent to the conclusion and the premises together; it is invalid in the case that there is never an instance in which it gives its assent to both together.[91]

The crucial test for this view of syllogistic validity for conditional syllogisms is whether it can make meaningful distinctions between valid inference schema such as MT and MP and fallacious ones such as DA and AC. Maintaining this distinction becomes particularly important in the case of arguments with for-the-most-part and *per accidens* conditional major premises, since in Text 14 Alfarabi is so emphatic in holding that, for example, MT is, as he says, 'genuinely productive (*fī al-ḥaqīqa*)', whereas DA is only ostensibly productive (*fī al-ẓāhir*).

In order for a conditional syllogism with for-the-most-part conditionals to be valid in a dialectic context, it must be hardly ever the case that the conclusion is false while the premises are true. Take the usual example of a true for-the-most-part conditional as the major premise 'if it is December in Montreal, then it is cold out' and let the minor premise be 'but, it is not cold out'. This premise

[91] This does not entail, however, that the argument with the same premise set and the contradiction of the conclusion would be valid in a demonstrative context, since there is clearly a difference between refusing to give assent to *P* on the one hand, and affirming not-*P* on the other. For a similar distinction between assertion and rejection, see T. Smiley, 'Rejection', *Analysis*, 56/1 (1996): 1–9.

pair yields the conclusion by MT 'then it is not December in Montreal'. This inference is valid in a dialectic context because it is hardly ever the case that we will deny the conclusion, *viz.* we affirm that it is December in Montreal, while also giving assent to the premises, *viz.* we give assent to the fact that it is warm or mild out (minor premise) and that it is hardly ever the case that it is warm or mild out and December in Montreal (conditional major premise). Now consider the fallacy DA with the conditional major 'if it is December in Montreal, then it is cold out' and the minor premise 'but it is not December in Montreal'. The purported conclusion is 'then it is not cold out'. In order for this inference to be valid it would have to be hardly ever the case that we do not give assent to the conclusion in spite of our giving assent to the premises. Assent to the conditional premise is assent to the fact that it rarely happens that it is warm out and it is December, as well as assent to the fact that there are, nevertheless, instances in which it is warm out and it is December in Montreal. What sort of assent can the assertion of the minor premise 'but it is not December in Montreal' in combination with the conditional major elicit? In fact, the minor premise is irrelevant to the information provided by the conditional: the conditional tells us only about the connection between the weather in Montreal in December, and nothing about the weather in any other time of the year. Thus, it may very often happen that the conclusion 'then it is not cold out' is false while the premises are true. DA is invalid. Consider AC, the other common fallacy, with the same conditional major 'if it is December in Montreal, then it is cold out' and the minor premise 'but it is cold out'. The purported conclusion is 'then it is December in Montreal'. Once again, in order to be valid, it must be hardly ever the case that we deny the conclusion, *viz.* we deny that it is December in Montreal, but we nevertheless give assent to the pair of premises, *viz.* we give assent to the fact that it is, in fact, cold out, and that it sometimes happens, though rarely, that it is warm or mild and it is December in Montreal. What sort of assent does the minor premise in combination with the conditional major elcit vis-à-vis the conclusion 'it is December in Montreal'? The conditional tells us that it is cold given that it is December in Montreal. In other words, it points out only a single condition, from all of the countless conditions, under which the statement 'it is cold out' is true. Thus, even if the conclusion 'then it is December in Montreal' is not ruled out by the combination of premises, more often than not the conclusion will be false due to the large number of other conditions under which 'it is cold out' is true. AC is invalid.

6. CONCLUSION

Of contemporary accounts of conditionals, our conjectures about Alfarabi's truth conditions and validity for conditional syllogisms suggests some similarities with Ernest Adams' account of the semantics of conditional sentences.[92] With respect to truth conditions, both Alfarabi and Adams' account of indicative (natural-language conditionals) are non-truth functional. For example, according to Adams' account of indicative conditionals, indicative conditionals with false antecedents are simply indeterminate rather than being true or false.[93] This indeterminacy is a technical result of Adams' use of probability theory to give an interpretation of indicative conditionals,[94] but the interpretation is lent greater plausibility by the fact that we do not normally use indicative conditionals in the cases in which we already believe that the antecedent is false prior to uttering the sentence. In Alfarabi's case, his use of conditionals originates from a dialectical context in which the antecedent is a hypothesis (*waḍʿ*) that the respondent and questioner give their assent to prior to carrying out a deduction in the format of a conditional syllogism. Since the antecedent is a hypothesis the truth or falsity of which the questioner and respondent have set out to determine, it makes no sense for questioner or respondent to *hypothesize* a proposition they already know to be false. Another important similarity between Adams' account of conditionals and some of Alfarabi's intuitions is the idea of indexing the strength of the following of the conclusion from the premises with the strength of the implication between the antecedent and consequent. For Adams, this means that the probability of the conclusion can be no greater than the sum of the probabilities of each of the individual premises. For Alfarabi, this simply means that if the implicative relationship between the antecedent and consequent is necessary, the premises entailing the conclusion will be necessary. On the other hand, if the implicative relation between the antecedent and consequent is only for the most part, then the conclusion will follow from the premise-pair for the most part. But perhaps most important of all, in both Adams' account and the account of Alfarabi's use of conditionals there is a basic intuition that a theory of conditionals for natural language contexts must recognize that conditionals are used often, even perhaps primarily, in circumstances in which the degree

[92] E. Adams, *The Logic of Conditionals: An Application of Probability to Deductive Logic* (Dordrecht/Boston, 1975).

[93] Evans and Over, *If*, p. 25.

[94] According to Adams, the probability of our belief in the indicative conditional $P(A \rightarrow B) = P(A\&B)/P(A)$. Obviously, if we believe that A is false, then we believe that A has 0% chance of coming about. $P(A)$ thus equals 0, and the probability of '$A \rightarrow B$' is indeterminate (since a fraction with a denominator of numerical value 0 is undefined).

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to which we believe the consequent to be true given the truth of the antecedent admits of gradations, and that truth-conditions and notions of inferential validity must be devised in order to compensate for this fact. This intuition led Adams to speak of conditionals in terms of gradations in the probability that our subjective belief that the state of affairs represented in the consequent will come about given our belief that the state of affairs represented in the antecedent comes about. It led Alfarabi to speak about conditionals in terms of gradations of assent to a conditional.

Nevertheless, though they share some basic intuitions, Adams' account of conditionals and Alfarabi's ideas about conditionals presented here are very different. Adams' account of conditionals is motivated by the way conditionals are used in decision making. Thus, in his writings, the pragmatic conditions under which his theory develops are sensitive to these uses of conditionals only. As we saw, Alfarabi does not share Adams' interest in using conditionals for decision-making at all. Alfarabi does say that, in general, dialectical arguments normally have premises from ethics, and to that extent Alfarabi might use conditionals in an argument about what is good or just, and, thus, what ought to be done. However, the conditions that motivate his use of conditionals are the conditions that obtain in dialectical, rhetorical, and demonstrative argumentation. Whereas the pragmatics of decision-making stand at the center of Adams' account of conditionals, making decisions about what is good do not motivate Alfarabi's use of conditionals as such. Finally, because Adams' account of conditionals focuses on their use for decision-making, conditionals come to be interpreted as means to speaking about the probability that our beliefs are true or false and then acting according to what is most probable. For Alfarabi, conditionals are a means to engaging in a syllogistically formatted argument the aim of which is to elicit in the listener or the audience at large some sort of conviction (*iḏʿān*) about the conclusion. The argumentative nature of Alfarabi's use of conditionals is essential to understanding them properly. For Adams, conditionals appear to be primarily geared to the individual's decision making process rather than eliciting any sort of assent in a listener. Thus, Adams would use a conditional inference only if the conclusion is probable, whereas what determines Alfarabi's use of conditionals is whether or not the speaker has confidence the conditional inference will have the desired effect on his audience. Its objective or quantitative probability is of secondary importance.

Given that Alfarabi's use of conditionals arises in his epitomes of the *Topics*, the *Rhetoric* and the *Categories*, it seems that the dialectical scenario described in Sections 2 and 3 would be familiar to Aristotle. Yet, it appears also that the underlying logical mechanics

of the Farabian conditional are a far cry from anything in the *Prior Analytics* or the *Topics*. Let us comparing the results of our analysis with Jonathan Lear's comments about Aristotle's brief treatment of hypothetical syllogisms in *Prior Analytics* A44. First, Aristotle:

> Further, we must not try to reduce hypothetical syllogisms; for with the given premises it is not possible to reduce them. For they have not been proved by syllogism, but all are assented to by agreement. For instance if a man should suppose that unless there is one [potentiality] of contraries, there cannot be one science and should then argue that not every [potentiality] 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. He has shown that there is not one [potentiality] of contraries, but he has not proved that there is not a science. And yet one must agree. But the agreement does not come from a syllogism but from an hypothesis. This cannot be reduced: but the argument that there is not a single potentiality can. The argument perhaps was a syllogism: but the other was an hypothesis.[95]

In this passage from *An. Pr.* A44 Aristotle presents the reader with a hypothetical scenario in which two opponents debate whether or not, for any given pair of contrary objects or states, there is a single science that has as its object both members of the contrary states.[96] The disputants agree to accept the thesis that there is not a single science for any given pair of contrary states *on condition that* it be proved that it is not the case that, for any pair of contrary states, there is a single potentiality underlying them. One disputant then proceeds to construct a *reductio ad absurdum* proof that there is at least one pair of contrary states that is not underlied by a single potentiality (or power or, maybe better, faculty [*dunamis*]).[97] If we assume that for every pair of contrary states there is a single potentiality, then this entails that, in particular, the contrary states of health and sickness return to a single potentiality. But holding this latter view forces us to conclude that we can make the following contrary predications of the same individual X at the same time, *viz.* "X is healthy" and "X is sick", where the predicate here expresses the inherence of the capacity in the subject. Our hypothetical opponents hold that this last entailment is absurd and so the contradictory of their assumption is proved

[95] *Prior Analytics* A44 50a16–28; quoted in Lear, *Aristotle and Logical Theory*, p. 40. The translation is Lear's.

[96] R. Smith, Notes to Aristotle, *Prior Analytics*, trans. R. Smith (Indianapolis, Cambridge, 1989), p. 175. Smith also notes (*ibid.*) that the context of the passage is dialectical. I am not sure that I agree with Smith's interpretation of this passage in important respects. Like earlier interpreters, Smith appears to take the agreed-upon proposition to be a conditional "if there is not a single potentiality [. . .] for a pair of contraries, then there is not a single science of them either". I have indicated in many places above why I believe Lear is right to say that this approach to Aristotle's text is wrong.

[97] Robin Smith notes (*ibid.*) that this second portion of the argument is in the form of a *reductio*.

true, *viz*. not every potentiality is of contraries (or, in other words, there is a pair of contraries (health and sickness) that do not return to a single potentiality). With this proposition proved, the disputants are bound by their earlier agreement to accept that there is not a single science for every pair of contrary states. The important observation to make at this point is that Aristotle says that the conclusion of the *reductio*, *viz*. that there is not a single potentiality for every pair of contrary states, has been definitively shown or proved. He explicitly denies that the thesis that there is not a single science for every pair of contrary states is proved, because this latter thesis only comes about from an agreement to accept it *if* it is proved that there is not a single potentiality for contraries.

Alfarabi's theory bears little resemblance to Aristotle's brief comments about hypothetical syllogisms. Aristotle holds that any attempt to formalize hypothetical reasoning into the categorical syllogistic developed in the *Prior Analytics* is bound to fail. The reason for this appears to be how he understands the prior act of agreement between the speaker and his opponent. By this I mean that Aristotle appears to see the agreement between the speaker and his opponent as a promise to give his assent to the speaker's thesis given that certain conditions obtain. In Aristotle's example,[98] this promise obligates the speaker's opponent to concede the thesis – a thesis that Aristotle believes is false – that there is not a single science for contrary objects or states of affairs on condition that the speaker can prove that there is not one potentiality for contraries. The next step in the scenario is that the speaker then proves syllogistically that there is not one potentiality of contraries. The *proof* that there is not one potentiality of contraries, not the mere supposition that there is not one potentiality of contraries, fulfills the condition, which obligates the speaker's opponent to concede the speaker's thesis that there is not a single science for every pair of contrary states or objects. Concede the opponent must, but Aristotle is explicit that this whole process does not constitute a proof of the speaker's thesis. For Aristotle, a proof must come from a syllogism, which is for Aristotle nothing but a categorical syllogism of the kind outlined in *Prior Analytics* 1–7. A conclusion from mere agreement does not constitute a proof of the speaker's thesis. In fact, according to Aristotle, the only thing that has been proven in this whole process is the statement following the initial agreement, *viz*. that there is not one potentiality of contraries.

Thus, when I claim that Alfarabi has formalized this act of agreement into the syllogistic, I mean that what was treated by Aristotle as a commissive speech act, *viz*. a promise between a speaker and

[98] In a previous version I misunderstood Aristotle's argument. I am grateful to Stephen Menn for bringing this error to my attention.

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opponent, Alfarabi gives a formal logic counterpart as the antecedent and consequent in a conditional proposition. The conditional *promise* in Aristotle becomes a conditional *proposition* with the conjectural truth-conditions given above. As a commisive there is no sense in which the prior act of agreement between speaker and opponent in Aristotle's example above can be said to be true, since amenability to truth and falsity is the province of assertives;[99] a promise might be described as felicitous or infelicitous, but never as apophantic.

Finally, unlike Aristotle, Alfarabi considers these conditional syllogisms as genuine proofs of the conclusion and not, as in Aristotle, conclusions that are a result of mere agreement. Aristotle rejects entirely the idea that the kind of hypothetical reasoning outlined in the passage above is a proof because it is not in the form of one of the canonical moods of his syllogistic. The deductive steps Aristotle describes above do not, when taken as a whole, constitute a syllogism, *i.e.* it is not 'a discourse in which, certain things having been supposed, something different from the things supposed results of necessity because these things are so'. Rather, it is a discourse in which certain things having been supposed, something different from the things supposed results *because of our prior agreement*. But this is not a proof. For Alfarabi, however, conditionals syllogisms really do qualify as syllogisms (1) because the conclusion follows from the premises due to an implicative relation between antecedent and consequent and (2) because the "things supposed" in the premises are, in Alfarabi's view, different from the things that result from them. 'Different', not in the sense of quality (*e.g.* 'Socrates is a bear' and 'Socrates is not a bear' are different in quality), nor merely because the major premise is a conditional rather than a categorical proposition like the conclusion. The antecedent of the conditional, the consequent of the conditional, or their contradictory opposites *qua* conclusion or repeated minor premise differ from the antecedent, consequent or their contradictory opposites *qua* members of the conditional because of their illocutionary force, where the former are assertives and the latter suppositions. Alfarabi explicitly recognizes the difference between the antecedent in the conditional and the repeated minor when he says that the former is simply hypothesized (*wuḍiʿa*) or supposed (*yufraḍu*), while the latter is asserted (*yustaṯnā*). With these logical distinctions in tow, Alfarabi is able to preserve the argumentative structure of Aristotelian dialectic but to bring hypothetical reasoning

[99] Black does note (*Logic and Aristotle's* Rhetoric *and* Poetics, pp. 54f) that, at times, Alfarabi does seem to entertain that there is a sense in which non-assertives, *viz.* non-apophantic discourses, might be said to be true or false. However, Alfarabi's position is clear: only apophantic statements are true and false in a genuine sense.

to level of demonstration that Aristotle reserved exclusively for his categorical syllogisms.

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