Ibn Sīnā on contradictories of absolutes (Qiyās 1.5)

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The text translated below is section 1.5 from the book 'Syllogism' (*Qiyās*) of Ibn Sīnā's encyclopedic *Šifā'*. Note straight away that the translation has not been checked by any native Arabic speaker. The section is in any case a difficult one, and any translation involves making decisions about where Ibn Sīnā stands on some subtle issues of logic. So the translation should be regarded as extremely provisional. The section numbers are my own; in several cases they are at odds with the paragraph divisions in the Cairo text.

The comments before the translation are purely a holding operation so that I can get a version of the translation onto the web before the Väänänen Festschrift. I know a lot of things are either wrong or incomplete.

1 Construction of propositions

Ibn Sīnā has a sort of theory of how propositions are built up. The starting point is a set of ideas, which in paradigm cases are the meanings of common nouns, such as [HORSE] for the noun 'horse'. Sentences are formed by attaching two ideas to each other and adding various other attachments. For example we can attach [EVERY] to [HORSE], and then attach the pair and [SLEEPS] together to a copula idea [IS], which in this case is suppressed in the spoken or written form of the sentence. Attaching [NOT] to [IS] gives a proposition that might be vocalised as 'Every horse fails to sleep'. Attaching [NOT] to [EVERY] gives 'Not every horse sleeps'. And so on.

Being bilingual in the VSO language Arabic and the SOV language Persian, Ibn Sīnā acutely aware that different languages can put the different components of a proposition into different orders. This may be one reason why his description of the construction of propositions almost never refers to the order of components. The point is very important, because it prevents him from saying for example that the scope of the word 'Not' takes in everything that follows 'Not' in the sentence — a statement that we find for example in Burley, who was perfectly happy to assume that Latin sentence order is the only correct one.

Hence when, as in several of the example sentences that he introduced in *Qiyās* 1.3 and 1.4, he has two quantifiers in a sentence, one of them universal and the other existential, he can't describe the relations between their scopes in terms of the syntax of the sentence. In fact he has no notion of syntactic scope at all. What he has instead is a notion that the interpretation of the existential quantifier may have to be a function that takes as arguments the individuals that the universal quantifier ranges over. Thanks to Skolem, Henkin and others, we understand this kind of situation reasonably well. We know for example that a universal quantifier and a function quantifier can be read 'simultaneously': the semantic scope relations between them can be controlled by the properties of the function. Paradoxically to my mind, Ibn Sīnā's notion of scope is a good deal closer to Hintikka's than to Frege's. Ibn Sīnā sees that there is a problem about what happens to function quantifiers when we negate; he doesn't come anywhere near solving it.

Another consequence of Ibn Sīnā's picture of the construction of propositions is that the effect of negating is not straightforward to describe. Since the proposition doesn't have a linear construction, the standard De-Morgan-type rules for moving the negation inwards don't apply. This certainly has some effect on Ibn Sīnā's intuitions. For example if a proposition ϕ is necessary, we think automatically that negating it will give a proposition that behaves as if it had a possibility quantifier. Not so to Ibn Sīnā: it contains necessity so it lives with the necessary propositions.

There is another item in this section that I don't fully understand, but I think it has to be seen in these terms too. This is the slogan 'Absolute propositions have absolute negations', which appears for example at 40.17?? and 44.1??, also figures in the parallel passages in *Najāt* and *Išārāt*. So we need to understand it. I think it means that the contradictory negation of an absolute proposition has to have a predicate of the same form as the original proposition; that seems to be what is going on in the examples. But obviously this depends on how far down we push the negation — if the

negation is simply tacked on the front of the sentence, it doesn't touch the predicate. It may be part of Ibn Sīnā's point that in some cases we do need to move the negation inwards.

The remarks in the last two paragraphs above seem to apply also to at least part of the earlier commentator tradition.

2 The meaning of a sentence

We consider the sentence

(1) Every human breathes.

The meaning breaks down into three parts corresponding to the words:

(2) [EVERY] [HUMAN] [BREATHE]

The meaning [BREATHE] is the disjunction of two meanings, [BREATHE-IN] and [BREATHE-OUT; it will be convenient to concentrate on just one of these two disjuncts. The meaning [BREATHE-OUT] assembles a class of events, namely where there is an organism with lungs, and air passes out of the lungs and then out of the organism. Each such event has an agent (the organism) and takes place over an interval of time. In symbols, a statement that an event of this kind occurs can be written

(3) BreatheOut(x,t)

meaning that the organism x breathes out over the time-interval t.

Now /IS/ asks: When we say

(4) Every human breathes out.

what are we saying in terms of BreatheOut? Some suggestions are clearly wrong:

(5) For every human x and every interval of time t, BreatheOut(x,t).

Ibn Sīnā rejects this, and also the more conservative suggestion

(6) For every human x and every interval of time t during the lifetime of x, BreatheOut(x,t).

Instead he opts for

(7) For every human x there is an interval of time t during the lifetime of x, such that BreatheOut(x,t).

One can easily pick holes in this reading, but at least it is true if (3) is true, and maybe it's the best we can do with purely logical notions besides [EVERY], [HUMAN] and [BREATHE-OUT].

Now Ibn Sīnā observes: If (7) is true, then there is a function F assigning to each human x an interval of time $F(x)$ over which x breathes out. If we fix (*faraḍnā*) this function F, then (7) expresses the same as

(8) For every human x, BreatheOut(x,$F(x)$).

Here we hit our first problem. The negation of (8) clearly doesn't express the same as the negation of (7).

3 Sentences of the form 'Every B is an A'

At line paragraph [5.2.7], line 41.5, Ibn Sīnā introduces what he calls 'the three-way division'. The three ways turn out to be ways of reading the sentence 'Every B is an A'. The readings are as follows:

(9) Every B is an A permanently.

(10) Every B is an A for as long as it is a B.

(11) Every B is an A for as long as it is an A.

A good deal of the first half of the section being translated is devoted to arguing that it's unreasonable to restrict interpretations of 'Every B is an A' to these three forms. So the three-way division is not Ibn Sīnā's own.

At line 44.1 (paragraph [5.1.11] he refers to two of the three ways as 'the two standard (or received, *mašhūr*) aspects'; probably he doesn't mean to imply that the remaining one is not standard, since just a few lines earlier (43.14f) he has excluded the third of the three as irrelevant to his present discussion. At 41.10ff (paragraph [1.5.8]) he traces the second and third aspects back to Aristotle himself, in the sense that Aristotle 'unhelpfully' takes it for granted that the sentence should be read in the second or third way. But he doesn't say that Aristotle explicitly lays out the three-way division, and in fact no such division appears in Aristotle's text. Some remarks at 45.9ff (at the end of [1.5.12]) associate the three-way division with a lack of respect for the plain meanings of words, and with a tendency to concentrate on banal aspects of classification. So my guess is that Ibn Sīnā attributes the three-way division to the hard-line aristotelians of Baghdad.

Ibn Sīnā attacks the three-way division at three points. First, the interpretation (11) is useless and should be discarded. Second, there is a more basic interpretation of 'Every B is an A' which is missing from the list. And third, the reading (10) is not stated at the right level of generality. We take these three points in turn.

3.1 The useless reading

Ibn Sīnā attacks the reading (11) in paragraphs [1.5.2], [1.5.5], [1.5.11] and especially at [1.5.3] and [1.5.9]. His objection in [1.5.3] is that the truth of the statement could never even be doubted. The implication is that there could hardly be any point in proving (11), because the main purpose of proof is to convince ourselves of the truth of things that we previously didn't know. Ibn Sīnā overlooks the possible use of the negation of (11) in proofs by reductio ad absurdum. Strictly he overlooks two other things. First, (11) is false if there are no Bs. And second, it's at least arguable that (11) is false if there are Bs but none of them is ever an A; see the note on 38.13.

In [1.5.9] he adds that the predicate 'is an A for as long as it is an A' doesn't distinguish what it is applied to from anything else at all (42.6). He makes the further point that (11) might make sense as an example of a necessary truth (42.2).

The reading (11) may trace back to a remark of Aristotle at 19a23 in *Peri Hermeneias*:

(12) What is, necessarily is, when it is. BARNES REF

Commenting on this passage, Ammonius (REF to commentary 153.13ff) says

(13) 'Allways' either — as in connexion with eternal facts — refers to infinite time, e.g. when we say that of necessity the sun moves or the angles of a triangle are equal to two right angles; or means 'as long as the subject exists', e.g. when we say that of necessity this fire is hot or Socrates is an animal. The other kind is not like this. It is true only if additionally qualified by 'as long as it exists', that is, as long as is the case what is predicated by someone saying 'it is so', but never without this qualification, no matter whether the subject is eternal or perishable. ZIMMERMANN trans, REF his page 256.

The two kinds of necessary proposition here correspond to (9) and (11).

3.2 Absolute propositions

At 43.17 in paragraph [1.5.11], Ibn Sīnā remarks that a 'follower of the First Teaching' cited two examples of sentences of the form 'Every B is an A' which are most naturally interpreted in a way that doesn't appear in the three-way division. The examples are 'Every horse sleeps' and 'Every horse watches'. (Here and below, the Arabic word for 'watches' is parallel to the word for 'sleeps' in that it expresses the activity of being awake. We have no such word in modern English, but the old word 'watches' fits exactly.)

The parallel passage in *Najāt* (34.1 to 36.4) gives some historical information here. Ibn Sīnā says that Aristotle himself gave the examples 'Every horse sleeps' and 'No horse sleeps' as examples of sentences that can be simultaneously true. No such examples appear in Aristotle, so the information we get from Ibn Sīnā's text here has to be treated with suspicion. Since the paragraph describes views attributed to Theophrastus and Themistius, a reasonable guess (REF) is that Ibn Sīnā is quoting or paraphrasing some information given by Themistius about the views of Theophrastus. Besides the uncertainty about whether the examples come from Aristotle or from Theophrastus, there has to be some uncertainty also about the interpretation. It's undeniable that the sentences 'Every horse sleeps' and 'No horse is sleeping' can be simultaneously true, and these are possible interpretations of what one presumes were the original Greek sentences. Ibn Sīnā goes on to say that on Theophrastus' view an absolute sentence (presumably an affirmative one) should be read as true if its predicate is true of its subject at least sometimes. This is contrasted with the view of Alexander of Aphrodisias, who held that an absolute sentence expresses that its predicate is true of its subject at least sometimes, but not always. (There is a quantifier ambiguity here.)

Since Ibn Sīnā never attributes the pair 'Every horse sleeps' and 'No horse sleeps' to Aristotle in the *Šifā'*, perhaps the attribution comes from an earlier logical work of Ibn Sīnā, and when he wrote the *Šifā'* he no longer believed that his sources supported this attribution. This seems more likely than a change of opinion in the other direction. It tends to support Gutas' view that *Najāt* represents earlier views than those in *Šifā'*.

Be that as it may, the *Najāt* passage makes it likely that the 'follower of the First Teaching' mentioned at 43.17 was Theophrastus. In that case Theophrastus may also be the 'they' who is cited at 41.3?? for giving the examples 'Every horse watches' and 'Every animal moves voluntarily'. So it seems to be Ibn Sīnā's view that people as far back as Theophrastus already rejected the three-way division. But he writes as if he thinks the battle

against the three-way division still needs to be fought.

3.3 Avicennisations

At 43.16 Ibn Sīnā reminds his readers that they already know that 'Every B is an A' has 'many' interpretations that are absolute (i.e. non-modal). He presumably has in mind the kinds of example that he gave in sections 1.3 and 1.4. If I understand him right, he has the same point in mind in paragraph [1.5.8], 41.10ff. Here he attacks the formulation (10) for not being general enough. He proposes a more general form: we understand 'Every B is an A so long as C holds', where C is some affirmative condition, presumably to be understood from the context.

To see the importance of this move, we need a diversion into Ibn Sīnā's philosophy of science. Suppose every B is an A sometimes but not always. Then being a B is not itself a cause of being an A; so by describing the situation with the sentence 'Every B is an A' we admit our ignorance. If we knew what caused a B to be an A, we could take C for the circumstance that the cause is in place, and then we could assert 'Every B is an A when it's a C'. For example the moon is sometimes eclipsed. But a more scientific statement is that the moon is eclipsed whenever the earth comes between it and the sun. What we have done is to remove an implied existential quantifier over times and replace it by a universal quantifier over times together with a new condition. Since the operation removes an existential quantifier, it looks a little like skolemisation. I call it avicennisation.

4 Paragraph [1.5.12]

In this paragraph Ibn Sīnā raises some fundamental questions of semantics. Although he comes nowhere near answering them, he puts out some penetrating feeders. He starts by observing that the truth conditions for sentences like (54) haven't yet been stated, although the sentences themselves were introduced some way back (in section 1.3). Since (54) is universally quantified, the Ammonius formula applies and tells us that (54) is true if and only if it is true of every horse h that h watches. But, says Ibn Sīnā, there is another quantifier hidden in 'h watches'; the meaning is 'h is watching at some time'. The Ammonius formula tells us nothing about this temporal quantifier. Now Ibn Sīnā immediately brings up the possibility of combining the two quantifiers into one. This is a sensible suggestion, because in some two-dimensional sentences one can combine subjects and

times into ordered pairs and quantify over these together; Ibn Sīnā uses this device (which goes back to Alexander of Aphrodisias) in many places. But Ibn Sīnā doesn't pursue it, and one can see why: in (54) the subject quantifier is universal and the temporal quantifier is existential, so they won't combine into a single quantifier of either type. But any step forward from the place Ibn Sīnā has reached would have been a major breakthrough.

In the light of the semantic theories of the last hundred years, we can point to three directions that Ibn Sīnā might have taken. He took none of them, but we can say a little about how they engage with things that he did pursue.

First there is the option of identifying a new two-dimensional quantifier $\forall x \exists t$. It could be given a game-theoretic semantics à la Hintikka. One appealing feature of this approach is that it would save Ibn Sīnā from having to make any analysis of the rest of the sentence. We know that he was sensitive to limitations on the processing power of the human mind, and that he thought there was a narrow limit to the amount of decomposition that the mind can carry out during reasoning.

A second option is to do the same, but with $\exists t$ replaced by an initial Skolem function quantifier f: $\exists f \forall x$. This would relate more closely to Ibn Sīnā's concerns in the first few pages of this section. One strong advantage is that it would allow him to ignore questions of scope; and in fact similar ideas have been followed by modern logicians and linguists precisely in order to handle cases where the semantic scope is out of line with the syntactic construction. (Hintikka, Reinhart etc.) Of course it would have stretched his technical equipment to the limit.

A third option is to follow the Tarski route and describe the semantics of the sentence recursively, starting from the atomic parts and working upwards. Some of the necessary machinery was already known to Walter Burley. But Ibn Sīnā might have been discouraged from this route, not only by his worries about processing power, but also by his doctrine of *taḥrīf*, according to which the context of a phrase can alter its meaning.

5 Translation of *Qiyās* 1.5

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I.5 Conflict between premises that carry modes

[1.5.1] We need to indicate which propositions are contradictory to which, 38.5

among the quantified propositions that we have mentioned.

[1.5.2] It would be appropriate for us to speak warily: some of the things 38.5
said in the third book (*ᶜIbāra*) were inadequate. Namely, when we say

(14) Every B is an A.

and we want to take into account the time in the sentence

(15) Not every B is an A.

since this is one of [the things that have to satisfy] a condition in order to have a contradiction, this makes difficulties for us. For example when we say:

(16) Every human breathes (i.e. in the time in which it happens that he breathes).

and we say:

(17) Not every human breathes (i.e. in the time in which it happens that he breathes).

so that the time is the same one, then (17) is genuinely contradictory to (16). Except for the fact that this is not how we do [in practice] take [the time] 38.10
into account when we are using contradictions. Nobody ever demonstrates contradictions this way. [The claim] that someone is breathing at a time leaves no room for questioning whether he is breathing at that time. As we will explain at length, going down this route is no way to demonstrate the logical behaviour of negative absolute premises.

[1.5.3] In fact (16) is something that doesn't admit any doubt. But if 38.13
what makes [(14)] true is a different time for each [B], let us take it as a time in itself, not as a time /39/ set by the breathing [[which excuses that, so that it wasn't possible for it to arise]]. The difference between taking the time as a time in itself, and taking it as a time set by the predicate, is that in the sentences

(18) The moon is eclipsed in the middle of the night etc.

and

(19) The moon is not eclipsed in the middle of the night etc.

the former is something that one could doubt, and it needs a proof; the contradiction is obtained nevertheless. But when it is said: 39.5

(20) The moon is eclipsed at the time of its eclipse.

and

(21) [The moon] is not eclipsed at the time of its eclipse.

then even if these two phrases are like the first two in that they are contradictories, there is definitely a difference in that one assumes the affirmative of the two without having any doubts about it.

[1.5.4] We should note that when there is a single [subject individual], the time of the predication can be made specific. But in the case of a universally quantified proposition where it's a matter of 'each individual', how could one specify [the time], so that when the negative proposition is read this way, it [still] is the negative corresponding to [the affirmative proposition]? If we neglect to get the times under control [in the two propositions], it's possible for a pair of universally quantified contrary propositions to be both true, as in the sentences 39.8 39.10

(22) Every human moves.

and

(23) Every human stands still.

The First Teaching made the same point using the fact that the sentence

(24) Every horse watches.

can be true together with the sentence

(25) Every horse sleeps.

I.e. the former is at one time and the other is at another time. It's the same point that we make when we say: Contraries aren't true together, when the conditions that make them contradictory are kept [the same from one to the other], and the times in them are the same. But [the question of the times at which the sentences are true] can be a matter of the facts themselves. 39.15

[1.5.5] We land ourselves in the following difficulties when we intro- 39.15

duce this point. /40/ Suppose we say

(26) Every B is an A.

and the times are different because each individual has a different time. Then if we say

(27) Not every B is an A.

it's not possible for us to make this sentence point to the time which is specific to each individual. In fact not every B [need be] an A at the one time. Of course if we said:

(28) It's not the case that some B is an A (i.e. at time t where t is the time at which the individual fits the description A).

then it might be possible [to take] this 'some' as a single individual with a specific time. But then (28) would be true only if the time for that individual was mentioned in it explicitly. If the meaning of (28) was [AT SOME TIME], and the time was not specific, how could the sentence 40.5

(29) It's not the case that some B is an A.

signify that [the B is not an A] at that time which has not been specified? Also, if I intend [by (29)] that 'At some time it is not an A', it's possible for both sentences [(29) and 'At some time it is an A'] to be true. And if I mean 40.10 that it is not an A at a time specified as being that in which it is an A, [its] negation will be self-evidently true in every situation, and contradicting it is useless. But that's not how it goes if we assume that we are using not the unadorned interpretation of

(30) It's not the case that some B is an A.

but rather we are maybe using the interpretation of (30) as meaning "It's not the case that every". The explanation above wouldn't apply if we said "It's not the case that every". You will see some proofs of this in the appropriate point, and they will make the point clearer.

[1.5.6] Also it's not possible for us to say: The contradictory negation of 40.15

(31) Every B is an A.

is the sentence

(32) It's not the case that every B is an A.

in the meaning that it is not the case that each B is an A so long as fits the description B. [If we could say this, then] this kind of absolute proposition would have a contradictory negation which is absolute. The reason [we can't say it] is that (31) and (32) could both be true together, because it is possible, when the sentence

(33) Every B is an A (i.e. at some time while it is a B).

/41/ is true, that

(34) It's not the case that every B is an A (i.e. for as long as it continues to fit the description B).

is also true. There is nothing to prevent the two interpretations of the expression [being true] together. This is why they give as examples of absolute propositions:

(35) Every horse watches.

and

(36) Every animal moves voluntarily (i.e. in actuality).

(so as not to be necessary). These things are not [true of the subject individual] throughout the time during which it fits the subject description.

[1.5.7] If [the proposition] is restricted to the three-way division, the contradiction is easy [to find]. (1) When the sentence is 41.5

(37) Every B is A (meaning simply that every B is an A permanently).

then it has [the contradictory]

(38) Not every B is an A.

I mean permanently. (2) When the sentence is

(39) Every B is an A (meaning simply that every B is an A so long as B fits the description B).

then it has the contradictory

(40) Not every B is an A (i.e. so long as it continues to fit the description B).

(3) When the sentence is

(41) Every B is an A (i.e. while it continues to fit the description A).

then it has the contradictory

(42) Not every B is an A (i.e. so long as it continues to fit the description A).

[1.5.8] But the absolute proposition itself doesn't have to have either of 41.10
these latter two meanings (39), (41) specifically, and it's unhelpful that the definitions given in the First Teaching always interpret the content in [one of these two ways]. One ought to look for an account of all this that covers the broad range. Perhaps it is that [the subject] is said to be an A so long as some affirmative condition holds. It so happens that we have here a case of the error that we mentioned earlier; in fact what the condition expresses is about something like time. [The result is that] even when we have the contradictory negation, we can't operate with it intuitively. 41.15

[1.5.9] In any case, the third interpretation [just mentioned] is repeti- 41.15
tious nonsense and drivel. I mean the one which says

(43) Every B is an A, for so long as it continues to fit the description A.

The same goes for its contradictory, namely /42/

(44) Not every B is an A in the time in which it is an A.

This negation is never true. And this interpretation is useless as a form of absolute proposition — though [it might have some use] if it was explained as expressing a necessity, and then the proposition was turned round about, as if one said:

(45) Everything that fits the description B, it necessarily and permanently, and for as long as its essence is satisfied, satisfies the description A for as long as it continues to be an A.

Then A would be not the predicate but a part of the predicate; the predi- 42.5
cate would be that it is an A for as long as it continues to be an A. But this predicate doesn't distinguish its subject from anything else at all; it's necessarily true of its subject. Similarly with the second aspect of the proposition, when you interpret it this way [in which] the proposition is turned around

to [express] the necessity of something either affirmative or negative. But an absolute proposition has to be in terms of either a thing being simply true, or its being true but not permanently. And as for the fact that it is with whatever condition is needed: this is a thing that attaches necessity to the absolute, so that the [original] predicate changes from being a predicate to being a part of a predicate. This being so, the absolute has to be 42.10
[the one where] either the truth in itself is considered without reference to permanent or impermanent, or the the truth is considered with reference only to its not being permanent, so as to fit into the [earlier] classification. So [the proposition] won't have attached to it any condition such that when [the condition] is satisfied, [the predicate] has to hold — these are the conditions which specify when [the predicate] holds, and that it has to hold [at that time]. You already know that saying

(46) This is true but not permanently.

is not the same as saying 42.15

(47) It is true and it has to be true given that such-and-such is the case.

even if the two convey closely related [information] about a time. When these affirmative satisfaction conditions are not included in the affirmative proposition, they can't be included in its contradictory negation [either]. /43/

[1.5.10] Of course there is such a thing as being tantamount to necessity 43.1
without being necessity itself, like the second of the three sorts, as in the sentence

(48) Every B is an A (i.e. every B is an A whenever it is a B..

In this case we say [as the contradictory]

(49) Not every B is an A (where there can be a B that is not an A).

In such cases the contradiction stands out; the condition is thought as one and the same [as in the proposition being contradicted], even if it wasn't explicitly stated.

[1.5.11] Suppose the sentence 43.4

(50) Every B is an A.

taken as absolute, must be either (1) a broad-[absolute proposition] where [the content holds] necessarily and permanently, namely 'necessarily so long as the thing continues to fit the description B and not something else', or (2) an absolute proposition carrying a condition 'only so long as the thing continues to satisfy the description B, but not so long as the essence continues to be satisfied'. [In the second case] the sentence will say 43.5

(51) Every B is an A not permanently while its essence continues to be satisfied, but through the time while it is a B.

So the sentence refers to its not being the case that [the predicate] holds for so long as the essence continues to be satisfied, and [the sentence] is not in terms of [the predicate holding] necessarily whenever a certain condition is actually satisfied. Even if there is no condition making it become necessary, unless something like the condition ['so long as it fits the description B'], still you know that there is a distinction between an interpretation under which [the predicate] is not permanent, and [an interpretation under which the predicate] is entailed when a condition is met, and that the two things differ in what they refer to and how the sentence is read. But leaving aside these conditions, the sentence 43.10

(52) Not every B is an A (i.e. there can be a thing which is a B but not an A).

will be the contradictory [of (50) in the first interpretation]. But this is just on the assumption that when we remove the third and useless [interpretation], there remain only the two kinds [above], so that the absolute would consist either of both kinds or of just the second. But things aren't like that. In fact, as you know, there are many kinds [of absolute proposition]. Thus one follower of the First Teaching gave, as examples of absolute [propositions], the sentences 43.15 43.17

(53) Every horse sleeps. Every horse watches.

/44/ It's a waste of time to refer these two propositions to either of the two standard aspects [of absolute proposition].

[1.5.12] Now we need to adopt a convention. We say: an absolute [proposition] is supposed to have a contradictory negation which is in use and is also absolute, and the absolute can only be one of these two subdivisions which were mentioned just now. So let us reckon that for any universally quantified affirmative proposition which can ascribe to its subjects a description that they are said to satisfy at some time, if the predicate 44.1

is something that doesn't hold then the proposition is false. Thus the sentence

(54) Every horse watches.

can be false because we see a horse sleeping, so that there is some horse that is not watching. But we still have to say what makes the sentence

(55) Some horse doesn't watch.

true. This sentence denies [WATCHING] of [SOME HORSE], not [SO LONG AS IT CONTINUES TO BE A HORSE], but [AT SOME TIME]. But the condition for the affirmative proposition [(54)] to be true makes it assert [WATCHING] for [EVERY HORSE] for [SO LONG AS IT IS A HORSE], not [AT SOME TIME AT WHICH IT IS A HORSE]. If one said: "What makes it true is its holding of all [horses]", then this doesn't answer the question what makes the sentence true about the individual cases. This is because the phrase 'every horse' embraces the class of horses and quantifies over it, but [it doesn't quantify over] both the class of horses and the classes of times together, because it is a quantifier on the subjects of the universal [HORSE], not a quantifier on the two things together, i.e. the individual horses and the individual times. If we repeat in the negative proposition (55) the condition that we put in the affirmative (54), then we don't mean that it is not awake while it is asleep; rather we mean that it fails to fit the description 'awake' though we don't know of a time when the description has to fail. [As opposed to our convention], the sense is very much in accord /45/ with actual discourse. This [reading of the predicate as holding at some time] is better [than the convention], in that it's what we understand from the wording of the sentence. This is because [the proposition] that it watches is more general than [the proposition that] it watches at a specific time, or [the proposition] that it watches, though [at] whatever time it happens to be rather than a specific time, or [the proposition that it watches] permanently. Everything that watches permanently watches, but not everything that watches watches permanently. Everything that watches at some time but not permanently watches, but not everything that watches watches at some time but not permanently. Also an utterance 'It watches' doesn't mean that it watches at the time of utterance; nor does it mean that [it is watching] at some specific time. [Compare the fact] that not every human is an animal now. So if we use 'absolute' in this way, we use it in line with what the bare facts require. But if we use it in the way that gives an absolute contradictory for any absolute [proposition], we are using it according to an artificial stipulation, as we explained. The effect [of

the convention] is that when we say a sentence ϕ we don't at all mean by ϕ what ϕ ought to mean. Instead of that, when we say ϕ, we say it and it means something that the artificial convention says it should mean. And you learn that 'this is a stone' and other drudgery.

[1.5.13] So now, when we say: 45.11

(56) Every B is an A.

perhaps its contradictory is just

(57) Necessarily not every B is an A.

I mean the contradictory which we can use in the sense that we reason with expressions that do mean it, and we can't reason without it. However, when (56) is false, it doesn't follow that it is inevitably and necessarily true that

(58) Not every B is an A.

In fact (57) can be false because of the truth of the sentence 45.15

(59) For some B it's contingent (i.e. narrow-possible) that it is not an A at any time at all.

And this sentence (59) doesn't preclude the falsity of the sentence (56). So then the contradictory negation is the thing in common to both (57) and (59), namely that

(60) It's broad-possible that no B is ever an A.

/46/ in the broad-possible. But you don't know that when we say

(61) Every B is an A.

in the absolute which includes both the necessary and the not necessary, and (61) [in this reading] is true, that (60) is false, just because when (60) is false then (61) is true. Rather, we have to take it (61) is true either as a necessary proposition or as one that is absolute and not necessary. But the sentence (60) is like saying: 46.5

(62) Not necessarily some B is an A at some time.

and this is only the contradictory of the necessary [part of (61)], which prevents it from being the contradictory of anything else. Our addition of

'ever' in one of the propositions and 'at some time' makes a difference to the [stated] circumstances.

[1.5.14] Consider the case where [a proposition ϕ] is taken as absolute 46.7
in the narrower meaning. Then both the proposition 'Necessarily not ϕ' and the proposition 'Necessarily ϕ', if true, make ϕ false. The same applies to what is false if ϕ is true in the last meaning of 'possible', which is that it's possible that [the predicate] is true of the subject, and that it is not true [of the subject], and that predicate is a possible accident that is not actually 46.10
true [of the subject]. Similarly when you say:

(63) Every B is an A (i.e. at a time and occasion, but not permanently).

then it is false in each of the following cases:

(64) Necessarily and permanently, no B is an A.

(65) Necessarily every B is always an A.

(66) Some B happens never to be an A.

For (63) to be false, no specific one [of (64)–(66)] has to be true. But you won't be able to find a single negative proposition which holds whenever at least one of [(64)–(66)] holds, because a negative proposition never generalises an affirmative one. Also there is no affirmative proposition which 46.15
is opposite to (63), because an affirmative proposition can't be the contradictory of an affirmative proposition. But there can be a single [proposition] expressing the inclusive disjunction of two negative propositions. So perhaps you might try combining negative statements /47/ and saying

(67) Not every B is an A at a time which is specific and not permanent.

or rather

(68) Either some B is permanently an A, or some B is never an A.

[1.5.15] Now we say: Consider affirmative universally quantified propo- 47.2
sitions, [read in the] broad absolute meaning, such as the sentence

(69) Every B is an A.

This sentence excludes two possibilities. One of them is that necessarily some B is not an A, and the second is that it [just] happens that some B is never an A. An affirmative proposition [stating that its predicate holds] either permanently or at some definite time counts as broad-absolute. [Its 47.5
negation has to say that

(70) [A] is permanently false of some [B].

where A being permanently false of this individual means being false for so long as the essence of this individual is satisfied. [The predicate] doesn't have to be necessarily [false of this individual]. It could be that something that could possibly hold of an individual is said not to hold of that individual, permanently throughout the interval during which the individual exists; or it could be that the permanent necessity (whether a negation or affirmation) is that the nature of the subject universal requires that at all times something holds [of one of its instances], though it is not required that [that instance] should be a specific individual. In fact a thing that is permanently false of some individual need not be necessarily [false of that individual]. So this contradictory (70) too, which says that A is perma- 47.10
nently false of some B, is absolute since it includes both the case that [the falsehood] is necessary and the case that it is not.

[1.5.16] Next we take the narrow-absolute. Its contradictory negates this 47.11
absoluteness, in the sense that it is the negation of the narrow-absoluteness and not the negation taken absolutely. It can negate the absoluteness without having to be the negation taken absolutely, just as 'not necessarily' is not the same as 'necessarily not', and 'not possibly' is not the same as 'possibly not'. An affirmative proposition taken [narrow-]absolutely can be 47.15
false, not in what it asserts, but in [asserting it as narrow-]absolute, since what it asserts is [in fact] necessary. [The proposition] could be false because the truth is the necessity of what [the proposition] denies. And it could be false because the truth is that what it says is permanently false for some [instance of the subject]. /48/ All of this is contributes to the negation of the absoluteness of the affirmative proposition, though it doesn't contribute to the negation of the absolute of the affirmative proposition. In this case its contradictory is

(71) Not every B is an A (absolutely).

or rather

(72) Some B is an A (necessarily), or else some B is not an A (permanently).

This is not a negative proposition read as absolute; rather, it negates the absoluteness.

[1.5.17] Suppose the proposition is universally quantified, negative and broad-absolute [as in 48.4

(73) No B is an A (broad-absolutely).]

Then its [contradictory] opposite is also

(74) Some B is an A (either necessarily or just permanently).

And if (73) is narrow-absolute, then it can be opposed in any one of three ways: either necessarily some [B is not an A], or necessarily some [B is an A], or some B is never an A though without this being necessary. And we won't find a single affirmative proposition composed from these three cases, just as there won't be a single negative proposition to which they contribute. 48.5

[1.5.18] We come to the existentially quantified affirmative case, as in the sentence 48.9

(75) Some B is an A.

in the broad-absolute. In this case the facts are obscure. Are 48.10

(76) [No B is an A,] necessarily.

and

(77) [No B is an A,] contingently.

both opposed to it? It's plausible that it is not correct to say that

(78) Something which is contingent for each individual could fail to be true of any of them ever.

If (78) is not correct, then a thing that is contingent will become true of some individuals and not of others. So the truth of (77) is a special case of the truth of (75), and the two don't contradict each other. It remains the case that (76) is opposed to (75). And even if (78) is correct, it is still the case that

(79) [No B is an A,] permanently.

is opposed to (75), and being permanent is not the same as being necessary. [A thing is] necessarily what it is by its nature, and this requires that if it is false of an individual then it is permanently false of that individual; while 48.15
[a thing is] permanent either by its nature or because it just happens to be. It is not for the logician as logician to know the truth about this. So let us take it that the opposite of (75) is (79), so that if the only things that are permanent are those that are necessary, then (72) will hold. Then if being permanent is different from being necessary, it would add to the contradictory the [permanent which is] contingent. The fact is that it's plausible that [something contingent] would undoubtedly /49/ not just happen to be true of all individuals at all times, just as it's unclear that it would not hold. Actually for something contingent, its [sometimes] failing to hold is more likely [than its happening always to hold]. Taking that on board, the contradictory would be (79). So: the contradictory of the sentence

(80) Some B is an A.

[read as broad-absolute] is

(81) No B is an A ever.

[1.5.19] The contradictory of the sentence 49.3

(82) Not every B is an A.

is

(83) Every B is an A permanently.

under the stipulation that 'permanent' is understood as you have understood it. So if the two [(82 and ??] were absolutes in the narrow meaning their [contradictory] opposites don't have to be a single thing. In fact the 49.5
contradictory consists of

(84) [Necessarily not every B is an A.

which is] the necessary proposition with the same quality as (82) and

(85) Every B is an A permanently.

which is] the permanent [proposition] which differs from (82) in both quality and quantity.

[1.5.20] The contradictory of the sentence

(86) Every B is an A necessarily.

is

(87) It's not the case that necessarily every B is an A.

This [contradictory is compatible with] both

(88) It is true that every B is an A permanently.

and

(89) It is possible that every B is an A permanently.

Also it follows from (87) that it is broader-possible that not every B is an A.

[1.5.21] The real contradictory of the sentence 49.9

(90) Necessarily no B is an A.

is

(91) It is not the case that necessarily no B is an A.

meaning that either 'No B is an A' is contingently true or the affirmative 49.10
proposition 'Some B is an A' is necessarily true. In fact (91) is really affirmative; it's covered by saying

(92) It is possible that some B is an A, with broad possibility.

[1.5.22] The sentence:

(93) Necessarily some B is an A.

has the contradictory

(94) It's not the case that necessarily some B is an A.

It follows from (94) that

(95) It is possible that no B is an A.

in the broad-possible.

[1.5.23] The real contradictory of the sentence

(96) Necessarily not every B is an A.

is

(97) It is not necessary that not every B is an A.

and it follows from this that 49.15

(98) It is possible that every B is an A.

in the broad-possible.

[1.5.24] Turning to contingent propositions, when we say 49.16

(99) It's contingent that every B is an A.

its contradictory is

(100) It's not contingent that every B is an A.

or rather

(101) It's either necessary or impossible that [simply every B is an A].

given how contingency works. But it doesn't follow from (101) that

(102) Necessarily not every B is an A.

as has been thought. That would be [the contradictory] if we were negating the broader-possible.

[1.5.25] The contradictory of the sentence 50.2

(103) It's possible that no B is an A.

is

(104) It's not possible that none of all the Bs is an A.

or rather,

(105) It's necessary or impossible or simply the case [that no B is an A].

given how contingency works. No single [equivalent] sentence follows that is affirmative and existentially quantified. Among the kinds [of proposition] which are true whenever the contingent universally quantified proposition (103) is false, there is no single one which embraces all of them. So [the contradictory] has been sought among pairs of existentially quantified propositions. 50.5

6 Notes on *Qiyās* 1.5

[1.5.2]

38.8 'the time in which': For any individual, there is no such time as 'the time at which it happens that he breathes'. The simplest emendation is that whatever he wrote, Ibn Sīnā intended 'a time'. Since it will be different times for the different humans, Ibn Sīnā is invoking a function f from humans to moments of times, so that f(Zayd) is a moment at which Zayd is breathing. The function is a Skolem function for the sentence 'For every human, there is a time at which he breathes'. CHECK Ibn Sīnā'S USAGE ON FUNCTIONS. The distinction below about time in itself and time set by the predicate is about the definition of the Skolem function. If the definition of the function contains the information that for each individual the predicate holds at the relevant time, then the skolemised sentence follows from the unskolemised. But otherwise the truth of the unskolemised doesn't entail that of the skolemised.

38.9 'the time is the same one': I.e. the same function is used in both propositions.

38.10 'genuinely contradictory': In Arabic, (17) comes from (16) by adding *laisa* ('it is not the case that') at the beginning. So we might say: of course (17) is the contradictory of (17). Why should the Skolem function be relevant to the question? The relevance is that for Ibn Sīnā (16) is incomplete. It expresses 'Every human breathes at a time t' but says nothing about what t is. (So in the Arabic Aristotelian terminology, (16) is *mahmul*; it has a variable needing quantification. ISHARAT.) Now Ibn Sīnā is fully aware that the missing item that completes the proposition could perfectly well be an existential quantifier 'at some time'.

The fact that he investigates interpretations by Skolem functions here seems to indicate that he thinks that if we have a belief that we can express by (16), then at least sometimes what we have in mind is a skolemisation of (16). COMPLETE THIS.

38.12 'no room for questioning': Literally, 'there occurs no doubt to the effect that he is not-not breathing' (*laisa lā yatanaffas*). I read this as a doubly-expressed negation, though Ibn Sīnā's usual idiom for that is *laisa wa-lā*.

38.12 'As we will explain': This sentence has a dubious grammar (a singular verb with a plural subject), and the restriction to 'negative absolute' seems gratuitous. I suspect the sentence was a gloss that has become incorporated in the text; the *Qiyās* contains a number of dubious cross-references of this kind. REF EXAMPLES.

[1.5.3]

38.13 'doesn't admit any doubt': True. But (16) is not a necessary truth, since it entails that there are human beings (though not necessarily at the present). In fact if Ibn Sīnā analyses it as 'For every pair of a human x and a time t, where x breathes at t, ...', as he well might, then it entails that there is a human who breathes.

38.14 'makes [(14)] true' (*ḥaṣal*): See [4] pp. 357–361 on the word *ḥaṣal*. The sense could be anything from 'If it's a matter of a different time in each case' to 'If the proven fact mentions a different time in each case'; maybe the ambiguity is deliberate. But on any of these senses, Ibn Sīnā seems to imply that asserting (14) involves some kind of choice of a time for each subject individual. See the discussion.

39.1,2 'set': Reading *muwaqqat* in both lines, instead of the Cairo text's *mu'aqqat* 'temporary'.

39.1 [[...]]: Leaving out the words '[which] excuses that, so that it wasn't possible for it to arise' (*ya^{c}ḏir ḏālika, fa-lam yumkin taḥṣīluh*), since they seem to be meaningless in this context.

39.4 'the former' (*ḏālika*): Literally 'that', but in Ibn Sīnā it very often means 'the former'.

39.6 'there is': As required by the sense, delete *laisa* 'not'; it was probably introduced because of *albatta* 'definitely' in the next line,

which came to be restricted to negative contexts.

39.7 'assumes the affirmative' : Ibn Sīnā uses one of his favourite technical terms, *musallam*) 'assumed'. More precisely the term means 'accepted as a premise', including the case where the proposition is accepted purely for the sake of argument. But it seems to carry no particular weight here. As the sense requires, I read *mūjiba* 'affirmative' rather than the majority reading *sāliba* 'negative'.

[1.5.4]

39.10 The rest of this paragraph looks to me like bullshitting. The points he makes have nothing to do with the sentences being universally quantified.

39.12 'true together with': This idiom 'p is true together with q' normally (as in Qiyās 5.1) means that p is true whenever q is. This is clearly not what Ibn Sīnā means here. The other common usage is that p and q are true 'together' (*ma^{c}an*), which must mean 'under the same readings', as in 39.15f below. That looks wrong here too, because the readings are not the same if the times are taken as different. Perhaps Ibn Sīnā means the sentences to be understood with an existential quantification over times, so that neither sentence is read as mentioning any specific time; though in that case lines 39.15f are a red herring.

[1.5.5]

40.2 I.e. (26) invites an interpretation by a Skolem function: $\exists f \forall x \phi(x, f(x))$. But Skolemising in (27) is not natural in the same way. Clearly not, because the time is now not existentially quantified.}

40.5 'it's possible [to take]': In a modern terminology (which Ibn Sīnā never uses), Ibn Sīnā is saying that 'some' could have wide scope here.

40.9 Apparently Ibn Sīnā has switched here to singular sentences 'It is (not) an A'. His excuse is that (29) could be read as being about a specific individual. Still, it's a confusing exposition.

[1.5.6]

41.2 'the expression': Maybe the expression 'every B is an A'.

41.2 'This is why': The reasoning is unclear.

41.3 'in actuality': As opposed to 'potentially moves'. The point is that it's a necessary truth that every animal has the potential to move, but there could be an animal that doesn't in fact move because of some accidental restriction on it. Ibn Sīnā makes the same point at *ᶜIbāra* 46.12 with 'writes'. Actually there is a significant difference between 'moves' and 'writes'. Namely, every human necessarily has the potential to be literate, but doesn't necessarily have the power to write in the sense of being actually literate. So the 'actually' in the *ᶜIbāra* passage needs to mean at least 'is actually literate', though there is no harm in making the stronger requirement 'is actually writing'. There is no such two-level distinction with 'moves', because movement is not an acquired skill.

[1.5.7]

41.6 'meaning simply that': Literally: 'its absolute is that'. Ibn Sīnā doesn't consider sentences of this form to be absolute, so the word 'absolute' is puzzling here. I read it as meaning something like 'the unadorned meaning'.

41.6 '[the contradictory]': From the parallel cases in lines 41.8 and 41.9 below, it looks as if the words *kāna mutanāqidan* (expressing that (38) is the contradictory of (37)) have gone missing after *dā'iman*. But there is no manuscript evidence to support this.

[1.5.8]

41.12 Delete *lā*, as the sense requires.

41.14 'something like time': In fact it usually is time in Ibn Sīnā's examples. But the fact that Ibn Sīnā says 'like' seems to imply that he allows further kinds of condition referring to other aspects of the situation. See REF.

41.14 'operate with it': It's not clear why we can't use these conditions intuitively in normal practice. Perhaps Ibn Sīnā means that we can't describe their properties without going beyond what we have absorbed from the traditional logic.

[1.5.9]

42.1 Ibn Sīnā has overlooked the fact that on his own account, (44) is true if there are no Bs. REF. Also from Ibn Sīnā's explanations it's not clear whether (44) should count as true when there is a B which is never an A.

42.1 Ibn Sīnā has overlooked the fact that on his own account, (44) is true if there are no Bs. REF. Also from Ibn Sīnā's explanations it's not clear whether (44) should count as true when there is a B which is never an A.

42.2 'turned round about' (*tanqalib*): Ibn Sīnā is talking about how a sentence is understood, so what is turned round about is the sense — or maybe the correlation between words and sense. This seems to be an example of what Ibn Sīnā elsewhere calls *taḥrīf*, 'deflection' or 'twisting'. Exactly what is turned round about here is not clear. But in any case Ibn Sīnā has unhelpfully run together two points. The first point is that this third kind of proposition, even if useless as it stands, could still be used to convey information about necessary truth. The second point is that its analysis (with the new material about necessity added, but in fact also without that new material) requires us to expand the predicate A and absorb at least the temporal quantifier into it. Ibn Sīnā will refer to this kind of expansion later in connection with other forms of sentence.

42.6 'necessarily true': This seems to need some argument. Is it true that the Eiffel Tower is a lemon for as long as it is a lemon? If we read the proposition as 'For every moment at which the Eiffel Tower is a lemon, the Eiffel Tower is a lemon', then this should be false because there is no such moment. REF.

42.7 'or negative' (*wal-sāliba*) : Several manuscripts drop this phrase, perhaps remembering that in an avicennisation the condition must be affirmative. But probably it should stand; it refers not to the condition but to the affirmative or negative quality of the original proposition.

42.8 'either ... or': Elsewhere Ibn Sīnā refers to these two cases as the 'broad absolute' and the 'narrow absolute'.

42.10 'This being so': It's not clear which of two opposite points Ibn Sīnā is making: (1) In order to regard the avicennisations as ab-

solute, we have to regard the added material as part of the predicate. (2) Even if the added material in an avicennisation is regarded as part of the predicate, the resulting proposition won't count as absolute, because the new material is about necessity. There are indications both ways. But it matters not a hoot, because this is a purely terminological issue about how we should choose to use the word 'absolute' in the context of Ibn Sīnā's new examples. Probably most modern readers will see the discussion as evidence that the old notion of 'absolute' has become useless. How Ibn Sīnā himself failed to reach this conclusion — if indeed he did fail to — is obscure.

[1.5.10]

43.1 'tantamount to necessity': Here Ibn Sīnā almost addresses the anomaly that some propositions which are not necessary in the sense of mentioning necessity are still necessary in the sense that they express that something is true permanently. They fall short of being fully necessary in two ways: first that they don't mention necessity, and second that the permanence is in terms of B, not of the existence of the subject individual. See also the commentary above on avicennisation.

43.3 From the parallels in the text, I suspect 'where' (*iḏ*) should be 'i.e.' (*ayy*). But there is no manuscript support for this amendment.

[1.5.11]

The main theme of this paragraph is an attack on the three-way classification discussed earlier. Even if we ignore necessary propositions and fatuous ones, there still remain propositions that should count as absolute but don't behave like the descriptionals. The paragraph finishes with two examples from the literature. But for reasons best known to himself, Ibn Sīnā mixes up this point with a new topic: the distinction drawn at 35.8ff between a broad and a narrow kind of absolute proposition. The narrow kind is where the proposition rules out necessity, rather than just not mentioning it. He introduced this kind in order to get a partition of sentences into necessary, impossible and absolute.

43.4 *fa-law* should introduce a subjunctive conditional, with apodosis

introduced by *la-*. There is no *la-*, but we hit the apodosis at 43.15. It turns out to be a repetition of the protasis, and Ibn Sīnā follows it immediately with the comment 'But that's not how it is'. In between the protasis and the equivalent apodosis, Ibn Sīnā repeats some points that he has already made about various kinds of sentence. This is hardly a well-planned piece of exposition!

43.5 'taken as absolute': As in the previous paragraph, he writes sometimes as if he is restricting to descriptional sentences, and sometimes as if he includes avicennisations.

43.8 'through the time while' (*ᶜinda waqti mā*): This would read better just as 'whenever' (*ᶜindamā*), which I suspect was the original reading. But there is no manuscript support for dropping *waqti*, and it just about makes sense, reading it as an iḍāfa.

43.10 'that condition': I.e. that the individual fits the description B. The other conditions making necessary could be for example 'when the earth comes between the sun and the moon' making an eclipse of the moon necessary.

43.11 'you know': Comparing with the parallel passage at 42.14ff, one suspects that Ibn Sīnā is here taking avicennisation in the stronger form $\forall x\ (\exists t B(x,t) \rightarrow \forall t(C(x,t) \leftrightarrow A(x,t)))$. Writing in Arabic allows him to fudge the distinction.

43.16 'the second': Why not just the first? We aren't told.

43.16 'many': Here Ibn Sīnā refers to the variety of examples given in *Qiyās* 1.3 and continued in 1.4. He also shows what he thinks of theories that try to get by with a small number of different types of absolute proposition. Actually some scholars have attributed a theory of precisely this kind to Ibn Sīnā himself on the basis of the *Išārāt*. A better reading seems to be that the *Išārāt* is a conservative work that pulls back from the radical originality of the *Šifā'* and tries to incorporate some of the insights of the *Šifā'* within a formal system of the aristotelian type.

44.1 From here to 45.11 is devoted to showing that we need a form of absolute that takes care of examples like (53), and hence is not in the 'standard three-way division'.

[1.5.12]

44.2 'and is also absolute': See the discussion above. According to that discussion, Ibn Sīnā is adopting for the sake of argument a position that he disapproves of, namely that in practical usage all 'absolute' sentences of the form 'Every B is an A' are to be interpreted in the second or third of the three ways discussed at 41.5ff, and their contradictory negations (which of course are not universally quantified) also have to have predicates expressed in one of these two forms. The people who took this position might not have agreed that this is an *iṣṭilaḥ*, an artificial convention. To sustain this view I took two liberties with the translation: I suppressed 'if' (*'in*) after 'We say:', and I read 'and' rather than 'so' for *fa-* before 'the absolute'. I suspect that in fact they should read *'innahā* (which in Ibn Sīnā is infinitely commoner than *'in* after words like *naqūlu*) and *wa-* (which is routinely confused with *fa-* in the manuscripts).

44.2 'in use' (*musta^{c}mal*): Ibn Sīnā uses this word a number of times. Does he mean 'in use in the language' or 'in use among logicians', or maybe 'in use among the commentators'? I need to do a trawl to see what evidence there is.

45.10 'this is a stone': A sardonic remark about a style of logic that avoids syntactic complexities and hence is unable to handle temporal relations.

44.10 'holding of all': Ibn Sīnā imagines an objector saying that the condition for a sentence 'Every B is an A' to be true takes A as an unanalysed unit, with the implication that it's inappropriate to analyse A in the present discussion. Ibn Sīnā answers correctly that this condition reduces the question to questions about when A is true of individuals, and for these we do need to analyse A. It's interesting to see Ibn Sīnā making this point, because elsewhere he seems to take the position of the objector and veto any analysing of the predicate.

44.12 'a quantifier on the two things together': I.e. a quantifier over ordered pairs of an individual and a time. Elsewhere Ibn Sīnā is happy to use such quantifiers; see the discussion. But he must avoid them here, because he is arguing for a sentence form where the individual quantifier is universal and the time quantifier is existential (or vice versa).

44.14 : 'not awake while it is asleep': This would be the third sort of

predicate in the three-way division. Ibn Sīnā has already demolished that sort, but he keeps coming back to it.

[1.5.13]

45.17 Delete *kull a wa-*, as required by the sense.

46.1 Add *lā* 'don't' before *ta^{c}lam* 'know'. The situation is that Ibn Sīnā has shown first that (57) is not the contradictory of (56), by pointing out that (56) can be false and (59) true, whereas (57) can never be true when (59) is true. So Ibn Sīnā has suggested that the disjunction on (57) and (59) might be the contradictory of (56). There is a supporting argument in one direction: if (56) is false then at least one of (57) and (59) is true. Ibn Sīnā doesn't prove this, but he states it at line 46.3 below. The point he needs to make here is that the converse implication fails: if (57) is true it doesn't follow that (57) and (59) are both false. This is exactly the point he is making if we add *lā* as suggested.

46.6 Add *illā* after *naqīḍa*, as required by the sense.

[1.5.14]

Here Ibn Sīnā turns to examples of sentences whose contradictory negations are disjunctions. (Recall the 14th century Scholastic discussions of exponibles; but need there be a common source?)

46.7 'a proposition ϕ': Ibn Sīnā never uses propositional variables. We could express his point here with a spread of anaphoras. But the result would be unreadable, which may be the reason why he leaves out even the required anaphoric pronouns.

46.8 It reads as 'when they are both true, it's false'. But the logic requires 'For both of them, if they are true then it's false', which is just about a possible interpretation of the text.

46.9 'false': This is the second of three examples of propositions which are false if and only if at least one of certain other propositions are true. Instead of spelling out the other propositions, Ibn Sīnā explains how the original proposition is a conjunction. So some form of De Morgan's theorem is assumed informally.

46.9 For *l-mawḍū^{c}i* read *lil-mawḍū^{c}i*.

46.12 The Cairo text includes another proposition, namely 'Some B happens to be an A and some happens not to be an A'. But this is

not inconsistent with (63), so there is a mistake somewhere. The propositions (67) and (68) confirm the text of (63), so the fault lies with the extra piece in the Cairo text. In fact (65) and (66) cover the ways in which (63) can be false, as Ibn Sīnā notes below. So the troublesome text, *aw yattafiq ... ya^{c}dam*, can be omitted. We could also omit (64) which is redundant, but there is no need. In both 46.13 and 46.14 Ibn Sīnā refers back to these ways in which (63) can be false, but only in general terms without specifying the sentences again.

46.14 This is one of the few places where I run a paragraph across what the Cairo text records as a paragraph break.

[1.5.15]

47.1 Clearly this needs an inclusive disjunction.

[1.5.15]

Here Ibn Sīnā begins a run-through of the main types of propositions and lists their contradictory negations. In a number of places he leaves it to the reader to work out whether he is referring to the proposition or to its contradictory negation. This shows the kind of concentration he expected from his students.

47.9 Ibn Sīnā had earlier distinguished two readings of 'Necessarily some B is an A', namely (1) 'Some B has the property that it is-necessarily-an-A' (he says the modality is attached to the copula or the predicate), and (2) 'It's a necessary truth that some B is an A' (he says that the modality is attached to the quantifier). Here he seems to distinguish two other readings: (3) 'It's a necessary fact about some instance of B that it's an A' and (4) 'It's a necessary fact about B that some B is an A'. Are these just (1) and (2) again under a different description?

47.9 'need not be': Ibn Sīnā is here denying the Principle of Plenitude. REF.

[1.5.16]

47.12 'negates this absoluteness': The description is odd, because 'absolute' has been introduced as a class of propositions, not a part

of propositions. Contrast what he says below about negating necessity, which is negating a modality in the proposition. Is he just jingling words here? Probably not; he is talking about narrow-absoluteness, and he thinks of narrow-absolute propositions as having a clause conjoined to them which expresses non-permanence. To 'negate absoluteness' is to negate this conjoined clause.

48.1 The second clause is clearly wrong. If 'the absolute of the affirmative proposition' means anything, presumably it would have to mean the affirmative proposition read as absolute. But this is exactly what the contradictory negation of (69) does negate. Perhaps the text is corrupt; perhaps Ibn Sīnā confused himself.

[1.5.17]

48.4 'also': I suppose this is a quirk of style.

48.5 'either necessarily or just permanently': Ibn Sīnā says 'permanent ... taken so as to include both of the two aforementioned ways'. This is a reference back to the two kinds of permanence (necessary and non-necessary) mentioned at 47.3f.

48.8 'just as there won't be' (*ka-mā kāna yūjad*): This is not the most comfortable parsing of the Arabic, but it is possible and it gives a reasonable sense.

[1.5.18]

48.11 'contingent' (*mumkin*): This could be read as 'possible', though Ibn Sīnā REF says that the normal meaning among specialists in logic is 'contingent'. In this case the 'not of others' below is an indication that he means contingent.

[1.5.19]

49.4 'as you have understood it' (*mā fahimta*): I.e. as co-extensional with 'necessary'. It could also be 'as I understand it' (*mā fahimtu*). But addressing the reader is a mark of Ibn Sīnā's style.

49.4 'the two': There is only one proposition under discussion here with a two-part contradictory. The dual is solid in the manuscripts,

so very possibly it belongs to an earlier draft and Ibn Sīnā failed to edit it out.

[1.5.20]

49.8 'broader-possible': I.e. the broad sense of *mumkin*, which is 'possible' in the sense 'not necessarily not'.

[1.5.22]

49.12 'necessarily some' (in (94)): The manuscripts are unanimous in reading *bil-ḍarūrati wa-lā šay'a min*, which means 'necessarily no'. Since (93) and (95) confirm each other, the reading in (94) is clearly wrong, and the obvious correction is *bil-ḍarūrati baᶜḍ*.

[1.5.24]

49.17 'simply' (*muṭlaqan*): The word usually translates as 'absolutely'. Here Ibn Sīnā uses it merely to remind us that in (101) there are no modalities hidden in 'every B is an A'. The same applies at (105) below.

[1.5.25]

50.3 As the logic requires, replace *kull* in the Cairo text by *šay' min kulli* (from one manuscript).

50.6 'pairs': I.e. he looked for a pair of existentially quantified propositions whose disjunction is a contradictory of (103).

50.5 'whenever … is false': Literally 'together with the falsehood of …'. For this idiom, see *Qiyās* 237.1 and notes on it.

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