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John of Holland on Epistemic Sophisms

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Abstract

The *Sophismata* attributed to John of Holland (fl. 1369) are preserved in three fourteenth-century manuscripts. The second part of the text contains three (bundles of) epistemic sophisms entitled “scitum a te est tibi dubium,” “tu dubitas an scis esse sicut A significat,” and “A magis est scitum quam B.” The first two develop William Heytesbury’s *Regulae solvendi sophismata* and *De sensu composito et diviso* by incorporating the theory of sentential meaning introduced in Richard Billingham’s *Terminus est in quem* and *De sensu composito et diviso*, and discuss the logic of epistemic statements and iterated modalities. The third sophism offers an interpretation of Aristotelian epistemology in terms of a mathematical framework developed by the Oxford Calculators, possibly drawing on John Dumbleton’s *Summa logicae et philosophiae naturalis*.

Keywords

John of Holland – William Heytesbury – Richard Billingham – epistemic logic – sophisms – iterated modalities – Oxford Calculators

1 Introduction¹

In fourteenth-century British logic, treatises *de scire et dubitare* started grouping together logical puzzles relating to epistemic statements. Despite not having discovered this family of puzzles, the text which seems to have played a foundational role for the genre is the second chapter of William Heytesbury's *Regulae solvendi sophismata* of 1335, which retained its influence well into the sixteenth century. The general issues discussed by Heytesbury included definitions of knowledge and doubt and their mutual relation, iterated modalities (the higher-order knowledge and the possibility of doubting one's own epistemic state), the distribution of knowledge over implication, and the logic of modalities in general (in today's terms, the *de re* vs. *de dicto* distinction).²

This article will focus on the collection of epistemic sophisms traditionally attributed to John of Holland (fl. 1369), which survives in three manuscripts preserved in Kraków and Leipzig.³

2 Manuscripts, Chronology, General Information

The current article only focuses on the second chapter of John of Holland's *Sophismata*, a complete analysis of which should further contribute to the rel-

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- 1 This article was written as part of the grant project GA23–05893S “On Knowing and Doubting: The Tradition of British Epistemic Logic in Late-Medieval Period,” registration number 23–05893S, supported by the Czech Science Foundation and coordinated by the Institute of Philosophy of the Czech Academy of Sciences in Prague. As part of the same project, an article on John of Holland's treatise on logical consequence is currently being prepared, some of the general findings being shared by both articles. The present article develops my earlier research published in *Studia Neoaristotelica*: “Scholastická logika ‘věděni’”. I would like to thank Lukáš Lička and the anonymous referees for *Vivarium* for their comments and suggestions.
 - 2 For a basic overview, see Boh, *Epistemic Logic*, and Knuuttila, *Modalities*, 176–182. For fourteenth-century logic in general, see Dutilh Novaes, “Logic,” and Read, “Logic.” For the British logical tradition in particular, see De Rijk, “*Logica Cantabrigiensis*,” De Rijk, “*Logica oxoniensis*,” and Ashworth and Spade, “Logic.” For the most recent presentation of Heytesbury's treatment of epistemic sophisms, see Strobino and Knuuttila, “William of Heytesbury.” For Heytesbury in general, see Hanke and Jung, “William Heytesbury.” The references relating to specific issues will be introduced later. For a basic overview of epistemic logic (mostly in its modern version) and further literature, see Rendsvig, Symons and Wang, “Epistemic Logic.”
 - 3 For John of Holland's biography, see Bos, “Introduction,” *13*–*14*^{*}, and most recently, Lička, “An Eastward Diffusion.” (My own take on John of Holland's biography is contained in a hitherto unpublished draft, “John of Holland on Logical Consequence. The Late-Fourteenth-Century Development of the British Logical Tradition.”)

ative chronology of John of Holland's writings and our current knowledge of the relations between the extant manuscripts. As of now, three copies of John of Holland's *Sophismata* are known:⁴

K Kraków, Biblioteka Jagiellońska, MS 2660, ff. 51^{ra}–125^{rb}

inc. Ad vtrumque respiciens non facile pronuncio, nam tacens, karissimi, non facio quod vultis. Si autem scripsero, detractatorum non effugio dentes ...

expl. ... que ergo est proporcio gradus ad gradum, illa est proporcio latitudinis ad latitudinem. Sed gradus ut quatuor subsesqualtera est ad gradum ut [ut] *supra lineam*; sub [?] *ante correctionem*] sex, igitur tota latitudo est subsesqualtera ad medietatem intensiorem, quod fuit probandum.

This copy is held to have originated in Prague between 1369 and 1371 (which makes it the earliest witness, contemporary to John of Holland's documented academic career in Prague), and some parts of the codex are as early as 1367. The probable place of origin and the *terminus ante quem* have been established by a note on the fly-leaf: "... quod volumen est ligatum Prage in crastino sancti Francisci ibique comparatum anno Domini milesimo tricentisimo septuagesimo primo ..." ⁵ The *terminus post quem* is based on John of Holland being referred to as "magister," a title which he presumably obtained in 1369 (which is E. P. Bos's argument, applied to both the *Sophismata* and *Consequencie*, preserved in the same codex). This copy is incomplete: some of the sophisms from the last (i.e., sixth) part of the treatise are missing.

L Leipzig, Universitätsbibliothek, MS 1360, ff. 207^{ra}–282^{rb}

inc. [Assit principio sancta Maria meo (*in margine superiori*)] <A>d vtrumque respiciens non faciliter pronuncio, nam tacens, karissimi, non facio quod vultis. Si autem scripsero, detractatorum non effugio dentes ...

4 As it is not the goal of the present article to offer a critical edition of the text, the article will not include a strict apparatus and will rely on a working edition which attempts at a charitable reconstruction of the text. The transcriptions attempt not to alter the original spelling and minimise editorial interventions; punctuation and formatting have been introduced for practical purposes. The variation will be disregarded, in particular the original corrections, spelling differences, and minor spelling or grammar errors, as well as minor omissions and reduplications, the innocuous differences in word order, the use of alternative yet equivalent pronouns, and some (very rare) obvious errors. These account for the majority of the variants in the cited passages, and the remaining variants do not affect the meaning of the passages cited. This appears sufficient for the present purposes.

5 Wislocki, *Katalog*, 630, and Bos, "Introduction," *31*.

expl. Secundo supponendum est pro regulis potenciarum quod a proporcione equalitatis non nec minoris inequalitatis fit motus, et secundum hoc respondetur.

coloph. Et sic est finis reuerendi magistri Johannis Holandrini.

Based on watermarks, the codex originated between 1389 and 1403 and some of its parts are held as having been copied from a Prague manuscript.⁶ This copy is the most complete in the sense that it contains all of the sophisms (as far as we can tell), but it also contains multiple lacunae.

B Kraków, Biblioteka Jagiellońska, MS 704.II, ff. 35^{ra}–39^{ra} and 48^{ra}–66^{rb}

The text of the *Sophismata* is preserved in two separate segments:

inc. I. Omnis homo est animal. Et diuiditur in tres particulas. In prima particula circa trium argumentorum materias tria dubia rationibus pro et contra disputantur.

expl. I. Et quia ista quantitas non est sylogisabilis, ideo de ista in illa diuisione tacuerunt. Sequitur secundum sophisma.

and:

inc. II. <I>nsolubile est verum. Probatur sic: sit A ista propositio: 'A est falsum', que significat ut termini communiter pretendunt, et sit vnum A omne A, tunc constat secundum diffinicionem insolubilis quod A est insolubile, et A est verum, igitur insolubile est verum.

expl. II. Si habitudini premissarum ad conclusionem deberetur modus causandi per se etc., vnde in demonstracione non solum sunt propositiones, sed eciam termini et habitudo premissarum ad conclusionem considerandam etc.

This copy originated in the 1370s, possibly in Prague.⁷ B is the least complete of the three copies, as the opening introduction and nearly half of the sophisms are missing.

The authenticity of the text is confirmed by the marginal titles, by the titles on the fly-leaves, and by the colophon of L. Also, Bos argued that the text is referenced in John of Holland's *Suppositiones*.⁸

6 For a detailed description, see Fitzgerald, ed. and trans. *Richard Brinkley's Theory*, 30–31. For the copy of John of Holland's *Sophismata*, see Bos, "Introduction," *31*, and Di Liscia, "Introduction," 4–5. For its origin, see Gál and Wood, "Richard Brinkley," 61, claiming that the copy of Brinkley's *Logic* in the codex was copied from MS Praha, Národní knihovna České republiky, III.A.II (confirmed by Spade, "The Manuscripts," 294–295), which is also historically tied to Prague at the very least through its owner, Wenceslas de Wessele (see Truhlář, *Catalogus*, 154).

7 For a detailed description, see Kowalczyk *e.a.*, *Catalogus*, 101–113. For the copy of *Sophismata*, see Bos, "Introduction," *31*–*32*^{*}; Bos doubted the attribution of the first segment to John of Holland (cf. Thakkar, "Wyclif," 186–187).

8 See Bos, "Introduction," *31*^{*}.

The qualification “longa” in the K and L versions of the title, i.e., *Sophismata longa Hollandrini* or *Iohannis de Hollandria*, might have interesting implications for John of Holland’s bibliography, as the fly-leaf of K also mentions *Sophismatha eiusdem breuia*. Unfortunately, this text is not contained in the current version of the codex and is, as of now, lost.

My preliminary observations regarding the interrelation of the manuscripts are primarily based on collations of the part *scire et dubitare* and may be summarised as follows: First, no one manuscript is derived directly and solely from any of the other ones. This observation mostly derives from the degree of (in)completeness of the three copies. Neither K nor L are directly derived from B, as B is the least complete of the three manuscripts. Neither K nor B are directly derived from L, as there are multiple lacunae in L, whence it could not have been the source for the remaining copies; also K and B appear to predate L. L is not directly derived from K, since the final portion of the sixth part of the *Sophismata* is missing from K but not from L. B is not directly derived from K, since there are certain non-trivial omissions in K but not in B; this is the relatively weakest argument which needs more research. The current working hypothesis is that K and L are derived from a source different from the source of B. In the case of a future discovery of other copies of the *Sophismata*, several omissions in K and L which appear to be *homoeoteleuta* might help identify this source. Also, there is a marginal note in K, not contained in either L or B, whose influence on the textual tradition of the *Sophismata* is interesting. In general, each manuscript gives a fairly reliable reading.

The second chapter of John of Holland’s *Sophismata* contains three sophisms which discuss multiple problems under a single, comprehensive heading:

- 3^{um} **sophisma** *Scitum a te est tibi dubium* (B 49^{ra}–51^{vb}; K 64^{va}–69^{rb}; L 217^{vb}–223^{rb})
 4^{um} **sophisma** *Tu dubitas an scis esse sicut A significat* (B 51^{vb}–53^{rb}; K 69^{rb}–71^{vb}; L 223^{rb}–226^{va})
 5^{um} **sophisma** *A magis est scitum quam B* (B 53^{rb}–55^{vb}; K 72^{ra}–76^{rb}; L 226^{va}–232^{va})

The approximate length of these sophisms is 9,000 words, 5,000 words, and 8,500 words respectively. These figures are based on the length of the text in B, which is slightly shorter due to omissions but with the differences not being significant. The three copies are (minor omissions aside) complete and relatively close to each other. The second chapter is distinctly separated as “secunda pars” or “secunda pars principalis,” the *incipit* or title of the chapter being “Sequitur

secunda pars in qua ponentur sophismata ex parte scire et dubitare seu sensus compositi et diuisi difficultatem habencia,” in K and L (the spelling follows K), and “Sequitur secunda pars principalis etc.,” in B. The general framing of the problem in K and L is that these sophisms are to be analysed in terms of the logic of epistemic terms “to know” and “to doubt” and are to be related to the distinction between *sensus compositus* and *sensus diuisus*, and, by extension, to the Aristotelian analysis of the fallacies of composition and division and modal fallacies.⁹ From a fourteenth-century perspective, this further relates to William Heytesbury’s *Regulae solvendi sophismata* and *De sensu composito and diviso*, two sources referenced explicitly in John of Holland’s *Sophismata*. That said, while a significant portion of the problems discussed in the second chapter of the *Sophismata* is derived from Heytesbury, John of Holland goes both beyond and occasionally even against Heytesbury.

3 Analysis of the Content

Each of the three units discusses multiple sophisms and has a complex internal structure. In what follows, the general structure of each unit will be presented and the analysis will address the most general principles of epistemic logic as well as logic and semantics in general, which should help in determining John of Holland’s role in fourteenth-century logic. This means that a vast amount of textual material is left to be discussed in the future, including a number of epistemic sophisms whose scenarios were being recycled in late-medieval debates, and thus present a great source for comparative analysis.

3.1 The Third Sophism: *Scitum a te est tibi dubium*

The general structure of the third sophism is as follows: first, it opens with the formulation of the sophism, i.e., that the same thing is both known and doubted, where the principal scenario (*casus*) is postulated together with an argument *pro* and *contra*;¹⁰ second, three general notes (*notanda*) are introduced to offer a general framework for the sophism; third, seven propositions relating to the issue under scrutiny are presented; fourth, John of Holland

9 See Woods and Walton, “Composition and Division,” for a basic overview and the confrontation of the modern and the medieval take on the fallacy. (The medieval part is based on Peter of Spain and William of Sherwood and modern analyses by Bocheński and Kretzmann.)

10 For “scenario” (or: *casus*), a technical term of the theory of *obligationes* capturing a counter-factual situation, see Spade and Read, “Insolubles.”

addresses seven scenarios from the second chapter of Heytesbury's *Regulae solvendi sophismata*; fifth, the principal scenario is briefly evaluated.

There are three fundamental sources used in this context, William Heytesbury's *Regulae solvendi sophismata* and *De sensu composito et diviso*¹¹ and Richard Billingham's "tractatus Biligam" cited in the first *notabile*, where the notion of proof (*probatio*) constitutes the general semantic approach.¹² Billingham is also viewed as the scholar who first introduced a specific distinction between analysable terms.¹³ In the third *notabile*, John refers to his contemporary experts (*secundum aliquos famosos magistros qui in sophistria reputati sunt*) and their definition of knowing a statement (*scire proposicionem*), a notion significant for the sophisms discussed in this passage.¹⁴ Lastly, notions of terminist logic, specifically several forms of supposition and appellation, are introduced to capture the semantics of epistemic context.¹⁵

The opening scenario is that Socrates is a human being and you are considering whether he is a human being but you believe (albeit with some hesitation) that he has died; also, you are assumed to know that you are a human and to know that you are an animal. The argument is that the fact that a human being is an animal is both known and doubted by you in such a scenario. The first part, the fact that a human being is an animal is known by you (*hominem esse animal est scitum a te*), is proven as follows: if you know that you are a human being and that you are an animal, you know that a human is an animal. If you know that a human being is an animal (*tu scis hominem esse animal*), then that a human being is an animal you know (*hominem esse animal scis*), as the two statements

11 While *De sensu composito et diviso* is referenced under this title, the *Regulae solvendi sophismata* is simply referenced as Heytesbury's opinion or as "textus Hesbri" (John of Holland, *Sophismata*, B 51^{ra}; K 68^{rb}; L 222^{rb}) and "tractatus Hesbri" (John of Holland, *Sophismata*, B 52^{ra-rb}; K 69^{vb-70^{ra}}; L 224^{ra-rb}). Needless to say, the text circulated under several titles in that era, notably as *Logica* in Prague (see Spade, "The Manuscripts," 278–281, for the title of Heytesbury's text).

12 John of Holland, *Sophismata*, B 49^{rb}; K 64^{va}; L 218^{ra}.

13 John of Holland, *Sophismata*, B 49^{va}; K 65^{ra}; L 218^{va}: "Vbi eciam aduertendum quod michi apparet esse de intencione Byligam, qui videtur fuisse principalis et primus positor istius modi distinccionis inter terminos ..."

14 John of Holland, *Sophismata*, B 50^{ra}; K 66^{rb}; L 219^{vb-220^{ra}}: "Tercio notandum quod scire A proposicionem secundum aliquos famosos magistros qui in sophistria reputati sunt sic describitur: scire A proposicionem est qualitercumque A significat primarie scire A significare primarie et qualitercumque scitur significare primarie quod sic est, ita quod ad hoc quod tu scias A oportet quod qualitercumque A significat primarie scis A significare et qualitercumque scis A primarie significare scis esse, et tunc scis A et A est scitum a te. Et intelligo per 'significare primarie' significare primarie et adequate, et ex isto statim patet quare propositio dicitur scita, quia idem valet 'scis A' et 'A est scitum a te.'"

15 For an overview of the terminist framework and literature, see Read, "Medieval Theories."

are held to be equivalent. That a human being is an animal is doubted by you (*hominem esse animal est tibi dubium*) is deduced from the assumption that Socrates being an animal is doubted by you.¹⁶

The sophism is solved in terms of the distinction between modal contexts traditionally referred to as “sensus compositus” (in today’s terms, *de dicto*) and “sensus divisus” (in today’s terms, *de re*). To use the traditional Aristotelian example, there is a difference between saying “you know that Coriscus is approaching you” and “Coriscus you know to be approaching you,” since the first statement, unlike the second, is held to require that you know that the person approaching you is Coriscus.¹⁷

John of Holland starts unpacking the problem in terms of two *notanda* addressing the general approach to analysing the meaning of statements. The first reproduces Billingham’s notion of proof and his distinction between immediate terms, such as demonstratives, for which the different sentential contexts are held equivalent, and mediate terms, which include resolvable terms (*resolubile*), such as common terms, explicable terms (*exponibile*), such as “every” and “only,” and operators (*officiale*), such as conditional connectives and modal terms, including epistemic verbs, the difference consisting in their inferential roles. As an example, a modal statement such as “it is possible that you are running” is deduced from two statements expressing the respective modal-

16 John of Holland, *Sophismata*, B 49^{ra-rb}; K 64^{va}; L 217^{vb}–218^{ra}: “Probatur (et sit rei veritas quod Sor grecus sit homo, de quo consideres an sit homo, et credas cum hesitatione eum esse mortuum), quia hominem esse animal est scitum a te et hominem esse animal est tibi dubium, igitur scitum a te est tibi dubium. Consequencia patet ... Item, tu scis hominem esse animal, igitur hominem esse animal scis. Consequencia patet, quia antecedens et consequens conuertuntur, cum sint propositiones in terminis similes et de simili sensu, quia vtrumque de sensu composito, nam in antecedente precedit modus omnino et in consequente modus omnino subsequitur, igitur etc. Et antecedens probatur, quia tu scis te esse animal et tu scis te esse hominem, igitur scis hominem esse animal. Consequencia est bona et antecedens est verum, ut supponitur in eodem casu, igitur consequens est verum, et illud fuit antecedens probandum. Tunc antecedens principale pro secunda parte, videlicet quod hominem esse animal est tibi dubium, probatur, nam hoc esse animal est tibi dubium (demonstrando Sortem grecum), et hoc est homo (demonstrando eundem), igitur hominem esse animal est tibi dubium. Consequencia patet in sylogismo expository, item quia arguitur ab inferiori ad superius affirmatiue sine distributione precedente, item consequencia tenet per resolutionem huius termini resolubilis, ‘hominem,’ qui est primus in ordine, et ergo habet primo resolui sub forma talis consequencie de qua loquitur, igitur ipsa consequencia est bona. Et antecedens huius consequencie tenet per casum, quia secundum casum tu credis quod hoc sit mortuum animal cum hesitatione an adhuc sit animal viuum, et hoc est de aliquo dubitare an hoc sit animal, igitur etc.”

17 See Aristotle, *On Sophistical Refutations*, 24, 179a26–b6 (118–121).

ity and the meaning of the respective statement, i.e., from “this statement is possible: ‘you are running,’ which signifies precisely that you are running.”¹⁸

As the second *notabile*, John postulates “the fundamental rule” that if there are multiple mediate terms in the same statement, the order of the proof follows the order of the terms in the respective statement.¹⁹ The rule establishes the general algorithm for proving sentences or, from a different point of view, for making their meaning explicit. Note that this algorithm presupposes a language whose grammatical structure directly corresponds to its logical structure. Whether or not this applies to medieval (or, for that matter, classical and modern) Latin is not clear, but John seems to attribute this feature to the technical Latin used in scholastic academia.²⁰ The statement is justified in terms of common linguistic behaviour: a listener to whom a speaker presents a statement containing multiple mediate terms (i.e., terms requiring further analysis) will unpack the meaning of the sentence starting with the first words perceived, i.e., the first words pronounced by the speaker.²¹

18 John of Holland, *Sophismata*, B 49^{rb}; K 64^{vb}–65^{ra}; L 218^{rb}: “Tercii autem termini sunt termini officiales. Et sunt illi qui cadunt super aliquod complexum uel apti nati sunt poni cum aliquo complexo uel qui ponuntur cum aliquo termino capto vniuersaliter, ut sunt ‘promitto,’ ‘significo.’ Et sic apparet quod omnia verba significancia actum interiorem anime uel que includunt in sua significacione actum interiorem anime, et iste diccionis ‘possibile,’ ‘impossibile,’ ‘contingens,’ ‘necessarium,’ et participia dictorum verborum et coniunccones causales et condicionales, et multa talia, sicut satis expresse habetur in tractatulo supradicto, et isti termini officiales non probantur aliquo supradictorum modorum, sed speciali modo et eciam differenter[?], quia illi termini qui ponuntur respectu alicuius complexi probantur per duas proposiciones exprimentes connotacionem istius termini officialis et significacionem complexi sequentis, ut hec: ‘possibile est te currere,’ probatur sic: ‘hec est possibilis: “tu curris,” que precise significat te currere, igitur possibile est te currere;’ et sic correspondenter est de alijs officialibus ponendis respectu complexi. Sed tunc iste proposiciones de termino officibili non conuertuntur cum suis probantibus. Et in hoc conuertuntur cum exposicionibus, quia tam hec quam illa sunt synkategoremata, qualia non semper sunt resolubilia.”

19 John of Holland, *Sophismata*, B 49^{rb}; K 65^{ra}; L 218^{rb}: “Secundo notandum pro fundamentali regula quod quando termini mediati sunt plures in vna proposicione, quod tunc probacio istius proposicionis debet principaliter et primo incipi a primo termino.”

20 For this issue, see Sinkler, “William Heytesbury’s Word-Order Theory,” and Perreiah, *Renaissance Truths*.

21 John of Holland, *Sophismata*, B 49^{va}; K 65^{rb}; L 218^{vb}: “Insuper videtur quod regula eadem aqualiter persuaderi potest esse sustinenda, quia quandocumque quis audit oracionem a pronunciante, in qua multi sunt termini mediati diuersas sibi expetentes probaciones, tunc audiens istum terminum potissime debet primo probare, scilicet resolure, exponere uel describere, sicut sua condicio exigit, quem primo audit, ita scilicet quod istum terminum primo intelligat audiens quem primo audiuerit. Sed primus terminus primo auditur et comprehenditur. Igitur eius significacio, resolucio uel exposicio debet primo intelligi

As a direct implication, John of Holland distinguishes between three types of epistemic contexts:

- (I) That Socrates is a human being I know (*Socratem esse hominem scio*)
- (II) Socrates I know to be a human being (*Socratem scio esse hominem*)
- (III) I know that Socrates is a human being (*scio Socratem esse hominem*)

These statements are mutually independent based on their different word order translating to different analysis algorithms. Furthermore, “sensus compositus” and “sensus diuisus” are used as relative, rather than absolute terms. As an example, (II) is composed as compared to (I) but divided as compared to (III).²² The proof of their independence introduces two scenarios. The first is that you see Socrates from far away (a traditional ingredient of epistemic sophisms) and believe firmly and without hesitation that he is a donkey, and you know that what you see is an animal and a substance. However, you do not know that what you see is Socrates, since you believe from some source that Socrates does not exist.²³ In such a scenario, (I) is true but (II) is false, which is proven in terms of their analysis which follows the aforementioned proof. The analysis of (I) has two steps, in each case the target of analysis being the first analysable term in order, in this case the (“resoluble”) words “Socrates” and “human being”:

First step: That this is a human being you know (Socrates being indicated) and this is Socrates; therefore, that Socrates is a human being you know.

Second step: That this is this you know (Socrates being indicated) and this is a human being; therefore, that this is a human being you know.

et considerari. Et hoc est quod vult regula seu notabile, secundum scilicet quod semper primus terminus <debet> primo probari.”

- 22 John of Holland, *Sophismata*, B 49^{vb}; K 65^{va}; L 219^{ra}: “Ex eodem fundamento videtur quod ista: ‘Sortem esse hominem scio’ nec conuertitur cum tali sensu diuiso: ‘Sortem scio esse hominem,’ nec cum tali sensu composito: ‘scio Sortem esse hominem’ ... Et sic dico quod vna et eadem propositio est tanquam sensus compositus respectu vnus et sensus diuisus respectu alterius, nam secunda, scilicet: ‘Sortem scio esse hominem,’ est sensus compositus respectu prime, scilicet: ‘Sortem esse hominem scio,’ eo quod secunda habet vnum terminum resolubilem post officialem et prima nullum, et eadem secunda est sensus diuisus respectu tercie, quia secunda habet vnum terminum resolubilem ante ly ‘scio’ et tercia nullum.”
- 23 John of Holland, *Sophismata*, B 49^{vb}; K 65^{va-vb}; L 219^{ra}: “Vnde posito casu quod Sortem a remotis videas quem credas esse asinum firmiter sine hesitatione, scias tamen quod illud visum sit animal uel substancia, sed nescias quod sit Sor, ymmo credas ex relatu uel aliunde quod nullus Sor sit, tunc hec est vera: ‘Sortem esse hominem scis,’ tamen hec est falsa: ‘Sortem scis esse hominem.’”

This move concludes the proof of (I), the consequent of the first step.²⁴ Knowing that this is this neither requires nor allows for further analysis and its truth is evident in the scenario. The analysis of (II) is as follows:

This you know to be a human being and this is Socrates; therefore, Socrates you know to be a human being.

The first premise of the analysis is false in the scenario (since it is assumed that you believe that the being in question is a donkey), and since the truth of the consequent, which is (II), requires the truth of both premises, (II) is false.²⁵ As a consequence, (I) and (II) are not logically equivalent. Also, (III) is false in this scenario: you are assumed not to believe that Socrates is real, which means that you do not know that he is a human being, which proves that (I) and (III) are not logically equivalent.²⁶

The second scenario, constructed to prove that (II) and (III) are not logically equivalent, is that Socrates is standing right in front of you but you firmly believe that the person in front of you is Plato and that he is a human being, but, based on some testimony, you believe that Socrates has died. In this scenario, (III) is not true, since knowing that Socrates is a human being presumes believing him to be a human being. Based on the aforementioned analysis, (II) is proven to be true in this scenario, since it is true that this you know to be a human being.²⁷

24 John of Holland, *Sophismata*, B 49^{vb}; K 65^{vb}; L 219^{ra}: “Quod prima sit uera probatur, quia hoc esse hominem scis (demonstrando Sortem), et hoc est Sor, igitur Sortem esse hominem scis. Consequencia patet et minor. Et maior probatur, quia hoc esse hoc scis (demonstrando per secundum[?] ‘hoc’ Sortem) et hoc est homo, igitur hoc esse hominem scis, que fuit prima pars antecedentis. Et consequencia patet per discursum expositoryum siue per resolutionem primi termini mediati, qui est resolubilis.”

25 John of Holland, *Sophismata*, B 49^{vb}; K 65^{vb}; L 219^{ra-rb}: “Et quod secunda sit falsa probatur, quia ex quo in illa precedit terminus resolubilis, requirit talia demonstratiua, scilicet: ‘hoc scis esse hominem’ et ‘hoc est Sor’; modo illarum prima est falsa, videlicet: ‘hoc scis esse hominem,’ quia ista conuertitur cum ista: ‘tu scis hoc esse hominem,’ quia iste terminus ‘hoc,’ cum sit pure immediatus, non refert illum preponere uel postponere ante uel post ly ‘scio’; sed constat quod ista est falsa seu repugnans casui: ‘tu scis hoc esse hominem,’ quia per casum tu credis istum esse asinum. Igitur sequitur quod altera demonstratiuarum que requiruntur esse uere ad veritatem istius: ‘Sortem scis esse hominem’ est falsa seu repugnans et neganda; igitur ista secunda propositio est falsa.”

26 John of Holland, *Sophismata*, B 49^{vb}; K 65^{vb}; L 219^{rb}: “Item ista: ‘Sortem esse hominem scis’ non conuertitur cum ista: ‘tu scis Sortem esse hominem,’ quia in eodem casu prima est uera (ut probatum est) et secunda est falsa, scilicet quod scis Sortem esse hominem, quia credis Sortem non esse, ergo non scis Sortem esse, et ergo non scis Sortem esse hominem.”

27 John of Holland, *Sophismata*, B 49^{vb}; K 65^{vb}; L 219^{rb}: “Dico eciam quod iste due non conuer-

As a consequence, John of Holland rejects Heytesbury's syntactic distinction between composed and divided sense, where the composed sense is generated by an epistemic verb either completely preceding or completely following a sentential nominalization, while the divided sense is generated by an epistemic verb being inserted into the nominalization, presumably to replace it with his three-member classification. The wording of John's criticism is, again, close to Billingham and echoes Billingham's *De sensu composito et diviso*.²⁸

Following this criticism, John of Holland admits the popularity of the Heytesburian view and, as a charitable move, reduces it to the terminist distinction between material and personal supposition of sentential nominalizations, such that the material reading of sentential nominalizations in epistemic contexts corresponds with (or, at least, entails) the compound sense of epistemic statements, whereas the personal reading corresponds with the divided

tuntur, scilicet: 'Sortem scio esse hominem' et 'scio Sortem esse hominem'. Posito casu quod Sor sit coram te et credas firmiter esse Platonem et scias bene quod iste qui est apud te sit homo et credas ex relatu uel aliunde quod Sor sit mortuus, tunc ista est uera: 'Sortem scis esse hominem', quia hoc scis esse hominem (demonstrato Sorte) et hoc est Sor, igitur Sortem scis esse hominem. Et tamen hec non est uera: 'tu scis Sortem esse hominem' in casu eodem, quia credis Sortem esse mortuum, igitur credis eum non esse hominem, igitur non scis Sortem esse hominem. Ista est bona consequentia et antecedens est verum in isto casu, igitur consequens, et contradictorium consequentis est falsum, uidelicet: 'tu scis Sortem esse hominem'. Et sic patet quod iste due non conuertuntur."

- 28 John of Holland, *Sophismata*, B 49^{vb}–50^{ra}; K 65^{vb}–66^{ra}; L 219^{rb}–^{va} [emphasis mine]: "Item ex dictis sequitur quod *notabile Hesbri non est sustinendum*, quando dicit quod quandocumque modus seu talis terminus significans actum anime mediat inter partes dicti, quod tunc est sensus diuisus, sed quando terminus modalis uel officialis qualiscumque omnino precedit seu sequitur, quod tunc est sensus compositus, quod etiam quamplurimi cum eo solent dicere. Quia licet ita est quod quandocumque terminus modalis omnino precedit, quod tunc est sensus compositus, quia hoc concordat cum hic dictis, tamen in hoc quod dicit quando terminus officialis seu modalis omnino sequitur, quod tunc est sensus compositus conuertibilis cum propositione in qua modus uel terminus officialis omnino precedit, hoc utique tenere non oportet, quia, ut iam declaratum est, quando terminus officialis omnino sequitur, tunc est maxime sensus diuisus, quia tunc primus terminus ut frequenter est resolubilis uel exponibilis, qui tunc primo habet resolui uel exponi, et sic fit sensus diuisus, ut notum est ex habitis." John's possible source is the following passage from Billingham: "... sed contra hoc est *communis fama* que dicit quod semper est sensus compositus quando totaliter praecedit vel finaliter subsequitur terminus officialis significans actum mentis. Dicendum quod hoc non est dictum vel ratione probatum nec textu firmatum, sed contra rationem et significationem termini. *Ideo est minime sustinendum.*" The text was edited as an appendix to Billingham's *Speculum puerorum* in Maierù, "Lo *Speculum puerorum*," 389–390, and the passage was linked to Heytesbury by Maierù. Billingham's treatise is referenced explicitly in the first sophism: see John of Holland, *Sophismata*, B 36^{va}; K 55^{rb}; L 209^{vb}.

sense.²⁹ While John retains his reservation towards Heytesbury, this suggestion makes the passage into a meeting point of alternative fourteenth-century semantic traditions.

There are several general issues tackled in the context of the third sophism, some of which pertain to general logic and semantics, while others are related specifically to epistemic logic. Starting with the general ones, John of Holland addresses sentential meaning being closed under entailment.³⁰ In the fourteenth-century context, the issue had been introduced by Thomas Bradwardine in his treatise on insolubles, but John's likely source appears to be Heytesbury's *Regulae solvendi sophismata*, where the principle is endorsed.³¹ Second, John of Holland makes several interesting remarks on the notion of logical consequence.³² To mention but two examples, (the failure of) validity is tied to (the failure of) truth-preservation with respect to a possible scenario, and (the failure of) "formal" validity is tied to validity (not) being preserved after the substitution of (extra-logical) terms.³³

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- 29 John of Holland, *Sophismata*, B 50^{ra}; K 66^{ra}; L 219^{va}: "Sed tamen quia iste modus Hesbri fuit diu et a multis obseruatus, credo quod sine causa non fuit, nam cum sic dicitur: 'Sortem esse hominem est possibile' uel 'Sortem esse hominem scio,' videtur quod ista et quelibet talis possit distingui penes suppositionem materialem et personalem, ita quod vno modo totum illud dictum potest supponere materialiter pro propositione cuius est dictum, et est sensus: 'Sortem esse hominem scio,' idest: 'istam propositionem: "Sor est homo" scio.' Et sic concederem cum eis quod ista propositio est conuertibilis uel saltem infert vnam de sensu composito. Alio modo contingit istos terminos stare significatiue, et tunc apparet michi, quod ut sic capiendo terminos talis propositionis generaliter est sensus diuisus. Et ad istum sensum ego posui quod tales erunt de sensu diuiso, ymmo et sunt in veritate magis sensus diuisi, quam vbi dictum mediat inter duos terminos communes, ut satis est superius declaratum. Et videtur michi vltra quod Hesbri ergo dixit insufficienter, quod tales propositiones vbi modus omnino sequitur semper sunt sensus compositi, ex quo hoc solum accidit capiendo dictum materialiter pro propositione cuius est dictum."
- 30 John of Holland, *Sophismata*, B 51^{rb}; K 68^{rb}; L 222^{rb}: "Respondetur negando casum, quia impossibile est propositionem vno modo significare, quod non significaret alio modo, puta consequens ad illud significatum."
- 31 Bradwardine's text has been edited twice, see Roure, "La problématique," and Thomas Bradwardine, *Insolubilia*, and analysed multiple times, especially since Read's "The Liar Paradox." For an up-to-date overview of the literature, see Spade and Read, "Insolubles." For Heytesbury's adoption of the principle, see Hanke, "Scholastická logika 'věděni' III," and Hanke, "The *Casus Obligationis*" (and an up-to-date overview in Hanke and Jung, "William Heytesbury").
- 32 John of Holland's treatise on consequences has been identified in Bos, "Introduction," *29*-*30*.
- 33 John of Holland, *Sophismata*, B 50^{va}; K 67^{ra}; L 220^{va-vb}: "... et sic oppositum consequentis in casu possibili est verum cum antecedente, ergo non valet consequentia, nec sequitur econtra (formaliter saltem), quia in aliquibus terminis non valet consimilis forma ..." Inter-

Two general principles pertaining to epistemic logic are introduced. The first is the principle that knowledge distributes over implication. In the scholastic context, the principle was often part of the debates on logical consequence, where it was listed together with other general principles of inference, such as the contraposition, transitivity, and, in particular, value-preservation rules. These typically define valid inferences in terms of a truth-value (if an antecedent is true, so is its consequent), modal value (if an antecedent is necessary, so is its consequent), or, as in this case, an epistemic value being preserved. However, knowledge is held to be preserved in inferences known to be valid, rather than in all valid inferences, which would imply a strong logical omniscience.³⁴ As an additional clause to the third proposition, John of Holland notes that this principle is, in fact, incorrect when taken at face value, despite being standard in the logic of his time.³⁵ To prove his point, he uses the following scenario: let there be a valid inference whose antecedent you know to hold, even though you do not understand what the consequent means, e.g., an inference, “a horse is an animal; therefore, that which is able to neigh is an animal,” where you assume that you do not know what “to neigh” means. If, furthermore, someone trustworthy tells you that the inference is, in fact, valid, you will firmly believe that without any doubts. Assuming that true, firm, and unhesitating belief constitutes knowledge, this translates to you knowing that the inference holds. While both medieval and modern philosophers would doubt whether such a condition is sufficient, John of Holland uses this as a working definition of knowledge derived from Heytesbury.³⁶ As a result, you would know that the antecedent and the inference do hold, but not that (or whether) the consequent holds, since you do not understand it.³⁷ The endorsement of knowledge based on an expert opinion (not limited to this context) is an interesting detail.

estingly, John also speaks about the frequency of the failure of validity: “Et talis forma raro fallit, nisi in raris casibus ...” (B 50^{vb}; K 67^{vb}; L 221^{va}).

- 34 For an overview of the medieval debate, see Boh, *Epistemic Logic*; Hanke, “Scholastická logika ‘vědění’ III,” 29–43; Hanke, “The *Casus Obligationis*.”
- 35 John of Holland, *Sophismata*, B 50^{va}; K 67^{ra}; L 220^{vb}: “Isti propositioni annectitur in eadem clausula, quod non valet consequentia sic arguendo: ‘ista consequentia est bona, scita a te esse bona et antecedens est scitum a te, ergo et consequens est scitum a te,’ licet est forma maxime vsitata ...”
- 36 John of Holland, *Sophismata*, B 54^{ra}; K 73^{rb}; L 228^{rb}: “Pro responsione ad illud dubium est notandum, quod ista argumenta videntur magis pertinere ad ea que sciuntur communiter per evidencias, prout sciuntur contingencia, de quo scire dicit Hesbri: ‘scire est credere aliquid firmiter sine hesitatione, cum hoc quod ita sit ex parte rei,’ sicut scio te loqui quando audio te.” For the controversy on the late-medieval debate on the necessary and sufficient conditions of knowledge, see Boh, “Belief”; Pasnau, “William Heytesbury”; Martens, “William Heytesbury.”
- 37 John of Holland, *Sophismata*, B 50^{va}; K 67^{ra-rb}; L 220^{vb}–221^{ra}: “Quod autem consequentia

Second, John of Holland briefly touches on the iteration axioms, which will be a central topic of the next sophism. Specifically, as a sixth proposition, John holds it to be impossible for a sentence to be doubted by someone who, at the same time, is in doubt whether the sentence is doubted by him. The justification combines several interesting principles. In order of appearance:

(*) If a sentence is doubted by you and you doubt whether it is doubted by you, you consider whether it is doubted by you.

(Presumably, the first premise is superfluous.)

(**) If a sentence is doubted by you and you consider whether it is doubted by you, you perceive that the sentence is doubted by you.

Note that perception is held to be equivalent to knowledge in the *Sophismata* and, in this particular context, as implying knowledge. Also, the equivalent to (**) is held for any mental act. In modern terms, every mental act validates positive introspection, provided that it is being considered, i.e., if attention is being paid to it. Finally:

(***) If a sentence is known to be doubted by you, you do not doubt whether the sentence is doubted by you.

Further details are postponed to later discussion (i.e., to the fourth sophism).³⁸

talis non valet statim probatur. Et pono quod fiat consequencia bona cuius antecedens sit scitum a te et consequens non sit a te intellecum, et ex relatu veridici credas firmiter sine hesitatione quod sit bona consequencia, licet consequens non intelligas, nec scias qualiter ipsum significat, sicut accidere posset, si tu bene scires quid 'equus' significat et nescires quid 'hinnibile' significat, et facta tali consequencia: 'equus est animal, igitur hinnibile est animal,' dicat tibi aliquis ueridicus cui credas, quod illa est bona consequencia, et credas sine hesitatione. Tunc in tali casu ista consequencia est bona: 'equus est animal, igitur hinnibile est animal,' scita a te esse bona et antecedens est scitum a te, et tamen consequens non est scitum, quia nescis qualiter consequens principaliter significat seu primarie."

38 John of Holland, *Sophismata*, B 50^{vb}; K 67^{va}; L 221^{rb}: "Sexta propositio est, quod impossibile est quod aliqua propositio sit tibi dubia et tu dubitas an illa sit tibi dubia. Nam si sit tibi aliqua dubia et dubitas an sit tibi dubia, igitur consideras an sit tibi dubia. Et si consideras an sit tibi dubia, et est tibi dubia, ergo percipis quod est tibi dubia. Consequencia patet, quia omnem actum mentalem quem habes, de quo consideras an habes, percipis te habere, sicut postea diffusius declarabitur. Et tunc ex consequente: tu percipis quod illa est tibi dubia, igitur scis quod illa est tibi dubia, quia percipere est perfecte capere per noticiam, uel tantum valet sicut incipis scire. Et tunc ex consequente: tu scis quod illa est tibi dubia, igitur non dubitas an sit tibi dubia, et sic dubitares et non dubitares, quod est impossibile."

3.2 The Fourth Sophism: *Tu dubitas an scis esse sicut A significat*

The fourth sophism corresponds with the discussion of iterated modalities in the central passage of the second chapter of Heytesbury's *Regulae solvendi sophismata*.³⁹ However, the opening sophism in John of Holland's text is the first of Heytesbury's epistemic sophisms, whose background scenario is that you know that A is either "God is real" or "a human is a donkey"; without knowing which one, you know that "God is real" is true and necessary and that "a human is a donkey" is false and impossible, and you are considering whether A is true or false as well as whether you know that A holds, the working definition of doubt being that a statement which is under consideration without being known to be true or false is being doubted.⁴⁰ The scenario is developed by arguments *pro* and *contra* the statement that you doubt whether you know that it is the case as A signifies, which are resolved at the end of the sophism, and the central part of the sophism contains a general proof of the impossibility of doubting one's own knowledge. As the central passage is the most relevant to the general principles of epistemic logic, it will be closely scrutinised.

The basic principles of the argument are, first, that doubting entails consideration (following Heytesbury's view);⁴¹ second, that any cognitive state with consideration entails a higher-order perception of that state, where perception is equivalent to knowledge, which translates to both positive and negative introspection, supposedly justifiable by experience;⁴² third, that a statement which is incompatible with two mutually contradictory statements is impossible, where A is incompatible with B either if they are contradictory or if they

39 The central argument of the sophism has already been analysed and formalised in Hanke, "Scholastická logika 'vědění' I," 163–169, where the analysis of John of Holland's position was based exclusively on L. While that is not the best choice, the other two manuscripts give no substantially different picture of John of Holland's position (especially since L is either related or close enough to K). For seminal research on the topic of iterated modalities in the late-medieval era, see Boh, "Epistemic and alethic iteration."

40 John of Holland, *Sophismata*, B 51^{vb}; K 69^{rb}; L 223^{rb}: "Posito casu primo, videlicet quod A sit altera istarum: 'Deus est' et 'homo est asinus,' de qua consideres an sit uera uel falsa, et ponantur alie particule posite in primo casu Heysbri. Et ponatur cum hoc quod consideres an scias sic esse sicut A significat."

41 John of Holland, *Sophismata*, B 52^{ra}; K 69^{va}; L 223^{vb}: "Primum est: si dubitas te scire sic esse, ergo consideras an scis sic esse vel non. Istud patet ex descriptione ipsius dubitare, quam innuit auctor Hesbri in primo casu."

42 John of Holland, *Sophismata*, B 52^{ra}; K 69^{va}; L 223^{vb}: "Secundum est: si percipis sic esse et consideras an percipis sic esse, sequitur quod percipis te percipere sic esse. Ista patet per experienciam. Si enim quis videt et considerat an videt, in foribus est quod percipit seu scit se videre. Eodem modo, si non videt et considerat an videt vel non, sequitur quod scit se non videre. Et ita est de scire et intelligere seu de quocumque actu anime cognoscente, id est intellectiue seu sensitiue."

conjointly entail a contradiction.⁴³ The third principle foreshadows the structure of the argument: the statement that it is impossible to doubt one's own knowledge is proven to be incompatible with two contradictory statements, namely with "you perceive that x is the case" and "you do not perceive that x is the case." The partial arguments have a similar structure and proceed as follows.

First, "you doubt that you know that x is the case" is held to entail "you do not know that you know that x is the case" (by the definition of doubting) and also "you consider whether you perceive that x is the case" (by the first note). However, "you perceive that x is the case" and "you consider whether you perceive that x is the case" entail that you perceive that you perceive that x is the case (by the second note) and (since "knowing" and "perceiving" are held to be equivalent) that you know that you know that x is the case. Note that the argument endorses the axiom of positive introspection supplemented by the assumption that the relevant agent pays attention to the relevant mental state. Lastly, you knowing that you know that x is the case is inconsistent with you not knowing that you know that x is the case – which is a contradiction.⁴⁴

Second, "you doubt that you know that x is the case" is held to entail "you doubt that you do not know that x is the case" (by assuming that doubting one thing entails doubting its opposite, i.e., that "doubting that" reduces to "doubting whether"), which in turn entails that you do not know that you do not know that x is the case (by the definition of doubting). Also, "you doubt that you know that x is the case" is held to entail "you consider whether you perceive that x is the case" (by the first note). However, "you do not perceive that x is the case" (which is the second part of the hypothesis) and "you consider whether you perceive that x is the case" entail that you perceive that you do not perceive that x is the case (by the second note) and (since "knowing" and "perceiving"

43 John of Holland, *Sophismata*, B 52^{ra}; K 69^{va}; L 223^{vb}: "Tercium quod supponitur est, quod si aliqua propositio repugnat duabus contradictoriis, quod illa est impossibilis. Et voco vnam propositionem repugnare alteri, quando vna alteri contradicit vel quando ex ea et altera sequitur contradiccionem."

44 John of Holland, *Sophismata*, B 52^{ra}; K 69^{vb}; L 223^{vb}–224^{ra}: "Primo quod ista: 'tu dubitas te scire sic esse' repugnat cum ista: 'tu percipis sic esse,' nam ex illis simul sequitur contradiccionem, ergo repugnant. Consequencia patet. Assumptum probo, nam sequitur: 'tu percipis sic esse et tu dubitas te scire sic esse, ergo percipis sic esse et consideras an percipis sic esse.' Consequencia tenet per primam suppositionem, quia dubitare includit considerare. Et ex consequente: 'tu percipis sic esse et consideras an percipis sic esse, ergo percipis te percipere sic esse.' Consequencia tenet per secundam suppositionem et experientiam. Et ultra, ex consequente: '... ergo scis te scire sic esse,' quia idem est scire et percipere quoad propositum. Eciam sequitur ex vna parte: 'tu dubitas te scire, ergo non scis te scire.' Quare sequitur contradiccionem: tu scis te scire et non scis te scire."

are held to be equivalent) that you know that you do not know that *x* is the case. Note that the argument endorses the axiom of negative introspection supplemented by the assumption that an agent pays attention to the relevant mental state. Lastly, you knowing that you do not know that *x* is the case is inconsistent with you not knowing that you do not know that *x* is the case – which is a contradiction.⁴⁵ – That concludes the proof that “you doubt whether you know that *x* is the case” is impossible.

This argument goes beyond Heytesbury in postulating both positive and negative introspection (as opposed to Heytesbury, who only endorsed positive introspection and whose argument had a different form).⁴⁶ Needless to say, the justification seems misleading, as it is formulated for cognitive acts but used to justify negative introspection, where the scope of the higher-order knowledge is the absence of an act. That said, a similar general argument was introduced at that time by John of Holland's contemporary, John Hunter (Johannes Venator Anglicus), whose *Logic* originated between 1360 and 1385.⁴⁷

45 John of Holland, *Sophismata*, B 52^{ra}; K 69^{vb}; L 224^{ra}: “Secundo probatur quod ista: ‘tu dubitas te scire sic esse’ et ‘non percipis sic esse’ repugnant seu claudunt contradiccionem, quia sequitur: ‘tu non percipis sic esse et tu dubitas te scire sic esse, ergo non percipis sic esse et consideras an percipis sic esse vel non.’ Consequencia patet, sicut prius per primam supposicionem. Et ex consequente: ‘tu non percipis sic esse et consideras an percipis, ergo percipis te non percipere.’ Consequencia patet per secundam supposicionem. Et vltra, ‘... ergo scis te non scire,’ quia idem est percipere et scire ad propositum. Et ex vna parte sequitur: ‘tu dubitas te scire sic esse, ergo dubitas te non scire,’ quia dubitato vno contradictoriorum dubitatur reliquum. Et vltra, ‘dubitas te non scire, ergo non scis te non scire’ (supple: ‘sic esse’). Et sic habetur contradiccio, scilicet: ‘tu scis te non scire et non scis te non scire.’”

46 See Hanke, “Scholastická logika ‘věděni’ I” (continued in Hanke, “Scholastická logika ‘věděni’ II,” and systematically summarised in Hanke, “Scholastická logika ‘věděni’ V”) for the analysis of the problem after Heytesbury. The position of John Hunter (see following footnote) was not analysed in these articles. Certain aspects of positive introspection in the extra-logical context of medieval and post-medieval scholasticism are covered in Hanke, “Scholastická logika ‘věděni’ IV.”

47 Bos, *Logica modernorum*, 16. In some ways, the two Johns are similar in developing a Heytesburian analysis of epistemic contexts, but while John of Holland appears to favour the Billinghamian paradigm of *probationes* in the general justification of his approach, John Hunter uses terminist semantics. Hunter's treatise *De scire et dubitare* has been edited by De Rijk in Johannes Venator Anglicus, *Logica*, 418–444. The passages relevant to the problem of iterated modalities are the following: “NULLUS DUBITAT SE CREDERE SIC ESSE (QUOCUMQUE DEMONSTRATO) ... Nam sequitur ‘tu credis sic esse; et tu consideras sufficienter an credis sic esse vel non; ergo tu percipis te credere sic esse et, per consequens, tu non dubitas’” (Johannes Venator Anglicus, *Logica*, 427–428), and: “Nam non sequitur ‘hec propositio est scita a me; ergo scis quod hec est scita a me.’ Nec etiam sequitur ‘ergo scio quod hec non est michi dubia.’ Et causa est quia stat me scire aliquam propo-

While positive (and possibly also negative) introspection is well-documented for Heytesbury in the 1330s and for John of Holland and John Hunter around 1370, where the development seems to have been very similar, the question is whether this similarity can be attributed to a shared, hitherto unidentified source.⁴⁸

While many details must, again, be left aside here, there are two passages which deserve to be at least briefly mentioned as examples of the terminist analysis of epistemic contexts. First, John of Holland likens the analysis of epistemic statements to the analysis of promises, such that “you do not doubt whether A is true” be analysed along the same lines as “I do not promise you a penny” (specifically, in terms of the *suppositio distributiva* and *suppositio confusa tantum*).⁴⁹ The second passage endorses *appellatio forme* in the semantic analysis of epistemic contexts.⁵⁰ Terminologically speaking, the passage seems

sitionem et tamen non considerare an scio illam nec considerare an dubito illam. Et sic conceditur ista conclusio: DUBITO HANC PROPOSITIONEM, ET NON SCIO ME DUBITARE ILLAM. Et negatur ista conclusio: EGO DUBITO HANC PROPOSITIONEM, ET SUFFICIENTER CONSIDERO AN DUBITEM IPSAM VEL NON, ET NON SCIO ME DUBITARE HANC, unde sequitur ‘dubito hanc propositionem, de qua considero sufficienter an dubito ipsam vel non; ergo ego scio me dubitare hanc propositionem’ ... actus dubitationis est michi immanens, et ideo cum considero hoc, constat michi quod est talis actus” (Johannes Venator Anglicus, *Logica*, 443).

- 48 Incidentally, De Rijk’s general characteristic of John Hunter’s *Logic* reads like the description of John of Holland’s *Sophismata* (biographical details aside): “Venator’s work should certainly be associated with what we now call ‘Oxford Logic’ ... he was well acquainted with the works of Walter Burley, William Heytesbury, Richard Billingham, Richard Feribrigge and Henry Hopton ...” (De Rijk, “Introduction,” 8–9).
- 49 John of Holland, *Sophismata*, B 52^{va-vb}; K 71^{rb}; L 225^{rb}: “Respondetur ibi illud negando. Et ad probacionem: ‘tu non dubitas an ista “Deus est” est vera, nec dubitas an ista: “homo est asinus” est vera, et nulla est propositio que est A nisi altera istarum, igitur non dubitas an A sit verum; respondetur ibi negando consequenciam, sicut non sequitur: ‘non promitto tibi istum denarium, nec promitto tibi istum denarium, igitur non promitto tibi denarium,’ nam ille terminus ‘denarium’ stat confuse distributive per distributionem sine qua staret confuse tantum, ergo non valet talis induccio, sicut habebatur in sophismate secundo de insolubili; sic eodem modo est de ista: ‘tu non dubitas an A sit verum,’ quia ibi ‘A’ stat confuse distributive, postquam stetit confuse tantum, igitur non potest illa eciam sic induci.” For scholastic terminist analyses of promises, see Ashworth, “‘I Promise You a Horse’ (1),” and Ashworth, “‘I Promise You a Horse’ (2);” Bos, “Mental Verbs”; Kaczmarek, “‘Promitto tibi equum’”; Klima, “Debeo tibi equum”; Hanke “‘Debeo tibi equum.’” For a parallel analysis of promises in John Holland’s writings, see John of Holland, *Four Tracts*, 23–25.
- 50 John of Holland, *Sophismata*, B 52^{rb}; K 70^{rb}; L 224^{va}: “Tamen iuxta aliqua que posui in primo sophismate de appellacione forme, bene posset fieri obieccio responsioni, quia ibidem recitabatur quod multi ponunt et asserunt, videlicet quod ista verba: ‘scio,’ ‘intelligo,’ ‘volo,’ ‘desidero,’ etc. actum mentis significancia faciunt terminum sequentem appellare suam formam, ita quod dum dico: ‘intelligo hominem,’ quod tunc non solum significatur

close to the *Logica* and *Sophismata* written by Albert of Saxony, which is consistent with Bos's claim of the parallels between the two authors.⁵¹

3.3 The Fifth Sophism: *A magis est scitum quam B*

The background assumption of the fifth sophism is that B is the antecedent of a (scientific) proof, of which A is the consequent; in other words, the question is whether the knowledge of a conclusion can, in some way, be of a higher degree than the knowledge of the premises. The sophism combines traditional and state-of-the-art epistemological views. As for the more traditional features, these include the causal interpretation of inference, the principle that all knowledge arises from what is better known (*omnis scientia fit a notiori*), and the principle that whatever is the cause of a certain property must itself have that property in a higher degree (*propter quod unumquodque tale et ipsum magis*); these can be traced back to the medieval reception of Aristotle.⁵² As for the principles contemporary to John of Holland, the question rests on the assumption that epistemic or doxastic states come in degrees, i.e., are measurable, and the terminological background for the debate consists of the theories of intension and remission as introduced by the Oxford *Calculatores*.⁵³

quod intelligo illam rem que est homo sub ratione humanitatis, sed quod intelligo illam rem sub ratione qua homo, idest quod intelligo illam rem, et eciam intelligo quod sit homo." Incidentally, the first sophism to be cross-referenced here deserves further attention as a confrontation between the "⟨opinio⟩ reuerendi magistri Parisius Byridani ... in loyca sua in illa parte que dicitur *de practica sophismatum*" and the "opinio multorum magistrorum de Anglia," citing Billingham's *Terminus est in quem* and *De sensu composito et diviso*, and "Hapton magister Vxoniensis famosus in determinacione que incipit: *omnis propositio est vera uel falsa*" (John of Holland, *Sophismata*, B 36^{ra}–37^{vb}; K 54^{ra}–58^{ra}; L 208^{vb}–212^{ra}) (see also Di Liscia, "Introduction," 5).

- 51 See Albert of Saxony, *Sophismata*, 3^a pars, soph. 33 (m11^{rb}–^{va}), and Albert of Saxony, *Logik*, 406–408, analysed in Biard, "Les sophismes du savoir." For the context, see again Bos, "Mental Verbs." (Biard, "Albert of Saxony," describes Albert's *Sophismata* as following Heytesbury.) For the parallels between Albert and John of Holland, see Bos, "Introduction," *18*, and "Appendix 2," in John of Holland, *Four Tracts*, 161–166.
- 52 For the causal interpretation of logical inference, see Hanke, "Scholastická logika 'věděni' rv." The two other topics relate to (among others) two Aristotelian authorities: "Necesse est demonstrativam scientiam ex primis, veris, immediatis, prioribus, notioribus, causisque conclusionibus" (*Les auctoritates Aristotelis*, 312 [based on *An. Post.* 1.2, 71b20–22]), and "Non solum necesse est praecognoscere prima principia, aut omnia, aut quaedam, aut conclusionem, sed et magis; propter unumquodque tale et ipsum magis, ut propter quod amamus rem, illud et magis amatum et omnia posteriora scimus et credimus. Per prima ergo, illa magis scimus" (*Les auctoritates Aristotelis*, 313 [based on *An. Post.* 1.2, 72a27–32]).
- 53 See Sylla, *The Oxford Calculators*, for an overview of the debate on intension and remission.

The general structure of the sophism is as follows: it opens with two arguments for either side of “A is more known than B.” The solution breaks down into three parts (explicitly divided in the original text): first there is a discussion of the principle that whatever is the cause of a certain property must itself have that property in a higher degree; the second part is the answer to the question of whether knowledge and belief come in degrees (i.e., can be subject to intension and remission); the third part is the solution to the opening question. As the topic’s relation to epistemic logic seems relatively loose, on the one hand, and, on the other, it requires separate attention, the present overview will be limited to the summary of the section on degrees of knowledge and belief.

The debate is restricted to the evidence-based “scire communiter” (as defined by Heytesbury), i.e., to firm, unhesitating, and factually correct belief regarding contingent events, required, moreover, to be evidence-based.⁵⁴ While John of Holland admits that there are multiple theories of intension and remission, he adopts the one which he views as intuitive and commonly accepted.⁵⁵ The theory employed in the arguments is one to which modern scholarship refers as “admixture theory”: the intensity of a quality is determined by the degree to which the contrary quality is admixed with it in the same body.⁵⁶ In the same way, the intensity of certainty is determined by the degree to which hesitation is admixed with it in the same mind, or by the proportion of evidence to counter-evidence. In this sense, knowledge defined as belief without hesitation cannot be remitted through admixing hesitation without ceasing to

54 John of Holland, *Sophismata*, B 54^{ra}; K 73^{rb}; L 228^{rb}: “Pro responsione ad illud dubium est notandum quod ista argumenta videntur magis pertinere ad ea que sciuntur communiter per evidencias, prout sciuntur contingencia, de quo scire dicit Hesbri: ‘scire est credere aliquid firmiter sine hesitatione cum hoc quod ita sit ex parte rei,’ sicut scio te loqui quando audio te. Et ergo in isto articulo dimisso de scire magis uel maxime proprie, solum de sciencia que est per evidencias in contingentibus est loquendum ...”

55 John of Holland, *Sophismata*, B 54^{ra}; K 73^{rb}; L 228^{rb}: “Et licet iuxta diuersas opiniones de intensione et remissione diuersimode quis posset respondere, tamen ad presens ne prolixia recitatio eorum que alibi habetur fastidium generet, transeundum est hic via magis vulgari.”

56 The most distinct formulations of the theory are the following: “... sicut patet de albedine et nigredine iuxta communiter opinantes, qui dicunt quod intensio et remissio fit per admixtionem contrarii maiorem uel minorem” (John of Holland, *Sophismata*, B 54^{ra}; K 73^{va}; L 228^{va}), and “Vnde communiter dicunt multi, maxime qui ponunt intensionem qualemcumque fieri per admixtionem contrarii maiorem uel minorem ...” (B 54^{rb}; K 73^{vb}; L 228^{vb}–229^{ra}). For the broader context, see Sylla, *The Oxford Calculators*, 201–207. As regards the commonality of the view, John of Holland’s younger contemporary Richard Lavenham criticises the admixture theory based on Gregory of Rimini’s influential commentary on Peter Lombard’s *Sentences*, see Hanke, “Richard Lavenham’s *Tractatus terminorum naturalium*,” 180, 219–220.

be knowledge (in the relevant sense).⁵⁷ However, beliefs can be intensified and remitted, based on the (quantifiable) number and strength of pieces of evidence and counter-evidence, which means that the degree of belief translates to the epistemic or “subjective” interpretation of probability.⁵⁸

As discovered by E. D. Sylla, a similar debate pre-dating John of Holland’s *Sophismata* occurs in John Dumbleton’s *Summa logicae et philosophiae naturalis* (dated before 1349).⁵⁹ Since Lukáš Lička argued for the influence of John Dumbleton on John of Holland’s *Sophismata* in the context of fourteenth-century optics, it is not unlikely that the fifth sophism constitutes another example of Dumbleton’s influence.⁶⁰ While there are prima facie differences between the two texts, their mutual relation is a promising topic for future research.⁶¹ Second, the quantification of probability in this period is noteworthy, since (the mathematisation of) probability has been viewed as being more characteristic of Baroque scholasticism.⁶² Third, as it seems unlikely that there were no other contemporary proponents of this idea, this too encourages further research.

57 John of Holland, *Sophismata*, B 54^{ra}; K 73^{rb-va}; L 228^{ra-vb}; “Et ponitur talis conclusio quod duarum credulitatum, quarum utraque est sine hesitatione, neutra altera magis uel intensius scitur ... Ex ista conclusione sequitur, saltem iuxta sic opinantes, correlarium quod non potest intendi nec remitti sciencia. Probatur, nam sciencia est credulitas sine hesitatione, sicut patet ex descriptione sciencie, prout hic capitur; sed remissio est cum hesitatione; igitur etc.”

58 John of Holland, *Sophismata*, B 54^{ra}; K 74^{ra-rb}; L 229^{rb-va}; “Tunc secunda conclusio est quod credulitas potest intendi et remitti, uel saltem vna credulitas potest esse intensior uel remissior. Ista patet per argumenta post oppositum istius articuli siue dubii facta. Item sunt bene due credulitates habentes ambe evidencias pro et contra, ita quod prima illarum habet plures evidencias et forciores inclinantes ad adhesionem propositionis et pauciores et debiliores inclinantes ad hesitationem seu formidinem eiusdem propositionis, secunda autem habet se econtra; tunc in tali casu manifeste videtur quod prima credulitas est intensior secunda.” See Hájek, “Interpretations,” for the notions of probability.

59 See Sylla, *The Oxford Calculators*, 133–137.

60 See Lička, “An Eastward Diffusion.”

61 My own preliminary assessment is based on Città del Vaticano, Biblioteca Apostolica Vaticana, MS Pal. Lat. 1056, 9^{ra-17rb}. Dumbleton’s logic is currently being researched by Stephen Read and Barbara Bartocci.

62 See Knebel, Wille, and Schüssler, *The Debate*. However, the debate seems to be shifting towards recognising medieval precedents to the post-medieval and early-modern debate on probability. See Schüssler, “Probability.” See also the interesting exchange regarding equiprobability in the pre-Baroque era between Schüssler, “Equi-Probability,” Thakkar, “A Note,” and again Schüssler, “Reply.” Finally see Hanke, “Between Imagination and Gambling,” for the continuity in the application of probability to the definition of logical consequence.

4 Conclusion

Albeit incomplete, the present analysis confirms the picture of John of Holland as a bridge between British and Continental logic. The texts introduce both British (Heytesbury, Billingham, Hopton, Dumbleton, etc.) and Continental (Albert of Saxony, Buridan, etc.) approaches. With respect to John's treatment of epistemic sophisms, his stance can be summarised as "Billinghaming Heytesbury" in the third sophism (with an interesting terminist rereading of Heytesbury's view of modal statements), a strong theory of introspection in the fourth sophism, and the employment of the Calculators' framework in the fifth sophism.

Other than the critical edition of John of Holland's *Sophismata* and a detailed analysis of individual sophisms, the question of the influence of the text remains unanswered. If the view presented above (in section 2) is correct, all currently known copies of the *Sophismata* originated in Prague and their further dissemination was probably a result of *peregrinatio academica*. In the case of the Leipzig manuscript it is hard to resist the temptation to link the fate of the codex to the secession of German masters from Prague after the decree of Kutná Hora.⁶³ At this point, the only further influence of John's *Sophismata* appears to be rare marginal glosses in some of the manuscripts. Provided that the institutional context of the text was John of Holland's teaching at the *Facultas artium liberalium* in Prague, some degree of influence is probable, but to what extent it determined further intellectual production that can be documented by textual evidence is not clear. All this is coherent with John of Holland being an author whose influence was limited to the Central European region, which must not be conflated with a negative judgement regarding his intellectual production, the qualities of which are undeniable. At any rate, the text of John of Holland's *Sophismata* documents the state of logic in Prague around 1370, especially his innovative work with contemporary sources.

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63 See Šmahel, *Die Prager Universität*, 159–171, and Šmahel (partially with Nodl), *Alma mater*, 168–212.

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