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Aquinas and Buridan on the Possibility of Scientific Knowledge

1.

This paper examines a specific but basic problem of Aristotelian natural philosophy which arises if we consider the following three propositions, stated as necessary requirements towards knowledge in the proper sense (quoted now from Aristotle):

I. The soul never thinks without an image.[1]
II. The object of knowledge is of necessity and of the universal.[2]
III. We understand something when we know its causes.[3]

In the following, I deal only with the first two, that is, with the possible reconciliation of the empiricist and the universalistic claim. After outlining the solution of Thomas Aquinas and some criticism of it in the 14th century, I shall call attention to John Buridan, who – despite his apparent Nominalism –, in certain respects, turns out to be surprisingly Thomistic.

2.

Aquinas accepts these two claims, and regards them as preconditions of all scientific knowledge. First, as he writes in his "*De veritate*", "there is nothing in the intellect, which was not prior in the senses"[4] (this empiricist slogan, at least since Duns Scotus, has been often – and incorrectly – attributed to Aristotle). Apart from this and similar statements, as e.g. "the human intellect is at first like a clean tablet on which nothing is written",[5] his empiricism can be observed at several points: he argues against innate knowledge throughout an article in the *Summa*,[6] the concept of

1 *On the Soul* 431a18. All Aristotle translations are from Barnes, Jonathan, ed., *The Complete Works of Aristotle*, the Revised Oxford Translation, 2 vols (Princeton: Princeton University Press, 1995)
2 *Posterior Analytics* 71b15, *Nicomachean Ethics* 1139b23
3 Cf. *Posterior Analytics* 71b10
4 *De Veritate* q.2 a.3 arg.19: Nihil est in intellectu quod non sit prius in sensu.
5 *Summa Theologiae* I, q. 79 a. 2 co: Intellectus […] in principio est sicut tabula rasa in qua nihil est scriptum.
6 *Summa Theologiae* q.84 a.3.

God acquired by the Five Ways is strictly *aposteriori*, and, finally, even human beings cannot know their souls except through observing its acts and effects.[7]

The fullest and most illuminating treatment of the possibility of necessary and universal scientific knowledge can be found in his "*Commentary on Boethius' De Trinitate*", where he asks, "whether science can be concerned with material, changing things".[8] His answer can be summarized as follows:

> 1. Scientific knowledge can be only of necessary things.
> 2. The sensible, individual qualities of things are not necessary.
> 3. Therefore, in sensation one has to differentiate between the very individual thing he senses and the general nature or form it exemplifies.
> 4. This nature can be recognized by abstracting from the source of the thing's individuality – that is, from the signified matter.

Of these, the second point is more or less evident, and we can accept the first as part of the already seen Aristotelian definition of science.

(3) According to the third point, in every sensation we have to recognize not only the thing we sense, but also its essence.

> We find in a sensible substance both the whole or the composite itself, and also its nature or form [...] Now anything can be thought of without all the items that are not essentially related to it. Consequently, forms and natures, though belonging to things existing in motion, are without motion when they are considered in themselves; and *so* they can be the objects of sciences and of definitions.[9]

To understand better, what this nature or form is, and why it is different from the Platonic from which Aquinas in the same place criticizes, consider the following example (it is from the "*Sententia libri de sensu et sensato*"). If one draws a triangle, he cannot do it without an acute or an obtuse or a right angle, a certain size and other, contingent properties. (Indeed, Aquinas would agree with Berkeley in that we cannot even imagine one without these.) But next, when he uses that picture

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7 Cf. *Questiones disputatae de veritate* q.10 a.8*; Sententia libri De Anima* II, 6.

8 *Super Boethii Libri De Trinitate* q.5 a.2: Utrum naturalis philosophia sit de his quae sunt in motu et materia. Translations are from Aquinas, Division and Methods of the sciences: Questions 5–6 of his commentary on the De Trinitate of Boethius, Transl. with an introduction and notes by A. Maurer, 4th ed. (Toronto: Pontifical Institute of Medieval Studies, 1986)

9 *Ibid.*: In substantia sensibili inveniatur et ipsum integrum, id est compositum, et ratio, id est forma eius [...] Unumquodque autem potest considerari sine omnibus his quae ei non per se comparantur. Et ideo formae et rationes rerum quamvis in motu exsistentium, prout in se considerantur, absque motu sunt. Et sic de eis sunt scientiae et definitiones.

to demonstrate that the sum of the angles equals two right angles, his proof will be valid not only for *that* triangle in the picture but all triangles – one can say, for *the* triangle in general.

That does not mean that *the* triangle as such exists; it is only in the mind, as a concept:

> Natures of this sort, thus abstracted, can be considered in two ways. First, in themselves; and then they are thought of without motion and determinate matter. This happens to them only by reason of the being they have in the intellect. Second, they can be viewed in relation to the things of which they are the natures; and these things exist with matter and motion. Thus they are principles by which we know these things.[10]

From the above example it is also manifest how this form or rule can be the principle of knowledge: after proving the thesis about the angles of a triangle, one can know that it holds even in such cases he has never seen (not to mention the calculations he could do with the help of it).

A possible objection against the example is that it is mathematical, while the question is not about mathematics but the possibility of empirical knowledge of natural sciences. We have to keep in mind, however, that the difference between natural science and mathematics, according to Aquinas, is only a focal one: the latter uses a higher level but basically the same kind of abstraction as the former.[11]

(4) Finally, in the fourth point it becomes clearer, what this abstraction exactly means. Since the main problem of knowledge in the natural sciences derived from the changing nature of things, the primary object of abstraction is change. Moreover, since change always occurs during a certain time and in a certain place which is determined by the particular, signified matter of the thing, to arrive at a proper knowledge it is necessary to abstract from that matter and from each property which specifically belongs to it. That, however, does not necessarily involve the abstraction from matter in general (this is the kind of abstraction what mathematics uses): the essence or quiddity of a material entity contains not only the Aristotelian form but the general matter as well.[12] For example, if I look at this orange in front of me,

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[10] *Ibid.*: Possunt ergo huiusmodi rationes sic abstractae considerari dupliciter. Uno modo secundum se, et sic considerantur sine motu et materia signata, et hoc non invenitur in eis nisi secundum esse quod habent in intellectu. Alio modo secundum quod comparantur ad res, quarum sunt rationes; quae quidem res sunt in materia et motu. Et sic sunt principia cognoscendi illa, quia omnis res cognoscitur per suam formam.

[11] *Super Boeth. De Trin.* q. 5 a. 3.

[12] Cf. *ibid.* a. 2: Huiusmodi autem rationes, quas considerant scientiae quae sunt de rebus, considerantur absque motu. […] Cum autem omnis motus tempore mensuretur et primus motus sit motus localis, quo remoto nullus alius motus inest, oportet quod secundum hoc aliquid sit mobile, quod est hic

and want to know something about its nature, I have to abstract from its particular matter, colour, this bash on its top etc., but must not abstract the matter which is common to all oranges, since it is part of its orange-ness.

Clearly the greatest difficulty of the outlined method is that while in mathematics it is more or less easy to determine the essential characteristics of a triangle, when we are confronted simply with an orange, we are not really sure whether its colour fall under its essential or accidental properties. Therefore, it is hard – if not impossible – to specify, from which qualities should we, and should we not abstract during an empirical observation. Aquinas admits the difficulty, but does not offer a magical tool for essence-cognizing:

> The truth of things consists in the apprehension of the things' quiddity. The rational souls, however, cannot apprehend this quiddity per se, but only through wandering around its accidents and effects which environ it, acquiring the truth through them, [...] judging the causes by its properties and effects.[13]

Therefore, one has to do what scientists have always done: to examine more and more cases, and in the light of this sometimes to refine the ideas about the quiddity of a certain species. We have to remember, however, that the natural philosopher of the 13th–14th centuries, in that respect, was in a more hopeful situation than the scientist of our era is: while the latter is expected to find a rule or form which is true of *all* entities in the world within a given species, consequently he has to modify it whenever a single counterexample appears, the former did not claim truth for his hypothesis without exception. As e.g. Albert the Great put it, nature is like an artist, who tends toward a given goal, but sometimes fails to acquire it. We can also find monsters in nature, especially as its goal is much more complex than of any human art; nevertheless, the natural philosopher does not have to consider these shoddy specimens.[14] (Albert left open the central albeit probably unanswerable question, namely that how many exceptions there need to be in order to change a hypothesis.)

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et nunc. Hoc autem consequitur rem ipsam mobilem, secundum quod est individuata per materiam exsistentem sub dimensionibus signatis. Unde oportet quod huiusmodi rationes, secundum quas de rebus mobilibus possunt esse scientiae, considerantur absque materia signata et absque omnibus his quae consequuntur materiam signatam, non autem absque materia non signata, quia ex eius notione dependet notio formae quae determinat sibi materiam.

13 *Super De divinis nominibus* c.7 l.2: Veritas enim existentium radicaliter consistit in apprehensione quidditatis rerum, quam quidditatem rationales animae non statim apprehendere possunt per seipsam, sed diffundunt se per proprietates et effectus qui circumstant rei essentiam, ut ex his ad propriam veritatem ingrediantur. Haec autem circulo quodam efficiunt, dum ex proprietatibus et effectibus causas inveniunt et ex causis de effectibus iudicant.

14 Cf. *De praedicabilibus* VII, 2, VIII, 10

To summarize, the main point in Aquinas' solution to the problem of scientific knowledge is the concept of abstraction. He presupposes first, that in the things there really exists an essence or quiddity, which is not liable to change and so can be the base of scientific knowledge; second, that we are – at least in the long run – capable of acquiring knowledge of this essence, because, third, that things which have a common nature, behave according to this nature, therefore more or less uniformly. (That latter principle can be labelled as the *uniformity of nature*, which – at least since Robert Grosseteste – had been so central to 13th-century natural philosophy and was accepted but never proved by Aquinas.)

3.

In the end of the 13th century, these presuppositions became highly questionable. The Parisian Condemnation of 1277, emphasizing the role of God's *potentia absoluta*, claimed that it is erroneous to suppose that a cause can make a certain effect only,[15] questioning therefore the uniformity and, consequently, the knowability of nature. Several points called attention to the contingency of cause–effect relation, the absolute power of God who can make an effect without its secondary cause or can conserve any thing (including any accidents without its substrate) destroying whatever other, and the fallibility of human knowledge.[16] Therefore, instead of supposing a common nature in similar things, as Aquinas did, the "standard" 14th-century view became that there is simply no such natures, but everything there exist in the world is individual, with individual nature and contingent qualities.

It is not easy to determine the impact of the Condemnation on the development of natural sciences, nor is it obvious, whether that impact was a negative or rather a positive one. As Pierre Duhem pointed out,[17] it helped to question some basic but problematic principles of Aristotelian natural philosophy (such as the principle of motion and weight), gave rise to new thought-experiments about naturally impossible but strictly speaking possible physical situations, many of which later turned out to be *de facto* real (such as the existence of and motion in the vacuum), and it forced natural philosophers to rely less on their senses than their mathematical calculations.

Beside these, however, the emphasized contingency of nature fundamentally questioned the possibility of – otherwise helped and inspired – natural philosophy. The primary question which had to be answered was that why we are able to acquire *any* knowledge of the world if it is ruled by contingent laws; why it is possible to

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15 Cf. 160: Quod nullum agens est ad utrumlibet, immo determinatur.

16 Cf. e.g. 48., 50., 102., 138., 140., 147.

17 Duhem, Pierre, *Le systéme du monde, Histoire des doctrines cosmologiques de Platon à Copernic*, 10 vols. (Paris: A. Hermann, 1913–1915)

make general, scientific statements about it, or how we can know anything at all, if the inference from accidents to subject, from effects to cause, or from one occurrence to a general rule is invalid.

In the light of this, William Ockham e.g. claims that science, strictly speaking, is not about the world but our mental concepts only – which is, as Gregory of Rimini pointed out, a clever answer, but a not very credible one. (When a mathematician considers a triangle, he does not only have propositions in his mind; or when a doctor cures, he does not cure the concept of the patient as it exists in his mind, but the patient himself.) His epistemology, moreover, opened such a way to scepticism that led to the probabilistic natural philosophy of Nicholaus of Autrecourt and to the general rejection of empirical data as a reliable foundation of knowledge (that is, to the "natural philosophy without nature"[18] of the late 14th century).

4.

John Buridan, who is often labelled as the "quintessential empiricist of the 14th century",[19] does accept the first two Aristotelian requirements toward scientific knowledge. His solution to the problem of the empirical origin and universality of science can be reconstructed as follows.

> 1. A scientific proposition – to be necessary and universal – has to consist of essential predicates.
> 2. A predicate, to be essential, has to denote a substantial concept of a thing.
> 3. Sensory information about sensible accidents does carry information about the substances to which these accidents belong.
> 4. The intellect, being active, can form from this information the substantial concept, and, through its inclination to verity, can arrive at true, universal knowledge.

(1) Without deeply examining Buridan's philosophy of language, it has to be pointed out that an essential predicate is one that is, contrary to accidental ones, signifies its significata absolutely, not in connection to anything else:

> We call the predication of a term of another 'essential' if neither of these two terms adds some extrinsic connotation to the things they supposit for. There-

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[18] Murdoch, John Emery, 'The Analytic Character of Late Medieval Learning: Natural Philosophy without Nature', In: *Approaches to Nature in the Middle Ages*, Roberts L. D. ed. (Binghamton, New York: Center for Medieval and Early Renaissance Studies, 1982)

[19] E.g. Grant, Edward, 'Jean Buridan and Nicole Oresme on Natural Knowledge', *Vivarium* 31 (1993), pp. 84–105 (p. 84.)

> fore, although the term 'animal' signifies more [things] than the term 'man', nevertheless, it does not appellate over and above the signification of the term 'man' anything having to do with man, i.e., as something pertaining to man. A predication is called 'non-essential', or 'denominative', if one term of it adds some extrinsic connotation over the signification of the other, as for example 'white' supposits for a man and appellates whiteness as pertaining to him. Therefore the predication 'A man is an animal' is essential, whereas the predications 'A man is white' or 'A man is risible' are denominative.[20]

That means that an essential predicate can never become false of its subject, unless that subject ceases to exist: e.g., the predicate 'black-haired' can be once true of Socrates, but in the moment he becomes white, the proposition 'Socrates is black-haired' becomes false; therefore, it is not an essential, but an accidental one. On the contrary, the predicate 'man' or 'rational animal' will be always true of him, and becomes false only when he dies. Obviously, from accidental terms it is not possible to form necessary, scientific propositions.

(2) It is easy to see from this definition that essential predicates stand for substantial, therefore absolute concepts (such as the concept of "man"), while accidental predicates or relative terms are subordinated to connotative or relative concepts (such as the concept of "black-haired").

> For the soul can think of things by two kinds of concepts. In one way, it thinks of things without comparing things to one another, and it is by the mediation of such concepts that the soul imposes the terms 'man' [...] to signify; such concepts therefore are to be called 'absolute', properly and primarily, and consequently also the spoken terms subordinated to these concepts are called 'absolute terms'. In another way the soul thinks of things in relation to one another, comparing one to another, and such concepts are properly called 'relatives' and 'relations', for it is by these that the soul relates and compares things to one another. It is by the mediation of these concepts that

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[20] *Summulae de dialectica* 2.5.2: Vocamus autem essentialem praedicationem alicuius termini de aliquo alio termino cuius neuter terminus super significationem alterius addit aliquam connotationem extraneam circa ea pro quibus unus illorum terminorum supponit. Unde licet iste terminus 'animal' plura significet quam iste terminus 'homo', tamen ultra significationem istius termini 'homo' nihil appellat circa hominem, id est per modum adiacentis homini. Praedicatio autem non essentialis sed denominatiue uocatur cuius unus terminus super significationem alterius addit alienam connotationem, ut 'album' supponit pro homine et appellat albedinem sibi adiacentem. Ideo haec praedicatio est essentialis 'homo est animal'; et haec est denominatiue 'homo est albus'. Translations are from Buridan John, *Summulae de Dialectica*, an annotated translation with a philosophical introduction by Gyula Klima (New Haven, London: Yale University Press, 1986)

> those spoken terms are imposed to signify, which, accordingly, we call 'relative', or 'respective terms'.[21]

The question is, therefore, that how one can come by such substantial concepts, if the sensory information of a thing is merely accidental.

(3) To answer this problem, Buridan first rejects the view of Avicenna, who claims that cognition of substance arises merely out of accidental qualities. On the contrary, he insists that accidental sensory data does contain some hidden information about the substance of the thing which is, however, not extractible by the senses, but only by the intellect which can thus form the substantial concept of the thing.[22] To illustrate it with an example by Gyula Klima, when one looks through a telescope to a star, he sees only the light of it; but the information carried by the very same telescope, by means of a spectral analysis, can inform him about its matter, age and other properties.[23]

(4) In place of spectral analysis, in everyday sensation, human beings have their intellect which is not a passive receptor but an active agent that extracts further information from the sensed qualities. For example, if one sees Socrates as white, and then sees him as black, his intellect can inform him that the whiteness and blackness is not contained in the substance of Socrates. That is a piece of information, however, what the senses alone could not process.[24]

Answering the question of the possibility of *universal* scientific knowledge, Buridan, due to his Nominalism, cannot rely on the solution of Aquinas. His explanation, instead, rests on the notion of the intellect's natural inclination to verity:

> Experience, deduced from many observations and memories, is nothing else than induction from singulars, through which the intellect […] due to its natural inclination towards verity, concedes to a universal proposition.[25]

Therefore, the human intellect, departing from the singular concepts of things, arrives at a general concept; it can do so not only through discursive reasoning, but

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[21] *Ibid*., 3.4.1: Duplici enim conceptu potest anima intelligere res. Uno modo sine comparatione earum ad inuicem, et sic mediantibus talibus conceptibus imponit anima ad significandum istum terminum 'homo' […]; tales ergo conceptus uocandi sunt 'absoluti', proprie et primo, et consequenter termini uocales illis conceptibus subordinati etiam dicuntur termini 'absoluti'. Alio autem modo anima intelligit res in ordine ad inuicem, comparando hanc ad illam, et tales conceptus uocantur proprie 'relatiui', et 'relationes', quia eis anima refert et comparat res ad inuicem. Et mediantibus illis conceptibus imponuntur ad significandum termini uocales quos uocamus consequenter 'terminos relatiuos'.

[22] *Questiones in De Anima*, l. 1. q. 5.

[23] Cf. Klima Gyula, *John Buridan* (USA: Oxford University Press, 2009) p. 99.

[24] *Questiones in De Anima* l. 1. q. 5.

[25] *Quaestiones super octo Physicorum libros Aristotelis* I, q. 15: Experientia ex multis sensationibus et

– this inclination being natural – also through simple apprehension. These general concepts might not bear the evidence of the first logical principle, but – contrary to Autrecourt – nor do they need to.[26]

5.

Some interesting points in the Buridanian solution clearly show that he is, in certain respect, more akin to Aquinas than either to his Nominalist contemporaries or to the empiricism of the 18th century. We shall recall the three basic presuppositions ascribed above to Aquinas.

First, Buridan does accept, like Aquinas, that there are substances in the sensible things, above or beyond their sensible qualities, which can be the subject of scientific propositions. The Thomistic and the Buridanian essence might be different in its generality and individuality – Buridan, due to his Nominalism, cannot escape from the problem of induction which was, for Aquinas, no problem at all –, nevertheless, its existence and mode of existence is similar in both thinkers. The exact contemporary of Buridan, Nicolaus Autrecourt, was not very clear on the subject, but he would probably agree with Hume in that our belief in substance is merely a result of illusion.[27]

Secondly, Buridan claims that we do have concepts and knowledge of these substances (as Aquinas does as well). Autrecourt explicitly rejected this claim, saying that "we do not possess certitude concerning any substance conjoined to matter other than our own soul".[28] Similarly, if the British empiricists were right, we can make sense of our substantial terms only if we associate them with relatively stable collections of sensory ideas, as can be seen e.g. in John Locke:

> The mind being […] furnished with a great number of the simple ideas conveyed in by the senses […], takes notice, that a certain number of these simple ideas go constantly together […] we accustom ourselves to suppose some substratum where they do subsist […] which therefore we call 'substance'.[29]

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memoriis deducta non est aliud quam inductio in multis singularibus, per quam intellectus […] ex eius naturali inclinatione ad veritatem, concedere propositionem universalem.

26 Cf. *Questiones in Aristotelis Metaphysicam*, II, 1. On the contrary, cf. Nicolaus of Autrecourt, Secunda epistola ad Bernardum and Exigit ordo 230.

27 Cf. Hume, David, *A Treatise on Human Nature*, I. 4. 3.

28 *Secunda epistola ad Bernardum*: De aliqua substantia coniuncta materie alia ab anima nostra non habeamus certitudinem… Translations from Nicholaus of Autrecourt, *His Correspondence with Master Giles and Bernard of Arezzo*, Critical edition and translation by L.M. De Rijk (Leiden, New York, Köln: E. J. Brill, 1994).

29 *An Essay concerning Human Understanding*, II, 23.

This Lockean quotation can be illuminating since Buridan argues clearly against such a view. His point is that if we had a complex concept of substance, it would be made out of simple concepts, for the analysis of concepts cannot go into infinity. Now, these simple concepts are either concepts of substance, or of accidents. If the former, we are ready, because we have simple substantial concepts. The latter – which is the British Empiricists' conception – cannot be the case: if it were made out of accidental concepts, would be itself accidental, therefore could not be predicated essentially. Consequently, it could not serve as a basis for valid scientific generalizations.[30] It was exactly this point, what Hume (and Autrecourt before him) made explicit.

The third point is that in order to have a simple cognition of substance which is based on sensory experience, Buridan has to maintain that from one incomplex cognition it is possible to arrive at another one (so, e.g., from the incomplex cognition of qualities to the cognition of substance). It is precisely the claim what Ockham, and following him, Autrecourt denies;[31] but it is exactly this premise what is inherent in Aquinas' principle of the uniformity of nature which claims that by means of a cognition of a thing we can have a simple, non-inferential cognition of other things of the same nature.

Finally, some of Aquinas' and Buridan's arguments may seem circular which is due to a further similarity between them: as a starting point they both supposed, contrary to Autrecourt, that the human intellect do have scientific knowledge, and only then they examined its preconditions. The general way of treating the matter, since the 14th century (at least since Autrecourt), through the British empiricist till nowadays, has been the reverse: we usually ask, *whether* and *why* human beings can at all acquire reliable knowledge, and only rarely scrutinize its mechanism.

6.

To summarize, it could be seen that the possibility of scientific knowledge in the Aristotelian sense is particularly problematic in an empiricist framework. Aquinas provided a detailed answer, the ontological commitments of which, however, were in strong opposition to the Nominalist tendency of the 14th century. John Buridan,

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30 Cf. *Questiones super octo libros Physicorum Aristotelis*, l. 1, q. 4: Item si conceptus substantialis hominis sit complexus, ponamus quod hoc sit ex tribus conceptibus simplicibus, scilicet a, b, et c. Tunc si nullus conceptus substantiae est simplex, a non esset, nisi conceptus accidentis, et similiter nec b, nec c. Igitur totum complexum ex eis non esset conceptus, nisi accidentium et non substantiae, cum totum nihil sit praeter partes. Sed hoc est absurdum, scilicet quod conceptus substantialis hominis non sit nisi conceptus accidentium; igitur, etc.

31 Cf. Ockham: *Ordinatio prol.* q. 9.; Autrecourt: *Secunda epistola ad Bernardum.*

standing by his Nominalist ontology, presented another answer, which is in certain points, however, bears strong resemblances to the Thomistic one.

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ÖSSZEFOGLALÁS

Tóth Zita Veronika

Szent Tamás és Buridan a tudomány lehetségességéről

Minden arisztoteliánus ismeretelméletnek és tudományfelfogásnak (tudomány alatt itt most elsősorban *philosophia naturalis*t kell érteni) alapvető nehézsége az alábbi két állítás összeegyeztetésében áll: egyrészt, hogy ismereteink forrása az érzékelés, amely egyedi, kontingens dolgokra irányul; másrészt pedig, hogy a tudomány állításai általánosak és szükségszerűek. Előadásomban két, egymástól lényegileg eltérő megoldását mutatom be e problémának, amelyek különbözősége a mögöttük lévő metafizikai és ismeretelméleti diverzitásból fakad: Szent Tamás és Jean Buridan tudománykoncepcióját. Tamás válasza a tudomány lehetőségének kérdésére az absztrakció fogalmára támaszkodik: érzékeinkkel megragadjuk az egyedi dolgot, majd az aktív intellektusunk absztrahálja belőle azt az általános természetet, a *species intelligibilis*t, amely a tudományos kijelentések alanyául szolgálhat. Megoldásának előfeltétele azonban – t.i., hogy a tárgyakban jelen van valami univerzális, amelynek megfelelően a természet mindig működik – az 1277-es párizsi elítélő határozatok következtében egyre inkább megkérdőjeleződik. A 14. századi, jellemzően nominalista metafizika számára ezért két alternatíva adódik: vagy elvetik a fönti második premisszát – hogy a tudomány általános és szükségszerű –, mintsem hogy Isten mindenhatóságát korlátozzák a természet uniform működése által; vagy pedig azt kérdőjelezik meg, hogy a tudomány a világ dolgairól szól. A kor ebből a szempontból egyik legérdekesebb gondolkodója Buridan, aki nominalizmusa és empirizmusa ellenére megpróbálja fenntartani mind a tudomány egyetemességébe vetett hitet, mind pedig azt, hogy a tudomány reális dolgokra vonatkozik. Tudományfelfogásának elemzése azonban megmutatja, hogy ennek következtében metafizikája és ismeretelmélete jelentős pontokon közelebb áll Tamáséhoz, mint korának nominalizmusához és a későbbiekben jelentőssé váló empirizmushoz.