THE NATURAL ORDER IN JOHN BURIDAN

Joel Beard

The concept of a "natural order" or "order of nature" has two correlative aspects, both of which I aim to evaluate in the context of Buridan's thought and its crucial role in the development of fourteenth-century natural philosophy. First is the idea (to put it somewhat anachronistically) of the law-governed structure of nature, i.e., of the status of physical laws. Second is the question of the consistency of nature to the extent that it is distinguished from other orders, which can be said to be supernatural. On the side of the supernatural, there is the question of divine intervention, which in the time of Malebranche or Pascal came to be called "the order of grace," but which must be considered here in its whole amplitude, i.e., not only via the question of the salvation (which is not a Buridanian question), but also through every form of divine omnipotence, as well as the order of human liberty, which was becoming increasingly important in Buridan's time. 1

1. Consistency and Autonomy

Questioning the consistency of nature would of course be closest to the medieval way of thinking about this problem. With respect to the Creator, nature stands in a contradictory relationship of dependence and relative autonomy, whose formulation changes throughout the Middle Ages. Already in the twelfth century, we have the concept of an autonomous law-governed structure delegated to creation by the Creator. If, on the one hand, the symbolic approach of the world runs the risk of reducing it to a mere vestige, a trace bearing no agreement to that of which it is the sign, the sanctity of the created world is, on the other hand, an invitation to study nature in all of its details. And finally, the creative abundance manifests itself in a dynamic nature. Nature is not only, as it is in Aristotle, the internal principle

1 Translated by Jack Zupko

1 In his "In Metaphysica" (Paris, 1518), Book II, q. 1, John Buridan distinguishes several senses of 'natural' besides the two mentioned here. But the senses I am concerned with can be found in John Buridan, "In Metaphysica" (Paris, 1518), II, 2, fol. 9v-10r.
of the movement of a substance that is always individual, but the creative energy of a great living being considered as a whole, in the way suggested by Plato's *Timaeus*, often the subject of commentaries from the period.

Aristotelian physics as such does not force us to consider the problem of the consistency of nature in its autonomy relative to a creator God – in fact, the prime mover has a completely different function in Aristotle's physics and metaphysics. But the question arises immediately in the confrontation with Neoplatonism and monotheist theologies, first in the Muslim-Arabic world, and then in the Christian Middle Ages.

Returning to Buridan, we must remember that the Picard master – his origins are now well known – is very much a part of a tradition of Parisian thought which had been evolving since the time of Albert the Great. This tradition is marked by the tendency to develop a natural (or naturalist) discourse having its own proper field of rationality and legitimacy, without recourse to theology, or without even assuming itself to be in conversation with theology, but claiming that its own modes of reasoning are specific to it. This claim, which is broader than the field of the natural philosophy alone but which concerns the whole of philosophy, including ethics and, to a large extent, metaphysics, is at the heart of the debate during the years 1260–1270, in which Bonaventure, Thomas Aquinas, and Siger of Brabant were among the chief protagonists. By asserting the autonomy of philosophical reason in questions such as the eternity of the world, the idea was promoted of reason as a natural faculty, exploring its object with its own proper means. It is thus hardly surprising that we should find this idea conveyed in Latin by the use of adverbs such as *philosophice* (philosophically), as well as the expressions *loqui naturaliter* (to speak naturally) or *naturaliter loquendo* (naturally speaking). The origin of these expressions can be found in Albert the Great. In this sense, the concept of reason as a natural faculty implies the relativization of physical discourse and even its subordination to superior sciences, though, at the same time, it defines a field in which the philosopher or natural scientist can move with relative independence. This attitude and the expressions associated with it seem to be more easily accepted in the fourteenth century.

\[\text{\footnotesize \textsuperscript{2}}\text{ Aristotle, *Phys.}\ II 1.192b21–23: "... nature is a principle or cause of being moved and of being at rest in that to which it belongs primarily, in virtue of itself and not accidentally."}\n
\[\text{\footnotesize \textsuperscript{3}}\text{ See Bianchi ca., *De vita dissonantia*, Chapter 2: "Loquens ut naturalis."}\]
than they were some decades earlier, e.g., in the crisis of the 1270s.

In any case, it must be emphasized that Buridan never ceases to assert
the natural character of philosophical discourse in order to define
its field of validity and autonomy: "... in natural philosophy we must
understand actions and attributes as if they always occurred in a
natural way; thus, God is no less the cause of this world and the order
found in it than he would be if the world were eternal."\(^1\)

But Buridan most often contrasts the word *naturaliter* with *supernaturaliter.* Thus, on the question of whether the heavens are generable and corruptible, he remarks that "we must hold on the basis of
faith that the heavens are supernaturally (*supernaturaliter*) created,
and also that they are capable of being annihilated. But it must also
be said that the heavens are not naturally (*naturaliter*) generable or
corruptible."\(^2\) "Supernatural" refers here, first, to divine intervention
in the course of nature. But if we compare this with the theological
distinction between absolute and ordained power, we can note two
modifications. First, if Buridan's concept of the supernatural involves
this distinction — and in the notion of "ordained power" there is al-
ready the idea of created order — it is being used not so much in its
properly theological formulation as in a way that would make sense
from the perspective of Masters in the Faculty of Arts, who used it to
establish domains of competence. More than deepening the distinction
between the two powers properly speaking, Buridan regularly
appeals to "omnipotence." This is either (1) to introduce imaginary
hypotheses contradicting Aristotelian principles — e.g., the appeal
to "... a certain Parisian article (from the Condemnation of 1277)
(quotand articulas Parisiensis)" in arguing that God could move
the world even if there were no other body relative to which it could be

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\(^1\) John Buridan, *Expositio et questiones in Aristotelis De coelo* [Patav.], Book II, q. 19,
p. 121. (also John Buridan, *Questiones super libros quattuor De coelo et mundo*
[Moods], p. 104): "Modo in naturali philosophia nos deberem actiones et dependen-
tias recipere; ne si semper procederent modo naturali, unde non minus Deus est
causa mundi mundi et ordinationis eius quam si iste mundus fuit aeternus."

\(^2\) John Buridan, *Expositio et questiones in Aristotelis De coelo* [Patav.], 110, p. 278.
(John Buridan, *Questiones super libros quattuor De coelo et mundo* [Moods], p. 42):
"Primo ergo de generatione vel corruptione, tuncendum est secundum siquid
caecum est *supernaturaliter* creatum, et etiam est annihilabile. Sed dicendum
etiam quod caecum nec est generabile *naturaliter* nec corruptibile." See also
John Buridan, *Expositio et questiones in Aristotelis De coelo* [Patav.], 127, p. 288. (John
Buridan, *Questiones super libros quattuor De coelo et Mundo* [Moods], p. 118), where
Buridan contrasts "speaking from the perspective of divine power" and "speaking in
accordance with natural powers."
situated— or, most frequently, (2) to leave room for affirmations of faith apparently contradicted by rational arguments. The systematic appeal to divine omnipotence was considered a theologian’s way of thinking. As such, it established a domain the philosopher must avoid entering, in keeping with the *modus vivendi* of the statute of April 1, 1272: “We state and ordain that no Master or Bachelor of our Faculty ... should presume to determine, or even to dispute, any purely theological question where doing so would transgress the boundaries assigned to him.”

But what does the methodological autonomy of physical discourse imply from the perspective of the things themselves, i.e., from what Buridan calls, in contrast to “supernatural cases (*casus supranaturales*),” the “common course of nature (*communs cursus naturae*)?”

### 2. Order and Necessity

The question of the natural order emerges primarily in developments surrounding the concept of necessity. There is nothing sur-

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6 See John Buridan, *Quaestiones super ad Physicam abhinc Aristotelis* (Paris, 1504), Book III, q. 7. Buridan wants to show that motion is distinct from place and the moved body: “Ad secundum dico quod non plus requisitum est inveniens quod esset motus et nihil movatur, quam quod esset albedo et nihil esset albus. Neutrum est possibile naturaliter, et utoque est possibile supernaturaliter” (John Buridan, *op. cit.*, III, 7, fol. 32r).

7 See, e.g., Buridan’s discussion in the *Quaestiones super quinque libros Ethicorum Aristotelis* (Paris, 1543) of how two distinct things (in particular, intellect and enjoyment) are separable by divine power: “Quia tunc, ipso mense ille altius ablatus, sicut anteri possunt per potentiam dei absolutam (ut aliqui theologici dixerunt), adhuc homo esset felix sicut lapis esset albus manente in eo albedo, omnibus accidentibus remolis ... Et confirmatur fortius, quia dicitur ali theolocig quod in anima Sotis cum clara Dei visu possit Deus formare triumphant sine detectione, et ordine Dei simili amore.” (John Buridan, *op. cit.*, X, 4, fol. 202v).

8 Denifle e.a. (eds.), *Chartularium Universitatis Parisiensis*, I, n. 111, p. 199. “Sunt minus et ordinarios quod nullus magister vel baccellarius nostrae facultatis aliquid questionem pure theologicam ... determinatur securn disputaret praesumat quinque sibi determinatos limites transgrediens.”

9 See, e.g., John Buridan, *Quaestiones super ad Physicam abhinc Aristotelis* (Paris, 1504), III, 12, fol. 51r: “Utrum omnis motus est subjective in mobili vel in movente vel in utroque.” See also John Buridan, *op. cit.*, II, 43, fol. 21r, where the supernatural does not suggest anything other than the direct and determinate action of God: “Sed Deus per suum infinitum potentiam et voluntatem liberam potest sine alia causa consequenti producere et create diversos effectus contrarios in eodem tempore, sive in diversis, et hoc modo supernaturali et miraculosi, tamen modo naturali non esset possible.”
prising here. Aristotelian or graeco-arabic necessitarianism had been a target of conservative theologians since the 1370s. These theologians relied more on a concept derived from Alfarabi and Avicenna of the emanation of the universe from God and the first intelligence, than on Aristotle himself, for whom the chance has a place in sublunary world. The picture of a world in the grip of natural necessity is nevertheless opposed to the Christian idea of free creation by divine decree, extending not only to the actual contingency of the created order – for authors such as William of Ockham show that regularity is certainly consistent with the global contingency of the created order – but also to the possibility that God would intervene in this order. This possibility is in no way denied by Buridan. On the contrary, it is precisely what is indicated by the hypothesis of the casus supernaturalis, which is assimilated to a miracle. But the question of what sort of necessity is at issue here becomes a problem to be considered once the supernatural is left aside.

The question of necessity does not immediately take the form of knowing how to redeem laws or rules. On the one hand, it seems to be admitted a priori, at least in a certain field whose limits can be defined. Thus, in Book II, Question 13 of his Questions on the Physics, Buridan asks about the origin of necessity in natural operations as if this were a matter of course: “Does the necessity that occurs in natural operations have a final or a material cause? (Utrum in operationibus naturalibus necessitas provenit ex fine vel ex materia?).” On the other hand, this leads to the question of the order of the universe in the sense of the organization (whether hierarchical or not) of the substances that compose it – a question that should be resolved in the interplay of efficient and final causality.

Book II, Question 13 is initially concerned with the relation between what acts by nature and what acts by will. We see already that nature refers to a field (it would be better to say “an order,” though not in the sense of an ordered disposition, but in the way Pascal speaks of three orders), defined by the difference that is for him constitutive, in the first instance, not of the order of the miraculous, but of human free will. Nevertheless, if “acting by will” leads us to posit a sort of liberty of indifference (I will return to

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10 See, e.g., John Buridan, op. cit., II.5, where Buridan sets aside “miraculous or supernatural” se in his discussion of the role of substantial forms or dispositions in actions or operations.

11 I will return to this below.

12 Blaise Pascal, Pensées [Lafuma], Fragment 308.
this), "acting by nature" invites us to ask about what it is that governs natural operations if we do not admit any ontological necessity in the relation between natures and if we emphasize the singularity of first substances.

Buridan begins to entertain such an order by presenting "materialist" arguments, which he will later refute. These are mechanist arguments, which see in the dispositions of things the only foundation for their operations and movements. In this way, rain would follow necessarily from changes in elevation, insofar as it would be made lighter through rarefaction, then fall as it became heavier through condensation. His reasoning opposes final and material causes, and refers to Aristotle, though it presupposes a total reevaluation of the significance and place of final causation. Our author remarks elsewhere that "this question is difficult enough," precisely because of its relation to the question of final causation. He gives a long list of details in the form of theses or "conclusions (conclusiones)," which I will consider in order, giving particular emphasis to those that concern the question presently under discussion.

First, the order of nature things comes "primarily and principally (primo et principaliter)" from one sort of supreme end, which is God himself:

Every order that is good and right in the operations and dispositions of natural beings arises primarily, principally, and originally from that best end for the sake of which everything else exists and acts or is acted upon in its first intention, viz., from God himself.

This supreme end for the sake of which things are what they are, and are ordered as they are ordered, is the first and principal cause of everything that is good in the universe. In Book II, Question 5, Buridan also insists that God is the first and principal agent of everything that happens, a role to which Avicenna gave the name *dator formium*:

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14 The proposed model is that of rain, which cannot but remind us of the teaching of Lucretius. See *Lucretius, De rerum natura*, II, 221-222.

15 I here summarize material from my article already published under the title "L’idée de nature."

16 John Buridan, *op. cit.*, II, 13, fol. 39b. "Omnis ordo bonus et conveniens in operationibus et dispositionibus c unstum naturalium provenit primo et principaliter a primo abi llo fine optimo gratia enim omnia ad aha sunt et agunt vel pertinent primo intentione, sol vicit ab ipso deo."
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One [end] is the giver of forms (dator formarum), as Avicenna states, who acts in relation to everything that happens as the common and first and altogether most principal agent, and this is supreme God. But second, this supreme end or first cause is not sufficient to explain the order of the universe, since it would be impossible to explain the diversity of effects and events by referring only to a first cause that is by definition absolutely simple. This leads Buridan to emphasize that, if we leave aside cases of the supernatural or miraculous, other agents must contribute. The argument here reasons from divine unity and perfection to the insufficiency of these attributes in the explanatory order. The problem is clearly that of moving from one to many, a remote echo of the Neoplatonic side of medieval Aristotelianism, as well as of the thesis, deriving from Alfarabi and Avicenna, that God can immediately produce only a first intelligence.

This question of the move to the many is linked, in a curious way, with that of omnipotence. The latter principle, which is theological in origin and nature, is brought out here in the context of physics, in terms of the possibility that God could, "by virtue of his infinite power and free will," create or produce different contrary effects at the same time "without other contributing causes." In other words, God can bring about directly everything that normally occurs by means of secondary causes. Paradoxically, we find here, forming an integral part of natural philosophy, Duns Scotus's expression of the proper theological definition of omnipotence, which is opposed to the more philosophical conception of an infinite power. At the same time, it is here, to begin with, that we move away from a purely "logical" model for the sake of an "operative" model, adopting the useful distinction proposed by Randi. The logical model, of the sort

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17 John Buridan, op. cit., II, 5, fol. 32v: "Unus est dator formarum, sicut dicit Avicenna, qui ad omne quod fit agit tamquam agens commune et primum et omnino principalissimum, et ille est Deus supremus."

18 Nevertheless, it is to Aristotle that Buridan refers when he assumes that it would be impossible to go from the one to the many, a move reminiscent of the second book of On Generation and Corruption. See John Buridan, op. cit., II, 13, fol. 39v; cf. Aristotle, On Generation and Corruption, II.1.

19 John Buridan, op. cit., II, 5, fol. 32v.

20 Duns Scotus opposed the philosophical definition of omnipotence as infinite power, defined by the force and amplitude of its causal power and manifested in the extent of its effects, to the properly theological (and indemonstrable) conception, according to which God can produce directly and without intermediary everything that occurs naturally through secondary causes. See John Duns Scotus, Ordinatio I, d. 32. "Ad questionem," vol. VI, pp. 362-363.

21 See Kantii, II sumnum e fundamentis.
developed in its most unadulterated form by William of Ockham, considers omnipotence as a purely methodological instrument to test the metaphysical structure of reality and to imagine the radical contingency of the created world. But in Buridan we find a sort of naturalist version of the operational or "juridical-political" model of omnipotence, characterized by God's ability to intervene de facto in the de jure order of nature, a naturalist version of omnipotence built around the opposition between the "supernatural and miraculous" and "natural" modes. This supernatural mode continues to have a methodological function entirely analogous to omnipotence. Far from being an established and common fact that would destroy all regularity in the world, it permits us to define the metaphysical status of this regularity.22

Taken by itself, the "natural mode" requires the presence of secondary causes for the reason indicated, viz., the need for multiplicity at the level of causes: "... nevertheless, in the natural mode it would not be possible for the same simple and invariable thing to produce different and contrary effects, now these effects and tomorrow others, unless there were other, diverse, causes contributing to them."23 To sum up, "in the natural mode (modo naturali)," God alone is not sufficient to explain the diversity of effects.

The third thesis emphasizes that it would also be insufficient to introduce a second principle, which would be the matter. Since matter is everywhere "of the same nature (eiusdem rationis)," we cannot use it to explain why we have air here and water there, a horse here and a goat there: "... it cannot give an adequate account of the cause of such a diversity of transformations and natural effects."24 Consequently, we must assume the existence of other causes that are diverse in themselves, some of which are determined (and determination should be understood here in terms of precision) to generate this particular effect, others that.25

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23 John Buridan, op.cit., II, 13, fol. 32v.24... tamen modo naturali non est posse ut quod ab eodem simplici et invarabilis praeveniit effectus diversi et contrarii, et tum tales et casus, nisi essent aliae cause concurrentes diverse.
24 Ibid., "... non potest sufficienter reddi causa talis diverse atque transformationum et effectuum naturalium."
25 As G. Federici Vescovini has emphasized ("La concezione," pp. 616-617), Buridan confers upon matter a dignity equal to that of form through its dispositions to receive form. Nevertheless, matter is not a sufficient cause unto itself.
The fourth thesis introduces celestial bodies. This is essential in order to situate Buridan in the evolution of Parisian thought, beginning with græco-arabic Aristotelianism and the synthesis of Albert the Great. The Questions on the Metaphysics returns to this point, which I will consider here only briefly. Celestial bodies are causes: "It is obvious that celestial bodies are ordaining causes with respect to the diversity of the many transformations and effects occurring in this world." 28 What we have here is actually a multiplicity of causes and effects. But are they causes of a superior order? Of course, Buridan often refers to bodies in the sublunary world as "inferior" beings, and analogously, to God and celestial bodies as "superior agents." But do celestial bodies have a degree of being or constitute a species of intermediary cause between the absolute simplicity of God and the multiplicity of material beings? The examples immediately following this passage do not permit such an interpretation. They concern natural causes of meteorological sort: the length and shortness of days and differences of climate. Celestial bodies really do exert an influence. It is in this connection that Buridan alludes to the causality of the stars, naturalized through interference between terrestrial and celestial causes.

Nevertheless, the apparatus of God, matter, and celestial bodies is not complete. We must add to it (and this is the fifth thesis) the network of particular terrestrial agent causes: "... other diverse particular agents ordaining this [to occur]." 29 It is necessary to diversify further because neither prime matter nor the heavens can account for the fact that in the same corner of the earth is generated such and such an animal, or such and such a tree. We are not dealing here with a process of emanation, i.e., with a continuous outgrowth of complexity from the primary cause. We are faced with a different, more horizontal order of causality, where the aforementioned influences intervene in the production of the effect, but are not of themselves sufficient for it. The "particular causes" determining a certain portion of matter to be one thing or another are, e.g., the "seeds" of animals and plants, or the "diverse dispositions of matter" by virtue of which flies or frogs are born: "... It is apparent that diverse and dissimilar effects often arise from diverse material dispositions.

28 John Buridan, op. cit., II. 13, fol. 39v. "Manifestum est quod corpora celestia sunt causae ordinativa diversitatis plurimarum transmutationum et plurimorum effectuum in hoc mundo eventuum."

29 ibid.: "Alia agentia particularia diversa hoc ordinantia."
by means of the same agents.”28 This idea of a material disposition can without a doubt be traced to Albert the Great, and through him ultimately to Avicenna. Albert is elsewhere cited in relation to the concept of the dator formarum, reinterpreted here in terms of Plato’s ideas, in order to express why we need to ascribe a role to forms. We must remember, however, that Albert rejects the theory of the dator formarum in its Platonist interpretation in favor of a complex theory of the drawing out of forms (eductio formarum), in which, through a process internal to the matter, the form is “educated (educta)” or, let us say, “aroused,” by a mover univocally with respect to what is generated.29

In view of the importance assigned to material dispositions, it is also apparent that the difference with the aforementioned materialist conception, though real, is very subtle. The replies given to the initial arguments, developed on behalf of a materialist conception of necessity, were based on the following idea: since prime matter is indifferent, material causes must be accompanied by a diversity of agents. Therefore, order and diversity are not explained by the interplay of material causes alone. The role played by agents thus has a certain priority, even though this is in the dispositions of the matter exhibiting it, transcribing the interplay of agent causes. This complex interplay of forms and qualities or dispositions of corporal substances is treated at length in Book II, Question 5, of Buridan’s Questions on the Physics.

The question remains, however, of the knowledge of how and why agents act. Here efficient and final causality are conjoined, but it is final causality that is decisive for establishing the existence of an order of nature: “... all of the order and diversity in natural changes and effects comes from the order and diversity of ends.” Following Avempace, Buridan distinguishes between two senses of “end:” that according to first intention and that according to second intention.30

The end of first intention (prima intentione) is that which is first in the order of being, goodness, and perfection. It is that for which, or for the sake of which (gratia cum), something or someone acts. For example, it can be the man for whom a house is constructed. If we consider the whole universe, it is God who is in this sense the end

28 John Buridan, op. cit., I.5, fol. 32v: “Apparet quod ex diversis dispositionibus materie proveniant sepe diversi et dissimiles effectus ab eisdem agentibus.”
29 See De Faber, Albert le Grand, p. 127.
of everything. It is God who has brought order and necessity to the system of the world:

For he necessitates and orders the heavens in their motions, and consequently, those inferior beings are more principally necessitated and ordered by the heavens and the motion of the heavens than by particular agents. 31

Two points should be emphasized here. The first concerns the relation between “to order (ordinare)” and “to necessitate (necessitare):” although the necessity is not merely that of efficient causality, as in classical science, order is very much a factor in necessity here. Second, this order is realized through particular agents, where we again find ends of second intention (secunda intentione) deliberately sought by agents. But the cornerstone of this building is God himself. Therefore, God (here a purely metaphysical and philosophical God) does not appear so much the omnipotent and even arbitrary God of the theologians as the originator and guarantor of the order of the universe. That is why the order of created nature itself will realize (give reality to) this divine order, just as, at another level, the end of first intention is resolved in the nature of the agent. 32

3. Freedom and Natural Rules

This conception of the natural order presents us with two questions. The first concerns freedom; the second concerns the procedures we should use in order to establish the rules.

If Buridan admits that it is possible for supernatural cases to arise and disturb the ordinary course of nature, then, in a general way, the order of the nature is not opposed to an order of grace but to

31 John Buridan, op. cit., II, 7, fol. 35r: “Necessitat enim et ordinat celum in motu suo, et consequenter per celum et motum celii necessitatur et ordinatur sua inferiore principalius quam per agentia particularia.”

32 This reduction of ends to agents is expressed in certain passages that appear enigmatic at first glance. Thus, when proposed in a passage speaking of God as the supreme end, it seems immediately generalized: “For in this way the Commentator says in De substantiis orbis that the end signifies the agent by a necessary signification (Sic enim dicit Commentator in De substantiis orbis quod finis significat agentem significatione necessario)” (John Buridan, op. cit., II, 13, fol. 32r). As a matter of fact, in order to demonstrate that order and divinity come from ends, Buridan explains: “For since they come from agents, as has been stated, and agents are final causes of their actions of first intention and not conversely ..., the proposed thesis follows (Cum enim pronuntiant ex agentibus, ut dictum est, et agentia sunt causae finales suarum actionum prima intentione et non everso ... sequitur propositum).” (Ibid.)
the order of human freedom. The question inevitably arises because the premises seem to orient us toward a necessitarian vision of the universe, as opposed to the radical contingency defended, e.g., by Franciscan theologians.

Only the advent of free agents—being essential to refute the accusation of "necessitarianism" leveled against philosophers by the University Censors in 1277—breaks the chain of necessity. Only free agents act in accordance with ends they set for themselves. On the other hand, there is no place for such goal-directed intentions among other natural beings. This point is largely developed in the same Question 13 of the Book II of Buridan's *Questions on the Physics*, beginning with the remark that the appearances are here against Aristotle and the Commentator. In the case of artificial beings, the end is reduced to the intention of the agent, which is absent in the case of beings that act by nature:

But as far as natural things are concerned, I believe that a swallow mating, nesting, and laying eggs does not cognize any more when it produces chicks than a tree does when it produces branches and flowers. Nor do the mating, nesting, and egg-laying activities of the swallow depend for their being and order on those chicks. Rather, the converse is true. And those chicks do not determine the swallow to act in this way, but the form and nature of the swallow, celestial bodies at certain times of the year, and supreme God in his infinite wisdom, together determine the swallow to mate, from which the production of eggs consequently follows. And again, when the swallow is so disposed, the nature of the swallow together with the celestial bodies and God determine it to nest and lay eggs, to hatch and produce chicks, and finally, to nourish them, etc. All of this comes about by divine artifice, celestial bodies, and particular agents, both extrinsic and intrinsic [to the subject of the action], which are the substantial forms of these same natural agents.31

31 John Buridan, op. cit., I, 14, 130: 40ab: "Sed de naturalibus ego credo, quod hirundo colens, nidificans et ovicans nihil plus cognosce pullos generandos quam arbor frondes et Flores producens cognoscit fructum generandum. Nec hirundinis coitum, nidificatio et ovificatio dependent in esse et ordine coitum ab illis pullos sed contra. Nec illi pulli determinantis hirundinem ad sit operandum, sed forma et natura hirundinis et corpora caelestia determinatis temporibus et Deus supremus persimant sapientiam infinitam determinans hirundinem ad coitum, ex quo consequenter sequitur generatio avium. Et formam hirundinis sit disposita, natura hirundinis cum corporibus caelestibus et Deo determinavit illam ad nuptiam et tandem ad procreationem ovium, corporium et generandum pullos et ulterius ad nutriendum etc. Hae ergo omnia proveniunt ab arte divina et corporibus caelestibus et agentibus particularibus tam extrinsecis quam intrinsecis, quae sunt formae substantiales ipseum naturalium."
Several Questions from the *Questions on the Metaphysics* develop the same idea. The operations of beings acting by nature are governed by necessity, and the latter is what grounds the ordering of natural phenomena:

necessarily as regards the actions of non-free agents, from those things that exist and proceed along certain lines there follows the being and order of everything that happens later.  

But this necessity on which the order is based must be conjoined with the action of free agents. This explains the apparently restrictive formulae—which actually express a penchant for precision—that are endlessly put forward by Buridan:

Whenever sufficient causes have been posited in such a way as to be sufficient, viz., such that there is no impediment as regards the fact that something is produced, it must be produced.

What sort of impediment is at issue here? Except for the miraculous intervention of God, which is usually—at least since the thirteenth century—opposed to the common course of nature, but whose possibility is circumscribed, it is in the power of a free agent to act or not act. In other words, a free agent is not necessitated to act, as is confirmed by well-known passages in the *Questions on the Nichomachean Ethics*. The essential point, however, is that this antinomy of freedom and necessity does not destroy the order of causes:

His second proposition (i.e., the proposition at n. 36 above, which Buridan ascribes to Plato) would not be denied as regards a free agent, but would be conceded as regards a non-free agent, viz., the proposition that when sufficient causes have been posited in the way that they are sufficient to produce something, the production would follow of necessity, such that nothing would impede it.  

32 "Utrum omne futurum de necessitate eventi." See also John Buridan, *op. cit.* IX. 4 and John Buridan, *op. cit.* XII, 1, fol. 65,"It should be noted that some things, such as God, intelligences, and the intellective soul, are free agents. Others are natural and non-free agents (Notaend: est que quodam sunt agentia libera ut Deus et intelligencie et anima intellectiva. Alia sunt agentia naturalia et non libera)."  
33 John Buridan, *Questions super octo Physicorum libros Aristotelis* (Paris, 1519), II, 4, fol. 39,"... de necessitate quantum ad actiones non liberorum agentium ex his que sunt et procedunt sequitur esse et ordine omnium que posterior ex omnium."  
34 "Quandoquime posse sunt cause sufficientes, eo modo quo sunt sufficientes, scilicet quod non sit impedimentum ad hoc quod aliquid fiat, oportet quod illud fiat,"  
35 John Buridan, *op. cit.* VI, 5, fol. 39,"Sic secunda propositione negatorem de agente libero, sed concedetur de non libero, scilicet illa propositione quod post-
So despite the crucial question of human liberty, what we have here is in fact the assumption of a natural order, or better, of a necessary natural order—necessary under certain conditions.

I will not develop at length the question of the status of natural necessity in Buridan, which has already been examined by Simo Knuutila. 33 I will only emphasize the sense in which it is a conditional necessity. It is conditioned in the first place because it rests upon the divine will which has created such an order, which is not necessitated internally, meaning that it would be impossible to deduce it metaphysically. This is, then, actual necessity. It is conditioned in the second place because it is realized only under certain epistemic conditions, i.e., in abstraction not only from supernatural or miraculous cases, 34 but also from the unquestionable presence of free agents who insert themselves, from another perspective, into this network of efficient or final causes. These conditions are not so much restrictive as constitutive, belonging to the order of nature as against the divine order and the order of freedom.

It is nothing other than this conditional order that makes possible a certain scientific evidenctness “on the assumption of the common course of nature.” In the first question of Book II of his Questions on the Metaphysics, Buridan asks “whether the comprehension of the truth of things is possible for us.” 35 He distinguishes several different kinds of necessity. After mentioning the necessity of propositions


34 Buridan explains this clearly in his In Metaphysicae (Paris, 1518), when he has occasion to discuss a logico-semantic problem arising from the supposition of the terms. John Buridan, op. cit., V.2, fol. 27v-28r, emphasis mine: “There is another necessity, however, which is called ‘natural’ and which is not (the same as) absolute necessity. This is necessity leaving the supernatural cases aside, such as when we say ‘A donkey is an animal,’ because leaving the supernatural cases aside, it is always necessary that there be some donkey, and so the proposition, ‘A donkey is an animal’ is (true) per se, because the subject determines the predicate to itself (Alba autem necessitas est quae vocatur naturalis, quae non est simplexier necessitas. Sed est necessitas ex unam nesciente causa supernaturali, sicut dicendo ‘asinos est animal,’ quia in unum nesciente causa supernaturali necessa est semper esse aliquam asinum et sic illa propositionis est per se ‘asinos est animal,’ quia subiectum determinat sihi predicatum)’ In his Questiones super octo Physicorum libros Aristotelis (Paris, 1509), Buridan emphasizes that the natural philosopher must not appeal to God: “... unless having recourse to the universal source of generation, i.e., to God—which in the matter at hand is not to have recourse to nature (... nisi recurreris ad universale genera, sollicita Deus, quod in proprieo non est naturalis recursus).” (John Buridan, op. cit., III.5, fol. 78v)

35 John Buridan, In Metaphysicae (Paris, 1518), II.1, fol. 8v: “Utrum de rebus sit nobis possibilis comprehensioni veritatem.”
expressing first principles, which the intellect cannot deny, he continues:

But in another way, "evidentness (evidentia)" is understood to be "relative (seuendum quid)" or "on the assumption (ex suppositione)," such as when it was said earlier that it would be observed in beings in the common course of nature. And in this way it would be evident to us that every fire is hot and that the heavens are moved, even though the contrary is possible by God's power. And evidentness of this sort suffices for the principles and conclusions of natural science.1)

The appeal to divine omnipotence reveals the actual character of this order: there is no essential necessity here. As for the examples — especially the second — they clearly have a propositional nature which leads to the formulation of rules or laws, at least by the attribution of properties to subjects. The affirmation is unambiguous; necessity ex suppositione is the norm of natural science. Is it not a hypothetico-deductive necessity, but a necessity that is operative when we assume the absence of miraculous intervention and set aside the order of free choice.

This leads to a second question, which I shall only be able to answer in outline: how can we find and formulate these regularities? What is the scientific process allowing us to establish natural laws? This question concerns induction. I will not review the Buridanian theory of induction — Hans Thijssen has done it elsewhere14 — but only recount how this question is articulated together with that of the natural order.

Buridan is wholly aware of the difficulties of induction, if we consider it not only to be the intuition of a universal nature via singulars — even via just one singular — but also the inference from singular propositions to a universal proposition. In Book II, Question 1 of his Questions on the Metaphysics, on the possibility of comprehending truth, one of the negative arguments presents the difficulties of induction:

Again, it is argued as far as principles are concerned that principles are known by experience and that these experiences are fallible, as is obvi

1) John Buridan, op. cit., II.1, fol. 89v-90r: "Sed alio modo accipitur evidentia secundum quid sive ex suppositione, ut prius dicubuit, quod observationem in eundem communem versus naturae, et sic esset nobis evidentia quod omnis ignis est calidus et quod celum movetur, licet contrarium sit possibile per potentiam Dei. Et huiusmodi evidentia sufficit ad principia et conclusiones scientiae naturalis."

14) Thijssen, "John Buridan and Nicholas of Autrecourt." See also Zupko, "Buridan and Skepticism."
ous via Hippocrates. Second, it is proved that they are fallible because experiences do not have the power to lead us to a universal principle except by way of induction over many, and a universal proposition never follows from induction unless it has been reached on the basis of every singular of that universal, which is impossible.\[11\]

In his Questions on the Prior Analytics, he develops this problem of sufficient enumeration:

Again, an induction is not a good consequence unless all of the singulars are enumerated in it. But we cannot enumerate all of them because they are infinitely many.\[12\]

After establishing that such a consequence is never valid simpliciter but only ut nunc, Buridan replies to the problem of enumeration on two fronts. In many cases, we have a finite number of objects. But in other cases, in which it is impossible to enumerate the relevant singulars, we add the clause “and so on for the others (et sic de alis)” as long as there is no reason to think that it is different in cases other than the ones enumerated. However, one cannot stop here without begging the question.

In his Questions on the Prior Analytics II.19, as well as in a corresponding passage of his Questions on the Metaphysics II.2, Buridan discusses the gradual process by which some non-demonstrative propositions are established by induction so that they can be used as principles in the domains of practical art (which concerns singulars) and natural science. By sensation and then by memory, we come to have an experience, which serves as mediator between the singular and the universal. In fact, experience permits us first to formulate a singular judgment from other singular judgments; thus, I say that this fire warns before I have approached it. The leap that brings us to a universal judgment is, as Thijssen has shown, based on this curious “natural inclination to the truth (inclinatio naturalis ad veritatem),” which Buridan attributes to our intellect. I quote here the passage from the Questions on the Prior Analytics in its entirety:

\[11\] John Buridan, Le Metaphysique (Paris, 1518), I.1, fol. 87v: “Item argumentum quanti vel quid principium, quia principium sunt nota per experimentas et ipse experimente sunt fallacis ut pacti per Hippocrates. Secundo probatur quod sunt fallacis quia experiencie ad conclusionem universalem principium non habemus vim nisi per medium inductionis in multis, et enim ex indictione sequitur universalis proposition nisi sit inducuntur in omnibus singularibus finitis universalibus, quod est impossibile.”

\[12\] John Buridan, Questions de Prima Philosophia I eiusdem [Habrecht], Book II, q. 119 (“Ut enim induction est bona consequentia”): “Item, inducunt non est bona consequentia nisi ibi enumerentur omnia singularia, sed illa non possimus enumerare, quia infinita sunt.”
THE NATURAL ORDER IN JOHN BURIDAN

Other principles need induction to become evident, and these principles are universals, such as that every fire is hot and that all rhubarb purges bile. For these principles are known to us through an induction based on sense, memory, and experience. For when you have often seen rhubarb purge bile and have memories of this, and have never found a counterexample in the many different circumstances you have considered, then the intellect, not as a necessary consequence, but only from its natural inclination to the truth, asents to the universal principle and understands it as if it were an evident principle based on an induction such as “this rhubarb purges bile, and that ...,” and so on for many others, which have been sensed and held in memory. Then the intellect supplies the little clause, “and so on for the (other) singulars,” because it has never witnessed a counterexample (even though it has considered many circumstances) nor is any reason or dissimilarity apparent why there should be a counterexample. And then it reaches the universal principle as a conclusion.15

Is this inclination a merely verbal reply to the conceptual difficulty of what some call the “problem of the induction,” given that it remains to be proved that the inductively inferred universal proposition can be legitimately be regarded as true? In fact, if we place this idea in its context, particularly in Book II of the Questions on the Metaphysics, we can ask whether an inclination of this sort does not itself have an objective basis.

The first question of Book II relates different varieties of “firmness of assent (firmitas assensus)” and “firmness of truth (firmitas veritatis).” With regard to the latter, the firmitas veritatis, Buridan distinguishes between an absolute mode, which concerns propositions that cannot be falsified in any case, such as “God exists,” and another

15 John Buridan, op. cit., II.2.2c “Alia principia indigent inducione ad hoc quod transtutur evidentia, et illa principia sunt universalia, ut quod omnem ignis est calidus, et quod omnem rhubarbarum est purgativum cholerae. Illa enim principia sunt nobis notae per inducitionem supponemus sensum, memoriam et experimentum. Cum enim aequi us vidissim rhubarbarum purgare cholera et de hoc memoriam habuisset, et quia in multis circumstantiis diversis (hoc) considerasti, munquam tanum interiori instantiam, tum intellectus, non proprius necessarium consequi tiam, sed solum ex naturali ejus inclinatione ad verum, assimilat universalis principium et capit ipsum tantumqnam evidens principium per talem inducitlum, hoc rhubarbarum purgare cholera, et illud, et sic de multis aliis, quae sensa fuerint et de quibus memoria habuerit; tum intellectus supplet istam clausulam ‘et sic de singulis,’ et quod munquam visis instantiam, licet considerauerit in multis circumstantiis, nec apparat sibi ratio nec dissimilando quare debeat esse instantia, et tum concludit universalis principium.” See also John Buridan, In Metaphysicen (Paris, 1518), II.2, fol. 4r, where Buridan emphasizes that this movement is not “on account of the form (forma),” and John Buridan, Quaestiones super octo Physicorum libros Aristotelis (Paris, 1509), I.15, fol. 19v (quoted by Thijsen, op. cit., p. 247).
mode, which concerns propositions that could be falsified by divine omnipotence:

But again, there is firmness of truth (firmitas veritatis) assuming the common course of nature, and in this way it would be a firm truth that the heavens are moved and that fire is hot, and so on for other propositions and commonalities of natural science, notwithstanding the fact that God could make a cold fire, and so falsify this proposition: "Every fire is hot." 5

Here again we have the "common course of nature (communis cursus naturae)." Moreover, just after these remarks we find the passage quoted above, which made this common course foundational to the science of nature in order to distinguish the different forms of assent (assensus). This confirms the fact that it is not a possible irregularity in natural phenomena which leads to the relativization of universality, but only the hypothesis of a supernatural or miraculous mode of divine intervention.

But if this is true, then we do not simply have the assumption of a pre-established harmony between what I am inclined to think is true and what is the case in the real world. More precisely, we have the assumption or supposition that there is in fact a natural order, limited and defined by this very limitation, on the one side by the supernatural order; and on the other side by human freedom, as I said before. And this order legitimates — grounds, if you wish — the leap which represents the passage from singular to universal proposition in the inductive process. If there is no contrary reason in the cases enumerated and considered, I may infer — not by a formal inference, but by a process based on the assumption of the common course of the nature, and thus a regular order — the universal proposition, which I will be able to use as a principle of reasoning in the physical sciences.

Perhaps it will be thought that from a post-Kantian perspective — and it is from this perspective that the problem of induction was formulated at the end of the nineteenth and beginning of the twentieth centuries — there is a pre-critical confidence in the harmony of being and thought. But the historical and intellectual interest of the Buridanian worldview is different. In articulating the question of

induction (rigorously formulated in terms of the inference of propositions) and the question of natural regularity, it is concerned with affirming the idea of the natural order as a presupposition of all scientific investigation.