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UPSETTING AN UPSIDE-DOWN WORLD: BRUNO'S REASSESSMENT OF ARISTOTELIAN INFINITY

1. Introduction

Towards the end of the third of the five dialogues that comprise *On the Infinite*,[1] Burchio, the character who acts as spokesman for the Aristotelians, replies to Fracastoro that whoever defends the theory of the elements he has just expounded would be turning the world upside down: «In this way, you would put the world upside down». Fracastoro's reply is: «Would you consider him to do ill who would upset a world which was upside down?» (324). In this passage's context, the target of subversion is the Aristotelian theory of the natural places of the elements. In fact, as Philotheo (275-276), Bruno's spokesman in the dialogue, previously pointed out, this subversion is the consequence of an earlier subversion: the subversion of the Aristotelian conception of infinity, which Aristotle himself explicitly presents in *Physics* 3, 6 as a subversion of the traditional conception (206b34-207a1). Therefore, Bruno's purpose is to subvert the Aristotelian subversion in order to return things to their natural order. However, as Miguel Ángel Granada sharply points out in a footnote to his Spanish translation of the work, if we follow the development of the dialogue carefully, we will see that this «first and fundamental error of Aristotle», consisting of «the denial of the infinity of the universe», «follows from the faith, following the

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[1] I will quote this dialogue from the English translation by Singer 1968, 225-378. In some quotations, I have standardized the spelling to adapt it to current usage.

immediate evidence of sense, in the immobility and centrality of the Earth» [Bruno 2019, 96, n. 19]. Indeed, the direct object of controversy of *On the Infinite* is Aristotle's *De Caelo et Mundo* [Bruno 2019, xxiv-xxix]. In later works (*Figuratio Aristotelici Physici auditus*, *Centum et viginti articuli de natura et mundo adversus Peripateticos*, *Camoeracensis Acrotismus seu rationes articulorum physicorum adversus Peripateticos*, and *Libri Physicorum Aristotelis explanati*), Bruno will hastily refute the notion of infinity that Aristotle presents in *Physics* 3. In these works, however, we find the denunciation of the error but not the causes that, according to Bruno, led Aristotle to commit it. Instead, these causes must be traced back to *On the Infinite*. It is this work that will allow us to illuminate the deep foundations of his later criticism.

The aim of this paper is twofold: on the one hand, to prove that behind the controversy between Bruno and Aristotle about the existence or not of infinity lies a more profound dispute about the existence or not of absolute moral values; on the other hand, to show that, by tracing back the former controversy to the latter, Aristotle and Bruno's arguments become more apparent. To this end, we will begin (section 2) by tracing the causes that lead Aristotle and Bruno to respectively deny and affirm the existence of the infinite. Then, we will show that this leads to two opposite ways of conceiving of God and the world. Thus, Aristotle conceives of God as an unmoved mover that only thinks himself, detached from a world populated by finite substances. Bruno, on the contrary, identifies God with the only infinite substance, of which the things of the world would be nothing more than its modes as immanent expressions of its infinite power. After that, we will examine (section 3) how Aristotle's concept of substance requires transforming negation into a substantial attribute of things in the form of privation. This explanation will provide us with the conceptual apparatus to clarify Bruno's account of Aristotelian negative and privative infinity (section 4) and his corresponding refutation, as well as to highlight its moral implications (section 5).

2. How to build a finite world

In a critical moment of the second dialogue of *On Infinity*, one of the characters, Elpino, paraphrases a passage from Aristotle's *De Caelo* (271b1-10) regarding the ancient philosophers who proclaimed the existence of an infinite whole: «however small an error may be in origin, it becomes by ten thousand repetitions ever greater, just as the smallest error of direction in the beginning of a path, becomes greater and greater the further the distance we traverse» (275).[2] As a reply, Philotheo throws the accusation Aristotle hurled against his predecessors back at him: «For even as he believed that from a wrong understanding of this original point his adversaries have been led to great errors, so we on the contrary believe and see clearly that by the opposite opinion concerning this prime matter, he has perverted all natural reason» (275-276).

As this passage points out, according to Bruno, Aristotle's main error is the denial of the infinity of the universe. This might suggest that the core of Bruno's polemic with Aristotle lies in a conceptual disagreement. However, if we pay attention to the causes that allegedly have led Aristotle to deny the existence of infinity, we will realize that under this disagreement there is more than meets the eye. According to Bruno, Aristotle's first mistake lies in turning his perceptual limitations into an attribute of the universe: «it is asserted against all reason, that the universe must terminate exactly at the limit of our perceptive power» (299).[3] But, as Bruno explicitly denounces, this error depends on the even more fundamental one of taking the relative immobility and centrality observed from our terrestrial horizon as essential attributes or properties of the Earth, thereby erecting a center of absolute rest, which can only have a place in a finite cosmos: «Once the end of the thread is

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[2] For Aristotle's passage: Aristotle 2020, 8-9. In *Physics* 1, 2, Aristotle makes a similar remark regarding Melissus' infinite whole: «Grant him one absurdity and the others follow – nothing difficult in this» (185a11-12). The quotations from Aristotle's *Physics* are primarily from: Aristotle 2018. Despite this, I will occasionally depart from Reeves' translation to emphasize some aspects of Aristotle's text relevant to our argument. For this purpose, I have consulted: Aristotle 1936.

[3] As Tristan Dagron comments: «Invoquer naïvement le témoignage des sens revient à situer dans l'objet la limite qui relève en réalité de nos propres facultés» [Dagron 1999, 129, n. 2].

found, the tangle is easily unraveled. For the difficulty proceeds from the method and from an unfitting hypothesis, namely, the weight and immobility of the Earth» (361).

Albertino then confirms that this is the error underlying Aristotle's denial of infinity. Reacting to the previous conclusion, he brings us back to the passage from which we started at the beginning of this section: «I perceive then more clearly than ever that the smallest error at the start may cause the greatest difference and peril of errors at the finish» (363). As Philotheo says, the error comes from the «method» and an «unfitting hypothesis». The unfitting hypothesis is the assumption of the centrality and immobility of the Earth. The method or way of proceeding[4] is to turn a relationship into an attribute or invariable property of one of the *relata*. In the first case, Aristotle projects his perceptual limitations onto the cosmos, which becomes finite. In the second case, Aristotle turns the stability of his viewpoint regarding the motion of the stars into a property of the Earth, which becomes motionless. By doing this, Bruno shows that every polyadic predicate, which expresses a relationship, is reduced by Aristotle to a single monadic one, becoming a property.[5]

Now, Aristotle's «method» is precisely the method Plato used in his battle against the Sophists. Thus, when Protagoras argues that honey «is sweet to the healthy man and bitter to the sick» (*Tht*. 166e2-4), Plato removes the relational clause that associates honey's sweetness with the individual who tastes it and converts it into an attribute of honey, and, consequently, into a monadic predicate.[6] According to Plato, Protagoras' error lies in limiting himself to the world of the senses, composed of a plurality of particular, relative, and changeable things. But in this world, where things are always changing, coming to be but never achieving true being, true knowledge cannot be found. It can only be found in

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[4] Singer translates «modo» as «method»: cf. Bruno 2006, 331.

[5] In speaking of monadic and polyadic predicates, I am aware of the great distance that separates the «logic» of Plato/Aristotle and Bruno from present-day logic and linguistics. I believe, however, that the historian must resort to the categories of his own time to clarify how he interprets the works of the past without hiding behind mere textual paraphrasing.

[6] Plato 2015, 35. In Plato's *Theaetetus*, the object of sweetness or bitterness is «wine» or any food. Here, however, I will speak of «honey» to emphasize my point and highlight the continuity with Aristotle's thought.

the intelligible world, composed of unique, universal, absolute, and immutable things; a world where the sweetness of honey is independent of the palates that taste it.[7]

As is well known, Aristotle coins the concept of substance to partially introduce in the world of the senses some of the properties that Plato reserved solely for the intelligible realm. The Aristotelian substance is, in the first place, that which designates the essence of things. These essences are defined *per genus et differentiam*. A specific difference designates the attribute or exclusive property that essentially belongs to the thing. Thus, for example, a human being is essentially a rational animal, rationality being the universal property that distinguishes it from the rest. Secondly, this universal substance subsists through change and is conceived by itself, independently from any accidental modification that the sensible substance, composed of matter and form, may undergo. Instead, these changes are only explainable by that which remains, as the substance's permanence is taken as a brute fact (*Metaph.* 1017b ff.).[8] The changes in the substance refer to its accidental properties. What remains, however, are not only its essential attributes but also its unique properties or *propria* (*Top.* 101b15-20 ff.).[9] Accordingly, if we consider sweetness to be a unique property or *proprium* of honey, it will be sweet regardless of who tastes it, and it cannot cease to be sweet without ceasing to be honey.[10] Once we remove the other *relata*, namely, the individual who perceives the honey, to affirm that honey is sweet and bitter is equivalent to attributing to it two mutually exclusive predicates, thereby falling into a blatant contradiction (*Metaph.* 1053a31-35). In such a way, from an Aristotelian point of view, Protagoras' world, i.e., the world as it appears immediately to our senses, has been reduced to mere accidentality. Perceptions are not intrinsic relations but the

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[7] We fully realize that Plato's doctrine is far more complex than we present it here, but to take a balanced position on this issue would entirely deviate us from our concern. For a subtle and nuanced interpretation of Plato's theory of relations, see Giovannetti 2022.

[8] Aristotle 1924, 74.

[9] Aristotle 1997, 3-6.

[10] «Thus honey because it possess sweetness is called sweet […] is not called sweet because it has been affected somehow» (*Cat.* 9a32 ff.): Aristotle 2002, 25-26.

result of fortuitous encounters between substances, detached from their essential nature.

We do not know what arguments Protagoras could have used to refute Aristotle's objections since all his works are lost. However, nothing prevents us from reconstructing his thought from Plato's account.[11] As already said, the statements «honey is sweet to the healthy man» and «honey is bitter to the sick» imply dyadic predicates. That is because honey's sweetness and bitterness result from perception, and each perception expresses a relation between the thing perceived and the thing that perceives it. From this viewpoint, the statement «honey is sweet» seems incomplete and meaningless. For it to be a complete statement, it should specify for whom honey is sweet, because honey, in itself, is neither sweet nor bitter. Therefore, we can claim that Protagoras does not contradict himself when he states that «honey is sweet to the healthy man and bitter to the sick». He would fall in contradiction if he asserted that «honey is sweet and bitter to the healthy man», which he does not. We could even argue in Protagoras' favor, that, by making sweetness an attribute of honey, Plato is taking the conditional «If upon tasting honey I perceive its sweetness, then honey is sweet» (which expresses a relationship since honey is sweet only *insofar as* I perceive its sweetness) for the conditional «If honey is sweet, then upon tasting honey I perceive its sweetness», thereby incurring the fallacy of *affirming the consequent*.[12]

The reader may wonder what Protagoras has to do with Bruno. The point is that, just as Aristotle, with his concept of finite substance, has provided an ontological basis for lodging Plato's forms in the world of the

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[11] From here on, I will rely on the following reconstructions of Protagoras' thought: Solana 1994, Osborne 2011. For an overview of Protagoras' «secret doctrine»: Brancacci 2011.

[12] Protagoras' exposure of this illicit reasoning on the part of his opponent is apparent in this passage from the Platonic dialogue named after him: «You are not correctly recalling what I said in answer to your question, Socrates. You asked me if the courageous are daring, and I agreed that they are; but you didn't ask me if, in addition, the daring are courageous – for if you had asked me that, I should have said that not all are» (*Prt.* 350c6-d1): Plato 2002, 44. As Solana acutely points out, Protagoras is perfectly aware that Socrates is incurring the fallacy of affirming the consequent: Solana 2000, 139.

senses, so Bruno, by asserting the existence of a single infinite substance, has provided an ontological basis for Protagoras' relationships.[13] Since there is according to Bruno only one substance, and the things of the world are nothing but accidents of it, these accidents must necessarily be regarded as «essential accidents», an expression Aristotle would find oxymoronic. That is why Bruno prefers to call these accidents «modes»: «for every mode therein is a thing, and every thing and every mode are the same, the one as the other» (235).[14]

In Bruno's understanding, things as modes are the reverse of substance: they are in something else by means of which they are conceived. And this in two senses: they are in the substance they inhere and comprehended by it, but they are also in another mode and comprehended by it. Since God, viz. the infinite substance, is the immanent cause of things, these things must be conceived by His immanent activity and not as His external products. Things, as well as the worlds and heavenly bodies of the infinite universe, are gestures of the divine «face»: «they all move and live, grow and render effective several acts of their vicissitudes; produce, nourish and maintain their inhabitants and animals; and by certain dispositions and orders they minister to high nature, changing the face of a single being through countless subjects» (323).

To understand what Bruno means, we should think of things as the gestures that a gymnast makes when exercising. Properties, in any case, supervene these things as, for instance, a specific physical complexion supervenes the one who exercises. However, adequately conceived, things will always be parts «in» the whole, not parts «of» the whole: «since being is indivisible and absolutely simple, because it is infinite,

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[13] The absence of this ontological foundation would lead Protagoras' to a sort of skepticism like that advocated by the Ephectic philosophers, as Bruno points out in the *Cabala*: Bruno 2002, 73. On the connection of this passage from the *Cabala* with the Aristotelian critique of Protagoras' relativism: Dagron 1999, 94-95.

[14] I have modified Singer's translation: «for every mode therein is an object, and every object and every mode are the same, the one as the other». Bruno's original says, «perché in lui [God] ogni modo è cosa, et ogni cosa e modo è uno e medesimo con l'altra e l'altro» [Bruno 2006, 19]. By translating «cosa» as «object», Singer predisposes the reader to think of a substantial thing. Unless by «object», one understands an intentional object such as *plier*, *étendre*, *relever*, *sauter*, *tourner*, etc.

and is act in its fullness in the whole and in every part of it (in the same way we speak of parts in the infinite, but not of parts of the infinite), we cannot think in any way that the earth is a part of being, nor that the sun is part of substance, since the latter is indivisible» [Bruno 1998, 92].

Now, if things are modes, and modes are always in something else in virtue of which they are conceived, then in Bruno's view things are intrinsically relations.[15] But not relations which take place «in between» things, but which essentially constitute them, just as, for example, we can say that «husband» and «wife» do not exist as such before the relation «marriage».[16] How are these constitutive relations reduced to properties? We have already seen this: by removing one of the *relata*. The wife becomes a widow when the husband dies, and their former relationship becomes an invariable property of her. So then, to go deeper

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[15] As Eugenio Canone points out, «La relation est un concept-clé de la pensée de Giordano Bruno, comme du reste de l'âge moderne, dès lors que la *relatio* y représente en fait une catégorie fondamentale, bien au-delà des réflexions qu'Aristote lui a consacrées» [Canone 2016, 143]. The Brunian concept of «mode» would be closer to the Aristotelian concept of «affection» than to that of «accident». It is not by chance that Aristotle holds in *Physics* that affections are neither properly finite nor infinite [Aristotle 2018, 43]. Accidents are finite insofar as they denote extrinsic determinations. Affections, on the contrary, are conceived as «intrinsic modes» of the essence. According to Dagron, this Brunian conception of modes as passions or intrinsic modifications could be traced back to Pomponazzi [Dagron 1999, 390-393]. It should be noted, however, that the Brunian conception of modes is inseparable from the actual infinitude of the substance. Ignoring this principle entails reducing the modes to mere accidentality, as Bruno seems to insinuate regarding Avicebron: «And this happens, inevitably, to those who do not know what we do» [Bruno 1998, 62]. On the influence of the Trinitarian model on the Brunian conception of intrinsic relations, see the insightful pages that Giulio Gisondi has recently devoted to the concept of «nexus» [Gisondi 2020, 205-213]. Regarding this question, on the Brunian rejection of the distinction between creation *ad intra/ad extra*: Blumenberg 1976, 127; 179, n. 148.

[16] Jeffrey E. Brower identifies two opposing theses on the reality of relations: the realist and the anti-realist. The first would hold that «Things are related independently of any activity of the mind»; the second, on the other hand, is that «There are no polyadic properties or accidents in extramental reality». However, both would share the same premise: «Relations are that in virtue of which things are related» [Brower 2016, 46]. Instead, the Brunian concept of mode implies a much more radical realism of relations, according to which: «Relations are that in virtue of which things are».

into the «method» of reduction of polyadic predicates to monadic ones, we must inquire into the nature of this suppression and, in particular, of negation understood as deprivation.

3. Three steps to deprivation

Most linguists and philosophers who have dealt with the subject of negation have remarked that negation cannot be considered a monadic predicate since, being built on a prior affirmation, it depends on the thing previously affirmed and in relation to which it is predicated [Heinemann 1944, 133].[17] When we say that «honey is not sweet», we are carrying out a reasoning that involves at least two terms: on the one hand, (a) the idea of sweetness associated with honey, and on the other hand, (b) the idea of another flavor associated with honey, such as, e.g., bitterness, which, in turn, we do not associate with sweetness. As a result, «non-sweetness» cannot be a property of honey. If this were to be the case, so would all the infinite lacks or absences that we could predicate of honey, such as, e.g., «non-*triangularity*» or «non-drivability». That implies that negative sentences and predicates must be counted among the class of ellipsis or anaphora when they do not specify the other term of the relation they presuppose and to which they refer. In this sense, the statement «honey is not sweet» only makes sense in a discursive context that presupposes the bitterness of honey. Otherwise, the utterance refers to an empty referent, which the receiver can fill with any other flavor that diverges from sweetness, such as salty or sour [Wason 1965, 7-11].[18]

In reply to such an argument, Aristotle would point out a commonsensical observation: we do not talk about a «sweet triangle», a «bachelor baby», or a «blind stone». Accordingly, we do not attribute sweetness to a triangle, bachelorhood to a baby, or blindness to a stone. Instead, we do so to one of marriageable age or naturally capable of sight. As a result, sweetness, although not perceived, can continue to

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[17] Cf. Bosque 1980, 12. Even Aristotle accepts this principle in his *Metaphysics*: «The affirmative proposition is prior to and better known than the negative (since affirmation explains denial just as being is prior to not-being)» (996b14-16).
[18] Cf. Hasson *et al.* 2006.

constitute an essential attribute of honey in the privative form of «non-sweetness». In this case, deprivation falls on the perceiving subject whose illness prevents him from accessing the real taste of honey. But it can also fall on the perceived object, as in the case of the blind man, deprived of sight.[19]

If we try to dissect the thought process or algorithm underlying the concept of privation, we will see that it can be explained as the result of implementing the following steps:

- (S_1) Affirmation: we *affirm* vision as a connatural attribute of a human being.
- (S_2) Negation: we *deny* vision in a particular human being.
- (S_3) Privation: we affirm the previous denial as an attribute of that human being in a *privative* form, namely, blindness.

In fact, it is the same mental algorithm by which the perception of the bitterness of honey is reduced by Aristotle to the privation of its sweetness: (S_1) the connatural sweetness of honey is *affirmed*; (S_2) the bitterness of honey is *denied* insofar as it differs from its essential sweetness; (S_3) the "non-sweetness" of honey is affirmed as a *privation* of its connatural sweetness (due to the illness of the one who perceives it).

If, however, we maintain with Bruno that all properties are relational, the criterion that allowed us to distinguish between a relative or accidental negation and a privative or essential one will vanish into thin air. For Bruno, privation is nothing; at most, it is nothing but a being of reason resulting from habit.[20] We assume that honey is sweet;

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[19] As Aristotle states in his *Categories*: «We say that that which is capable of some particular faculty or possession has suffered privation when the faculty or possession in question is in no way present in that in which, and at the time in which, it should be naturally present» (*Cat.* 12a28-33).

[20] «Naturae nomine dignius esse formam quam materiam nusquam probare potuit Aristoteles. Privationem quoque naturae nomine insignire nescio quam tute potuerit» [Bruno 2007, 11]. On the Brunian concept of privation, see Lucia Girelli's entry to the term in the *Enciclopedia Bruniana & Campanelliana* [Girelli 2017, 149-164]. On the same issue, see also: Girelli 2013. From Girelli's account, we gather that, in his works, Bruno uses the term «privation» in three different senses: (i) in a positive

that an adult must be married; or that a particular animal species can see. As a result, when we find an exemplar that disappoints our initial expectations, we project those expectations onto it in the form of faults.[21] But, in doing so, we are reifying a lack, a mere negation, and conferring being to non-being. However, things cannot be defined by what they are not but by what they are. Hence, what distinguishes a blind person is not his lack of vision but the peculiar relationships he establishes with his environment and the strategies he employs to adapt to it. The same thing will happen with an individual who is far above average height and who has to cope with a medium that is not tailor-made to his or her size.

According to these principles, we must necessarily conclude that, from Bruno's perspective, each step of the deprivation algorithm would entail engaging in illicit reasoning:

- (S_1) In the first step, we move from the proposition «If when tasting honey I experience sweetness, then honey is sweet», according to which honey is sweet insofar as it is perceived by someone as such, to the proposition «If honey is sweet, then when tasting it I experience sweetness», which explains sweetness by a connatural attribute of honey.[22]

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one, when he uses it in order to expound Aristotle's thought; (ii) in a negative one, when he expresses his ontological rejection of the concept and reduces it to a being of reason; and, finally, (iii) when he resignifies it in an Anti-Aristotelian sense to express the dynamicity of becoming. This last sense is the predominant one in the works that Dagron considers «rhetorical» or «encyclopedic» in nature, such as the *Summa terminorum metaphysicorum* or the *Lampas triginta statuarum*, in which Bruno makes use of philosophical multilingualism to inoculate in the reader his own thoughts [Dagron 1999, 16, 221-222, 235-239]. On Bruno's usage of Aristotelian language with an Anti-Aristotelian meaning: Zaffino 2022, 9-15.

[21] Aristotle himself depicts privation in his *Metaphysics* as the absence of what would be expected by nature to be present (1022b23-1023a8).

[22] In this paper, we have confined our analysis to Bruno's denunciation of this inversion in *On the Infinite* since it is there where he shows how this mechanism leads Aristotle to deny the existence of the actual infinite and to postulate a finite cosmos. Nevertheless, it is noteworthy that the process of substantialization described in this first step (S_1) entails a severe drawback to Aristotle's epistemology. Since, according to Aristotle, things are defined by their substantial essence, their singularity reduces

- (S₂) In the second step, we move from the proposition «If honey is bitter, then honey is not sweet», according to which honey is not sweet only insofar as it is perceived as bitter, to the proposition «If honey is not sweet, then it is bitter», which allows us to define bitterness as «non-sweetness», and which, to that extent, is equivalent to affirming that «Honey is bitter *if and only if* it is not sweet», which is blatantly false, since it could well be neither sweet nor bitter, but sour or salty, without the affirmation of any of these tastes implying the negation of the others.[23]
- (S₃) In the third step, the affirmation of the bitterness immediately perceived by the senses is subordinated to the negation of sweetness and becomes conceived by virtue of what is not, as deprivation of sweetness, subverting the priority of affirmation over negation and making the former dependent on the latter.[24]

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them to the realm of the accidental and, to that extent, become unknowable. The Scotists will try to circumvent this epistemological hurdle by forging the concept of «haecceity» to designate the constitutive form of a particular being. In the *Cause*, however, Bruno objects to them that their individual forms are nothing but accidents [Bruno 1998, 59]. This issue, which largely deviates from our scope, is thoroughly examined in: Dagron 1999, 189-197, 311-321; Gisondi 2020, 187-197.

[23] As can be seen, going from the statement «If honey is bitter, then honey is not sweet» (in which bitterness and sweetness are conceived as contrary predicates since they cannot be both true in relation to the same subject, but both can be false) to the statement «Honey is bitter *if and only if* it is not sweet» (in which bitterness and sweetness are conceived as contradictory predicates, since they can be neither true nor false at the same time, since the affirmation of one implies the negation of the other, and vice versa) expresses the reduction of contrariety to contradiction, a procedure that Bruno explicitly denounces in *Cause* by pointing out that Aristotle «stopping at the genus of opposition, he remained snared by it in such a way that, not having descended to the species of contrariety, he did not reach or even perceive the goal. He strayed completely away from it by claiming that contraries cannot actually concur in the same substratum» [Bruno 1998, 100]. «L'erreur d'Aristote est précisément pour Bruno de penser la privation comme une "contradiction"» [Dagron 1999, 101]. On Bruno's conception of contrariety: Carannante 2017, 85-97.

[24] As one of the anonymous referees has pointed out, Bruno's critique of privation extends to the distinction between the ordained and the absolute power of God, introduced by Christian thinkers from the dogma of creation *ex nihilo*. Indeed, as God, by virtue of his free will, self-limits his absolute power to create only one among the infinite possible worlds, the created world comes to be conceived as a private one.

So far, we have shown that behind the Aristotelian denial of the existence of the infinite the following premises lie: (S_1) the affirmation that every existing thing is necessarily a finite substance; (S_2) the subsequent reduction of relations to connatural properties of those substances; and, finally, (S_3) the necessity of reintegrating those properties into the substance under the form of privation when we cannot attribute them to a particular substance in a straightforward manner. This analytical toolkit will allow us hereafter to understand clearly and precisely the substantial conception of finitude in Aristotle, as well as its correlative denial of the actual existence of the infinite and its partial reintegration in the real under a privative and unknowable guise.

4. A private matter

In taking the finitude of particular substances as an unarguable starting-point, Aristotle jumps into the discussion about the nature of infinity by playing with marked cards.[25] Moreover, he keeps those cards so close to his chest that he does not reveal the premise of his whole argument until the end of the four long chapters (4-8) he devotes to the issue in *Physics* 3. So, in line 208a13 of the eighth chapter, he plainly states: «what is limited is not a relation (τὸ δὲ πεπερασμένον οὐ πρός τι)».

To clarify this point, Aristotle distinguishes being limited (τὸ πεπεράσθαι) from being in contact (τὸ ἅπτεσθαι). The former is not a relation, whereas the latter is, «since everything that makes contact makes contact with something, and is an accident of some limited things» (208a11-13). The issue is that each body, being a finite sensible substance, is limited by its own figure, without such a limit implying in itself the reference to another body. For every finite substance subsists and is conceivable by itself, making contact with another is something that happens to it or supervenes it.

Here, however, we shall confine ourselves to Bruno's criticism of Aristotle, to whom the concept of creation *ex nihilo* was utterly foreign. On this matter, I refer the reader to: Granada 1994; 2002a; 2021, 315-348; Del Prete 2003.

[25] «Negamus Aristoteli corporis rationem esse planitie terminatum, sicut et numeri rationem numeratum esse non concedimus, petit enim in principio philosophus iste, quotiescumque tales asumit definitiones» [Bruno 2007, 15].

This is how the finitude of substance results in the substantialization of finitude. Limitation, or finiteness, acquires all the characteristics proper to substance. Everything that exists, by the sheer fact of being, is necessarily finite or limited. Accordingly, finitude is complete, independent and conceivable by itself. In other words: finitude is a whole. As Aristotle puts it: «Whole and complete are either entirely the same or very close in nature. Nothing is complete that has no end, and the end is a limit» (207a13-15). Aristotelian finitude, in this respect, acquires an absolute and positive sense: «So one must judge Parmenides to have spoken better than Melissus: the latter says that the infinite is whole, the former that the whole is finite» (207a15-16).

As can be seen, by explicitly depriving the limit of its relative sense and making it a feature of particular substances, Aristotle remains faithful to his usual procedure of reducing any dyadic (or polyadic) predicate to a monadic one. Everything susceptible of being conceived relationally will become a substance's attribute, defined by its genus and specific difference and explained by its substantial nature. Movement and rest, up and down, center and periphery, even left and right (as happens with political parties), become proper and inseparable attributes of certain substances: «every sensible body is in a place, and the specific differences of place are up and down, before and behind, and right and left. These are not merely relative to us or to position; they are so in the universe itself» (205b31-34).

If this is so, finitude, understood positively, is one of the specific properties or attributes that substances possess in their own right. In that case, infinitude is only conceivable negatively, as a negation of substantial finitude, and that in the twofold sense of negation: a relative and accidental one as well as a privative and proper one.[26]

In the first conception, we have *negative infinity*, which Aristotle associates with two mental processes: addition and reduction. The former is infinite because there is always the possibility of finding a number greater than any number assigned. The latter is also infinite because there is always the possibility of reducing a continuous extension to a smaller magnitude than any magnitude assigned. In both cases, the

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[26] For the characterization of Aristotelian privative infinity: Philoponus 1994. On Philoponus' influence on Bruno: Granada 2018a, 161, n. 18.

infinity at stake here is conceived negatively and anaphorically. Thus, what we have is always a finite and determinate number or magnitude. However, by relating this positive quantity to another unknown quantity different from the previous one, which we can add or subtract, we say that such quantity *x* exceeds the previous one. When we fill this empty box with a specific positive quantity, we have a finite and determinate quantity again. So infinity can only be conceived as a partial negation of the previous finite quantity. That is why Aristotle will characterize this possibility of always exceeding a given quantity, in the direction of the large or the small, as potential infinity. In such a manner, Aristotle has reduced potential infinity to the purely psychological realm, depriving it of any actual correlate beyond the minds that conceive it.

In the second conception, we have *privative infinity*, which Aristotle does not confine to a mere thought process but to that which underlies every process in general. Indeed, after rejecting the previous conceptions of infinity as something positive and reducing it to the mere negation of finitude, Aristotle admits that this negation cannot be absolute. If this were so, we could not account for three apparent phenomena: the infinity of time, numerical series, and the infinite divisibility of extension. However, there is an important feature that Aristotle points out a few paragraphs later. We do not speak about the infinite in extension, movement, or time in a straightforward manner: movement is infinite because the extension it covers is infinite, and time is so because the movement that occupies it is so (207b21-25). For instance, planets move around the Earth in perfect circles and uniform motion. While they do so, the extension they cover is infinite, as every portion of it differs from the previous one, even though those same portions will be covered repeatedly due to the circularity of motion. On the other side, if we read on to *Physics* 4, we will see that Aristotle defines time as «a kind of number»: time is a «number of movement in respect of the before and after» (219b1-2).

In all three cases, for Aristotle, the ontological substratum of infinity is movement. That is why he suggests that infinity exists in the same way that a day exists. We say that the day is infinite because it is never wholly actualized since, when it becomes, it is no longer: it is another day; that being said we must remember that, for Aristotle, the physical

correlate of the day is the movement of the Sun around the Earth. Thus, if we want to inquire about the mode of existence of infinity, we must ask: what is movement? Previously, Aristotle defined movement as «the actualization of what is potentially, insofar as it is such» (201a10-11). A block of marble is potentially a sculpture. The marble moves during the process of actualization by which it becomes a sculpture. However, the block of marble potentially does not move, just as the actual marble sculpture does not. Movement, instead, insofar as it is such, «cannot be posited either on the potential or on the actual side of things» (201b28-29) but in the passage from potentiality to actuality. That is why «it seems infinite» (201b28) and is so «difficult to grasp» (202a2). How could it be otherwise if all that is and is conceivable is a substance, and substance is what remains through change?

It is in this precise sense that we must understand the analogies between infinity and matter established by Aristotle throughout these chapters. Prime matter is the ultimate substrate that allows the passage from one form to another during generation and corruption. Its never-satisfied desire to acquire a new form makes it possible to account for substantial change. Therefore, «it is evident that the infinite is a cause in the way matter is, and its being is a privation» (207b36-208a1). «That is why the infinite, insofar as it is such, is unknowable, since the matter has no form» (207a25-26).

That was, indeed, as we tried to show with our three-step algorithm, the result to which Aristotle was necessarily driven by undertaking the first step and (S_1) *affirming* finitude as a substantial attribute. That obliged him to conceive of infinitude in the second step (S_2) as the *negation* of the previously affirmed finitude; and, finally, in this last step (S_3) to reintegrate under the form of *privation*, that is, as the negation of the previous negation, everything that contravenes that substantial finitude postulated in the first place.

What is knowable for Aristotle is limited to potential infinity, i.e., infinity as the anaphoric negation of something finite in relation to something else. So, since the *privative infinite* is properly unknowable, only the *negative infinite* can be defined, and it must be done in relation to another thing: «It turns out that the infinite is the opposite of what people say it is: it is not what nothing is outside of, but rather what

something is always outside of» (206b34-207a1). Thus, insofar as the infinite refers to something outside of itself, it must be conceived relationally. Moreover, as Aristotle clarifies a few lines later, that to which it refers is not something positive but an absence or partial negation, whatever it may be: «But what something is absent from and outside of is not an 'all', whatever may be absent» (207a12). When we fill this empty box with a number or a magnitude (or whatever it may be), the infinite ceases to be infinite and becomes finite. In this sense, as we have already seen, infinity is the partial negation of complete and finite substances: «For this is how we define what is whole, namely, as that from which nothing is absent – for example, a whole human being or a whole box» (207a9-10).

Through this line of reasoning, Aristotle explicitly portrays his conception of the finite and the infinite as the subversion of the customary view: what has hitherto been understood as infinite corresponds to the finite, and what has hitherto been understood as finite corresponds to the infinite. Throughout these chapters, Aristotle takes great care to emphasize, with his conceptual maneuver, that he is operating a subversion not only of the conception of the infinite by the thinkers who preceded him (φαίνονται δὲ πάντες καὶ οἱ ἄλλοι) (208a2-3) but also of its popular and traditional meaning: «Yet it is from this that people derive the dignity attributed to the infinite, that it surrounds everything and contains everything in itself, because it has some similarity to the whole» (207a18-21).

Let us now finally see how Bruno's criticism of the Aristotelian concept of infinity is easily explainable as a counter-reply to each of the points we have outlined in this section and how it entails a subversion of the moral universalism implicit in it.

5. Finitude is not that great

If we now try to read Bruno's criticism in light of the tripartite scheme we have elucidated in the third section, we will see that his argument becomes crystal clear.[27]

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[27] In this section, I will focus on those aspects of Bruno's critique of Aristotelian

(S₁) First, Bruno rejects the Aristotelian premise that the things of the world are limited and complete substances and that, as a result, finitude is a substantial attribute or property conceivable by itself. He implicitly assumes that a negation depends on a previous affirmation; therefore, nothing can deny itself.[28] For the same reason, «there is no object which does not terminate in another, nor can we experience nothing which terminates in itself» (233).[29]

Thus, Bruno starts his attack on Aristotle by redefining finitude according to his own principles. The things of the world are modes and, to that extent, relations. Therefore, finitude is a relation. Rather finitude expresses a limit, and that limit implies a negation. Now, as we have seen, it is accepted among most philosophers that every negation depends on the prior affirmation of the thing denied. And the affirmed thing, like everything, is a relation. We start, therefore, from a relation between A and B, that is, from A-B. Then, in relating A to B, we say that A is finite or limited because *it is not that other thing* B. That is the only sense in which we can regard something as finite.

To support his claim, Bruno makes a very witty and ingenious move. Since, according to this conception of finitude, the limit is not something given beforehand but something produced, it must be understood as the result of a process of delimitation. And the Greek word that Aristotle uses in *Physics* 3 to designate the action of delimiting is the verb «ὁρίζειν» (207a32), which is the etymological root of the word «horizon». This etymology allows Bruno to use the image of the horizon to illustrate his relational conception of limit. When we look at the horizon line, we have the impression that this line actually exists

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infinity that contribute to stress my claim. In doing so, I am certainly adopting one among many other historiographical options. But a broader examination, including Bruno's remaining criticisms, would dilute the scope of this paper and diminish the force of my argument. For a fuller development of this question: Del Prete 1998, 68-95. Likewise, the reader can find a detailed study of Brunian Anti-Aristotelianism, especially concerning the *Camoeracensis acrotismus*, in Amato 2005. For an overview of Bruno's critique of Aristotle's physics: Zaffino 2015.

[28] «I speak of things that exist, for I do not think the distinction between 'being' and 'non-being' is real, but merely verbal and nominal» [Bruno 1998, 75].

[29] «Finitum Aristotelis est ignotum, falsum, et impossibile: notum, verum, atque necessarium est infinitum plurium philosophorum» [Bruno 2007, 15].

and that it divides, limits, or separates the sea or the land from the sky. In fact, «the arch of the horizon that our deluded vision imagines over the earth» (246) is merely a distortion of perspective.

Neither the sea limits the sky nor the sky the sea. Likewise, finitude supervenes things by putting them in relation and considering that one partially negates the other. But it in no way constitutes a substantial attribute. Moreover, since the impression of finitude depends on the relations between things, which can change at any moment, the limit of something, like the horizon line, will always be changeable: «And in this matter our sense-perception […] advertises and confesses his own feebleness and inadequacy by the impression it gives us of a finite horizon, an impression moreover which is ever changing» (251).[30]

Thus, in Bruno's view, there is not a single horizon as Aristotle thinks, that of the sphere of fixed stars constituting the ultimate limit of the cosmos. This Bruno calls ironically the «highest horizon» (362). Rather there will be an infinite «plurality of horizons», as many as relationships can be established between the things of the world: «You would then see that however numerous were the horizons around a world, they would belong not to one world, but would have each one the same relation to his own center» (370).

(S_2) After converting negative and relative finitude into a substantial attribute of things, Aristotle's next step, as we have seen, consisted in denying the possibility of attributing infinitude to them, establishing, to that extent, a dichotomy between finitude and infinitude, which reduced the latter to a negation of the former. Accordingly, the same procedure applies to all relational predicates. Thus, things will either be naturally at rest or in motion; they will naturally tend toward the center or periphery, and so on.

However, once we have stripped things of their substantial quality, as Bruno has done, and have returned these predicates to their original relative meaning, they will cease to be mutually exclusive, and we will

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[30] «For those who approach the limits of the horizon, the sense always makes them the center of the horizon, which is their inseparable companion. So that any point to which they go from the previously manifested periphery becomes the center for them» [Bruno 1879, I, 1, 217]. On Bruno's use of this image as a paradigmatic example of «senso regolato»: Granada 2018b, 113 ff.

be able to hold that the same body is at rest and in motion, depending on the other body we take as a point of reference: «we cannot apprehend motion except by a certain comparison and relation with some fixed body» (311). So likewise, since the center has ceased to be an absolute property of the finite cosmos, there will be as many centers and peripheries as there are points of reference in infinite space: «For the points they suppose to be on the ultimate circumference of the world whose center is our earth may be conceived as points on innumerable other earths beyond that imagined circumference» (329).[31]

More importantly, since finitude is nothing more than a partial negation that happens to things when they enter into relation with one another, each thing is partially finite and infinite. Finitude and infinity have thus ceased to be exclusive predicates. But things, as modes or affections, are always in something else and conceived by something else, and this is whether that something else is another mode or the substance into which they inhere: «For anything which can be termed a limiting body must either be the exterior shape or else a containing body» (252).

(S$_3$) We arrive at the consequence that follows from the previous steps: the privative conception of infinity. Having reduced the infinite to a mental process, Aristotle cannot account for certain natural phenomena, such as the passing of days or the generations of men, whose ultimate ontological substratum lies in motion. The difficulty of this, no doubt, lies in the premise that Aristotle has taken as his starting point. If everything is a substance, and substance remains through change, motion can only be predicated of substance accidentally but not understood by itself (*Ph.* 191b15). Hence, when that motion refers to substantial change, involving, to that extent, the passage from one form to another, Aristotle parallels infinite motion and matter, whose perpetual desire to acquire a new form can only be understood privatively.[32]

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[31] For a more extensive development of this aspect of Bruno's critique, see Del Prete 1998, 85-86; Amato 2005, 160-165.

[32] For a thorough examination of the motif of matter's unfulfilled desire to constantly acquire new forms and its reception (and subversion) by Bruno, according to his positive conception of desire: Granada 2017, 467-469. The identification between matter and desire understood as deprivation and its positive resignification is explicit

Likewise, the infinite, regarded as a manifestation of change, can only be understood as a deprivation of substantial form's permanence and, thereby, is unknowable.

Now, for Bruno, movement is not a problem. On the contrary, if the things of the world are affections of a single substance, they are essentially changeable.[33] Motion is not something that happens to things; things are motions, modes, gestures. If nothing happens, nothing is. Therefore, it is not what is changeable that needs to be explained by what is permanent, but permanence in change, which can only be understood as the relative motion, more or less stable and regular, that some changing things attain. Far from being unknowable, motion is the most knowable thing that presents itself immediately to the senses. Hence Bruno refutes the privative conception of the infinite advocated by Aristotle (and of matter as the subject of substantial change associated with it) simply by asserting that privation is not. Privation, at most, is nothing more than a being of reason, which Aristotle has endowed with an ontological entity by reifying negation, subordinating the affirmative to the negative: «Or you may call it [heaven] the primal subject denoted by that word space, so as to ascribe unto it no limited position, if you prefer by *privation* and *logically* to regard it as *something distinct in our mind*, but *not in nature*» (373).[34]

Moreover, Bruno will reverse Aristotle's gesture and interpret the Aristotelian conception of finitude under the sign of privation. Indeed, by

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in the lower triad Void-Orcus (Privation, Desire)-Night (Matter) of the *Lampas triginta statuarum*, as Granada 2018a, 169-172 has shown. For Bruno's positive conception of matter: Bruno 1998, 78-86. See also the enlightening pages that Barbara Amato has devoted to the issue in: Bruno 2009, 21-25, as well as in her entry for the voice «materia» in: Amato 2010, 58-65. On Bruno's rejection of the Platonic and Ficinian conception of desire, understood as lack or deprivation, perpetually unsatisfied, and its positive revaluation as *philautía* or desire to endure in being, see Granada 2018b, 111-120.

[33] Hence Bruno argues: «Motum non in quattuor, vel sex tantum, sed in omnibus reperiri praedicamentis dicere debuisset Aristoteles» [Bruno 2007, 13].

[34] Thus, Bruno would subvert the characterization of Aristotelian *potential* and *actual* infinity as *negative* and *privative* infinity, affirming, on the one hand, the existence of actual infinity, and conceiving of potential infinity, on the other hand, as a being of reason and, accordingly, in privative terms: Blum 2016, 70-72.

postulating that each body is limited by its own figure, independently of its eventual contact with other bodies, Aristotle faces an insurmountable stumbling block when he must determine the limit of the sphere of the fixed stars, the ultimate limit of the finite cosmos. If the latter is finite, it must have a surface, and consequently, it will be susceptible to being limited by something else. But, in that case, there would be something else beyond the finite cosmos, with which it would cease to be finite. To solve this paradox, Aristotle distinguishes the concave surface from the convex: the cosmos has a concave surface, but not a convex one. Thus, being deprived of a convex surface, it can neither come into contact with nor be delimited by anything else. Now, according to Bruno, the distinction between a concave and a convex one is a mere being of reason without any actual reference outside the mind that imagines it. To conceive of a concave surface without a convex surface is like conceiving of a one-sided coin. Hence, Bruno denounces that Aristotle has endowed with reality a mere logical distinction making «two» out of what is one.[35]

Once again, Bruno's deconstruction of the Aristotelian scheme faithfully reproduces the tripartite algorithm of privation that we have elucidated:

- (S_1) First, Aristotle transforms the relation of concavity and convexity, which are two sides of the same coin, since one cannot be given without the other, into independent and separable attributes of the same thing.
- (S_2) This allows him, secondly, to introduce negation, conceiving of concavity and convexity as correlative terms: there is no surface that is not concave or convex, but there can be concave surfaces that are not convex.

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[35] «He cannot escape the difficulty that one cannot be transformed in two, for the container is eternally different from the contained, so different, indeed, that according to Aristotle himself, the container is incorporeal while the contained is corporeal; the container is motionless while the contained has motion; the container is a mathematical conception while the contained has physical existence» (253-254). It is possible that, in denouncing that Aristotle has made two out of what is one, Bruno has also in mind Philoponus' commentary on *Physics* 201a3: «Now each is present in two ways to everything, as in the case of [what is] this in particular; for the one is shape, the other privation» [Philoponus 1994, 20-21].

- (S$_3$) Third, he reifies the negation of convexity, conceived, in turn, as the negation of concavity, granting it an ontological entity so that finite bodies come to be conceived as bodies essentially deprived of convexity.

Accordingly, what Aristotle maintains about the sphere of the fixed stars must be applied to every finite body insofar as its inner limit is independent of its eventual contact with other bodies. Therefore, according to Bruno, Aristotelian finitude is nothing other than privation and, to that extent, a being of reason.[36] In contrast, infinity expresses the absolute perfection of the universe.[37] That is why Bruno, against Aristotle's criticisms, vindicates both Parmenides' and Melissus' infinity.[38]

As can be seen, the first misstep (S$_1$) will pave the way for the remaining two. This step involves reducing relations to invariable properties of finite substances or, as we have said above, polyadic predicates to monadic ones. Thus, when Aristotle turns the relative rest of the Earth regarding the observable motion of the stars into an invariable property of the Earth, he reproduces the same gesture as one who goes from «honey tastes sweet» to «honey is sweet». In doing so, as Bruno cruelly suggests, Aristotle indulged himself in what he considered the major impediment to attaining actual knowledge: the

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[36] Undoubtedly, as many scholars have pointed out [Amato 2005, 163; Blum 2016, 103; Dagron 1999, 107], Bruno's criticism of Aristotelian privation extends to the use that the Christian Aristotelians had made of it to characterize the theological concept of sin, as can be seen in the long speech of Poliinnio that opens the fourth dialogue of *Cause* [Bruno 1998, 70-74]. It may not be ruled out that behind Bruno's denunciation hides a more direct confrontation with the most noble and well-bred gentleman Sir Fulke Greville, in whose chambers the dialogue of *The Ash Wednesday Supper* took place [Maggi 2005].
[37] On Bruno's infinity as absolute perfection: Knox 2020, 71-102. For an overview of Bruno's conception of infinity beyond its confrontation with Aristotle: Del Prete 2006, 47-60.
[38] «Ex eo quod Parmenides dixit unum undique aequale atque sphericum, et Melissus unum asserit infinitum, minime contradiction sequitur inter illos, sed potius alter alterum exponit» [Bruno 2007, 11]. For Bruno's interpretation of Parmenides' One: Ruggiu 2002, 215-219.

«force of custom» (350).[39] For Aristotle is falling in the same bias that impels us to say that some guy is nice and not that we are fond of him (or that ice cream is good and not that we enjoy it). Since all the qualities that we predicate of things necessarily refer to our point of view, for the sake of simplicity, we remove ourselves from the equation and turn those dyadic predicates into monadic ones, which designate invariable attributes of things.

So, in explaining Aristotelian finitude as the sophisticated product of a bias introduced by custom, Bruno pays Aristotle back in his own coin. For, if the latter confined relative infinitude to the merely psychological realm, the former relegates absolute finitude to the domain of error. But this small mistake, which we make every day without even noticing it, namely of reducing relations to attributes of things, reproduces the exact mechanism by which we go from «If we like something, then it is good» to «If something is good, then we like it», which allows us, to that extent, to erect a universal morality. In effect, to establish an absolute good and evil, and not simply qualities in relation to what we desire or reject at a given time, goodness and badness must become invariable properties of things, which explain why they are desirable or contemptible. In this sense, as we have tried to show, Bruno's criticism of Aristotelian infinitude must ultimately be understood as a criticism of morality.

6. Conclusions

Most scholars have assumed that Copernicus' discovery triggered Bruno to elaborate his cosmological proposal, extending the Copernican model to an infinite cosmos devoid of spheres [Bruno 2018, xv-xix]. However, despite the solid arguments for upholding this claim, some have questioned the extent of Copernicus' influence on Bruno.[40] For instance, Ernan McMullin has argued that leaving aside the revolution

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[39] For Bruno's Averroistic denouncement of custom's poisonous effects: Granada 2002b, 37-42.
[40] Bruno himself could have given rise to it: «I am not particularly interested in Copernicus» [Bruno 2018, 161].

of the planets around the Sun, the differences between Copernicus' and Bruno's cosmologies are far more significant than their similarities.[41] On the other hand, some ancient philosophers, such as Democritus or Epicurus, had already advocated the infinity of the universe and the plurality of worlds [Del Prete 1998, 31-39]. Not by chance, these philosophers share with Bruno the rejection of universal moral values and the defense of ethical relativism [Granada 1989]. This observation, obvious as it may seem, makes our claim to be taken into account: Bruno's critique of morality does not derive from his infinite cosmology, but, on the contrary, his infinite cosmology derives from his critique of morality. Thus, far from constituting a derivative aspect of his thought, Bruno's critique of morality provides a valid exegetical criterion to explain certain aspects of his cosmology that would otherwise be utterly incongruous. Thus, for example, his refusal to turn the Moon into a satellite of the Earth, as Nicola Badaloni pointed out [Badaloni 1955, 85], must be understood in the light of his fundamental opposition to projecting moral values onto the physical world, introducing elements in it that would denote subordination or hierarchy.[42]

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[41] «To call Bruno a "Copernican" requires one to empty the label of all content save the assertion that the earth and planets move around the sun. Not only does his arrangement of the planets differ entirely from that of Copernicus, as we have seen, but he separates himself in the most emphatic way from the methodology on which Copernicus rests his case» [MacMullin 1987, 64]. On the striking differences between Copernicus' and Bruno's conception of mathematics: Rossini 2020.

[42] Indeed, the rejection of the objectivity of moral values results in the suppression of hierarchies and degrees of perfection on the physical plane, in favor of a total defense of the homogeneity, not only of space but of the basic structures of the bodies that populate it. That could account for Bruno's rejection of one of the most critical aspects of Copernican cosmology: the order of the «inferior» planets, which put an end to the ambiguity inherent in the Egyptian and Chaldean order [Pantin 1988]. As Dario Tessicini has pointed out, in certain passages of his work, Bruno not only goes on to place the Moon on the circumference of the same epicycle as the Earth but establishes the exact relationship between the Mercury-Venus couple, placing its epicycle on the same solar deferent as that of the Moon-Earth couple at diametrically opposite distances. As if that were not enough, in *De immenso*, III, 10, Bruno seems to apply the same model to the higher planets, Mars, Jupiter, and Saturn, together with their respective consorts (imperceptible to our eyes), placing their epicycles on the same solar deferent as that of the lower ones, and even to entertain the wild idea

What Bruno assumes from Copernicus, after all, is that sense data do not designate properties or attributes of things but must be related to the observer who perceives them [Namer 1966, 10]. In this paper, we have attempted to unpack and develop this motto, portraying it as a reversal of the natural tendency to take things for finite substances, and showing its essential coincidence with the cognitive biases that lead us to erect a universal morality. Perception is not the effect of the substantial nature of things but the cause of our attribution of a substantial nature to them. As Dicson, one of the characters in *Cause*, observes: «And I say that the expressed, sensible and unfolded being does not constitute the fundamental essence of actuality, but is a consequence and effect of it» [Bruno 1998, 83].

Recognizing this central motif of Bruno's thought, namely, the denunciation of the inversion of cause by effect, allows us to trace the unforeseen continuity of this idea in the history of philosophy. Thus, in a famous passage in the Appendix to the first book of the *Ethics*, Spinoza argues that the doctrine of final causes «turns Nature completely upside down. For what is really a cause, it considers as an effect, and conversely» [Spinoza 1994, 112]. Likewise, in a mysterious aphorism from *Twilight of the Idols*, Nietzsche makes the following remark: «No error is more dangerous than that of *confusing the cause with the effect*: I call it a genuine destruction of reason. Nevertheless, this error can be found in both the oldest and the newest habits of humanity: we even sanctify it and call it 'religion' and 'morality'» [Nietzsche 2005, 176].[43]

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of granting them the same annual revolution around the Sun [Tessicini 2007, 59-109]. Indeed, this seems to have been something other than Bruno's definitive stance on the question [Granada 2010]. But, in any case, his lucubrations and hesitations should be regarded as absurd and incomprehensible if one does not consider Bruno's profound rejection of any ontological hierarchy and the consequent structural homogeneity that it entails. If our hypothesis seems sound, it is precisely this structural homology that would lead him not only to eliminate the distinction between «inferior» and «superior» planets but to attribute to them a disposition capable of being iterated both at the macrocosmic and at the microcosmic level (as we find it in his *Area Democriti* [Lüthy 1998]). On Bruno's radical rejection of any kind of cosmo-ontological hierarchy: Granada 1992, 65, n. 56.

[43] Although in Spinoza and Nietzsche the denunciation of the moral character of this initial subversion is explicit, while in Bruno it is rather implicit, this component is nonetheless an essential element of his critique, as I have attempted to prove in this

This confusion of cause with effect is a modality, as we have seen, of the so-called fallacy of *affirming the consequent*, consisting in going from «If I like something, then it is good» to «If something is good, then I like it». Thus, the goodness we attribute to things insofar as we like them becomes an attribute of things that explains our liking for them.

Nietzsche portrayed his philosophical project as a transvaluation of Christian moral values. Since he considered these values to subvert the natural order of things, he envisioned their subversion as a transvaluation, that is, as a subversion of the subversion that restored things to their natural sense. Likewise, we could say that by showing the moral assumptions of a scientific theory whose scientific objectivity had remained undisputed for centuries, Bruno carries out a «genealogy» of the Aristotelian-Ptolemaic cosmos.

Nowadays, it is very likely that in addressing the relationship between infinity, which is associated with such an abstract discipline as mathematics, and morality, which is conceived as the doctrine of good and evil, someone asks us what that has to do with the price of fish. However, Bruno's unveiling of the moral biases implicit in the cosmology of his time should make us wonder if behind the use of terms from the economic field to designate physical theories, does not underlie a human, perhaps too human, angle. In Bruno's time, on the other hand, the morally revulsive component of his critique of the prevailing cosmology did not go unnoticed by the opponents against whom he addressed it. By upsetting an upset world, Bruno upset the followers of those who had put the world upside down. He upset them so much that they found that sending him to the stake was the most convenient thing to do.

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Keywords

Abstract

Between 1584 and 1585, during his stay in London, Bruno published six dialogues in Italian in which he expounded the bulk of his philosophy in a unitary way. Scholars unanimously agree that these six installments can be divided thematically into two distinct parts: the first three present the new cosmology and its ontological and theological principles, while the last three deal with the moral, political and ethical consequences that follow from the former. Thus, the third dialogue, *On the Infinite*, is the bridge where the passage from the cosmological to the moral sphere takes place. The dialogue presents itself as an open refutation of the Aristotelian finite cosmos. In it, Bruno argues that Aristotle's main error lies in his rejection of the infinity of the universe. However, if we pay attention to the causes that Bruno deems to motivate such rejection, we will see that these ultimately coincide with the cognitive biases that lead to the assumption of moral universalism. This paper aims to prove that contrary to the established belief Bruno's critique of morality is not a consequence of his cosmological view but rather that the latter derives from the former. That will cast new light on Bruno's criticism of Aristotle's moralized infinity and provide us with a firm criterion for interpreting some of the more idiosyncratic aspects of his cosmology.

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