Beyond Analogy and Contingency: Giordano Bruno's Infinity of Worlds

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Abstract In the wake of Copernicus, the Italian philosopher and cosmologist Giordano Bruno (1548–1600) posits an infinite cosmos and an infinite number of worlds on the basis largely of arguments from sufficient reason, or that God, given his nature, could not have done otherwise. Bruno's infinite cosmos, then, is not contingent, but unfolds by necessity. Further, this essay argues, instead of relying on analogy like most Renaissance cosmographers, Bruno embraces paradox, or the coincidence of opposites, to reconcile the extremely large and small in the universe. What results is a radically immanent, organicist, pantheistic, and decidedly non-Christocentric cosmos. Such a cosmos, Ernst Cassirer argues, is the supreme instance of ethical self-consciousness in Renaissance philosophy. In this manner, Bruno makes cosmological infinity emblemize the very freedom of thought that the Catholic Church wished to deny him.

Keywords Giordano Bruno; cosmos; infinity; analogy; contingency

1 Introduction

One reason why the Inquisition burned the peripatetic philosopher and cosmographer Giordano Bruno at the stake in 1600 in Rome was his detailed theory of the infinity of worlds. The document drawn up by Cardinal Bellarmine in 1599 containing eight propositions Bruno was supposed to recant is lost. But most agree one proposition must have read something like: Innumerable and eternal worlds (*mondi*) exist. He who denies the infinite effect denies the infinite power of God (Ricci 2014, 103–109, 114). During his trial, Bruno defended this and the other propositions as speculative and as compatible with Christian belief. His writings, however, confirm that his claims about infinite space and the infinite number of worlds it contained were ontological claims about an immanent, organicist, pantheistic, and decidedly non-Christocentric cosmos.

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Consider Bruno's stirring rhetoric in his 1584 dialogue, *De l'infinito, universo e mondi* (*On the Infinite Universe and Worlds*):

> when we consider more profoundly the being and substance of that universe in which we are immutably set, we shall discover that neither we ourselves nor any substance suffers death; for nothing is in fact diminished in its substance, but all things wandering through infinite space undergo change of aspect […]. There are no ends, boundaries, limits or walls which can defraud or deprive us of the infinite multitude of things […]. [W]e recognize a noble image, a marvellous conception, a supreme figure, an exalted shadow, an infinite representation of the represented infinity, a spectacle worthy of the excellence of God magnified and the greatness of his kingdom made manifest; he is glorified not in one, but in countless suns; not in a single earth, a single world, but in a thousand thousand, I say in an infinity of worlds. (Bruno 1950, 245–246)

Such insights concerning an infinite cosmos do not depend, this essay contends, on analogy—even if analogy sometimes ornaments and helps explicate them. Nor do they draw directly on mathematical reasoning, as does, for instance, Thomas Digges, whose 1576 *Perfit Description of the Caelestiall Orbes according to the most aunciene doctrine of the Pythagoreans lately revived by Copernicus and by Geometricall Demonstrations approued* is one of the first published works to feature a celestial diagram indicating an infinite universe (**Fig. 1**) (Koyré 1957, 35–39).[1]

Instead, they rely on what Arthur Lovejoy and Alexandre Koyré identify as the principle of sufficient reason. As Bruno puts it with uncharacteristic concision: "Omnipotence does not begrudge being" (Bruno 1950, 262). To contemplate infinite worlds is thus also to contemplate a cosmos stripped of all contingency. For Bruno it is not a question whether to posit the existence of infinite worlds, but rather how to express the necessity of doing so. Bruno the cosmologist, Hans Blumenberg argues, becomes a metaphysician after he reads Copernicus, who, after positing the Earth's annual orbital motion around the sun, notes that the absence of any parallax in the fixed stars meant they must be extremely far away (Blumenberg 1975, 416–452). Bruno, however, transforms these immense dimensions into infinite ones. And this transformation grants the cosmos new "metaphysiche[] Dignität," for its infinity now matches its creator's grandeur (Blumenberg 1975, 417).

1 Although Bruno sojourned in England from 1582 to 1584, where he published, remarkably, six Italian dialogues, including *De l'infinito*, there is no evidence that he knew Digges's diagram.

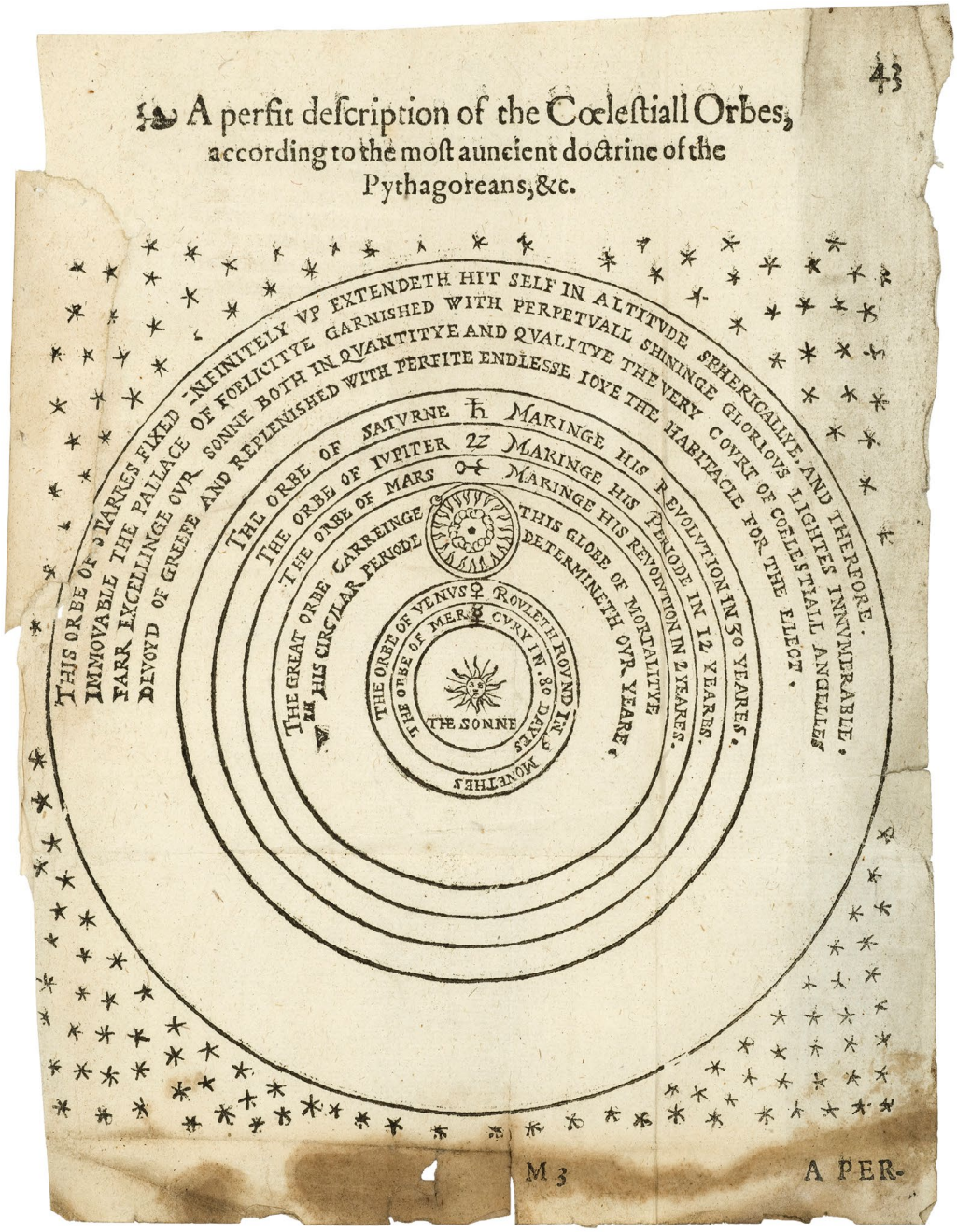

Figure 1 Thomas Digges's (1605) diagram of the universe.

Bruno thus explodes the Neoplatonic, analogical framework in which his contemporaries typically pondered the cosmos. In other words, when it comes to infinite worlds, Bruno's logic (and to some extent his rhetoric) no longer links to that Great Chain of Being, *scala naturae or analogia entis*, which furnishes the ontology structuring most Renaissance cosmological thought. And while the rhetorical aspects of Bruno's writing are often rightly underscored by scholars, it must also be remarked that his poetics aim less to persuade than to ravish and transport (Maiorino 1977, 317–327). True, the ingenious, bombastic Bruno employs all kinds of rhetorical figures. Indeed, he dedicates an entire book, *De gli eroici furori* (*The Heroic Frenzies*), to allegorizing the new cosmology. Further, as Olivia Catanorchi indicates, his reliance on analogy in the form of simile and ontological similitude is ubiquitous (Catarnorchi 2014, 3.82–84). However, I would argue that Bruno, while heuristically employing analogy to describe the organicism of his infinite worlds, relies on other modes of reasoning when it comes to intuiting these worlds in the first place.

In recent years, Hilary Gatti has shifted the focus of Bruno studies by stressing the physical over the symbolic aspects of his cosmology. Following Gatti, I see Bruno's doctrine of infinite space and infinite worlds as no mere *oratio*, but rather as a subtle *ratio* affirming that God's infinite nature is incompatible with anything save an infinite universe populated by infinite worlds. By emulating Cusanus's fifteenth-century embrace of the coincidence of opposites, *coincidentia oppositorum*, Bruno aims to reconcile metaphysical and physical truths. In this manner—and it is decidedly a *maniera*—he integrates *maxima* and *minima*, infinite space and the infinity of animated atoms or monadic souls that constitute matter. Moreover, as Ernst Cassirer persuasively argues in his 1926 book *Individuum und Kosmos in der Philosophie der Renaissance*, this solution to the cosmological problem can ultimately be viewed as the supreme instance of ethical self-consciousness in Renaissance philosophy.

Cassirer's thesis will be considered below in some detail; but here I would note that Enlightenment and Romantic thinkers, like Pierre Bayle, F. H. Jacobi, and F. W. J. Schelling, saw in Bruno's cosmology a novel form of pantheism, which, in disdaining any limits to our physical universe, discovers that "divinity is present in us and in our planet no less than in every other heavenly body" (Ingegno, in Bruno 2004, ix). Put another way, "Bruno's infinite universe radically modifies the relationship between God and the world, between God and human beings" (Ingegno, in Bruno 2004, xi). Thus, if the Brunean self ecstatically makes the embrace of such *coincidentia* the mark of its freedom, then the question remains open how we, contemplating such a cosmos, might interpret his abuse of the principle of non-contradiction with his use of the principle of sufficient reason. While I have no satisfying solution to this crux, at the end of this essay I will suggest that the recent efforts of Quentin Meillassoux to describe the absolute contingency of physical laws might be read as a response to Bruno.

2 Beyond Copernicus

Bruno praises and blames Copernicus in the 1584 dialogue *La Cena de le ceneri* (*The Ash Wednesday Supper*). "[G]reatly superior" to all previous astronomers for his discovery of heliocentrism, Copernicus, we are told, "being more a student of mathematics than of nature," did not go far enough (Bruno 1995, 86). It was left to Bruno himself to pass "beyond the borders of the world" and to efface "the imaginary walls of the first, eighth, ninth, tenth spheres and the many more you could add according to the tattlings of empty mathematicians and the blind vision of vulgar philosophers" (Bruno 1995, 90). It was left to Bruno to forge a dramatically new kind of perspectivism:

> We know that there is naught but one sky, one immense ethereal region where those magnificent lights keep their proper distances in order to participate in perpetual life. These blazing bodies are the ambassadors who announce the excellent glory and majesty of God. So we are led to discover the infinite effect of the infinite cause, and the true living sign of infinite vigor [*il vero et vivo vestigio de l'infiniti vigore*]; and we have the knowledge not to search for divinity removed from us if we have it near; it is within us more than we ourselves are. In the same way, the inhabitants of other worlds must not search for divinity in our world, for they have it close to and within themselves, since the moon is no more heaven for us than we for the moon.[2] (Bruno 1995, 91; Bruno 2002, 2.455–456)

In the less florid *On the Infinite Universe and Worlds*, Bruno presents this vision of the cosmos as absolutely necessary and, as Gatti stresses, as clearly distinct from hermetic, Neoplatonic views of the infinite universe.[3] By positing a single, universal, physical law, Bruno in one fell swoop abolishes the Aristotelian distinction between the sub- and superlunary worlds and challenges the Neoplatonic notion of empirical reality as illusory.[4]

2 Gatti (1999, 99–127) situates Bruno's infinite universe besides Patrizzi's and Palingenius's; but she also shows how Bruno spurns the Neoplatonic notion which rejects the notion that the universe is a continuum.

3 Gatti (1999, 99–100) notes Copernicus had radically shrunk the size of the Earth, which made the sky/heavens seem immense by contrast. This "led to a lively revival of a debate, begun in classical antiquity and continued with fervor throughout the Middle Ages, as to whether God could create or had created the universe of finite or infinite dimensions." More generally, to reinscribe Bruno into the history of cosmology proper, Gatti would counter Frances Yates's interpretation of the Brunean universe as a hermetic "hieroglyph."

4 See also Bruno's Latin poem *De innumerabilibus, immenso, et infigurabili* (1591).

3 Sufficient Reason and *Intellectio*

The argument for infinite worlds filling an infinite universe is a logical one. Schematically put, it runs: since God is an infinite, omnipotent being this implies an infinite creation. (Propositional logic calls this argument a *modus ponens* (MP), a rule of inference that can be summarized as: *P* implies *Q* and *P* is asserted to be true, therefore *Q* must be true.) Adhering to the "principle of plenitude" as Lovejoy and Koyré put it, Bruno affirms that "God could not do otherwise" but create an infinite universe containing infinite worlds. As Bruno writes in *On the Infinite Universe and Worlds*:

> Why should we or could we imagine that divine power were otiose? Divine goodness can indeed be communicated to infinite things and can be infinitely diffused; why then should we wish to assert that it would choose to be scarce and reduce itself to nothing—for every finite thing is as nothing in relation to the infinite? Why do you desire that centre of divinity which can […] extend infinitely to an infinite sphere, why do you desire that it should remain grudgingly sterile rather than extend itself, as a father, fecund, ornate and beautiful? (Bruno 1950, 260)

Such exorbitant rhetoric aside, specific cosmological consequences are also deduced via the principle of sufficient reason: "the universe being infinite, there must ultimately be other suns. For it is impossible that heat and light from one single body should be diffused throughout immensity" (Bruno 1950, 305). The line, in other words, between logic and cosmological speculation is extremely blurry for Bruno.

I would revisit, then, how Blumenberg conflates Bruno's "metaphorical presentation" and the reasoning behind his metaphors. Blumenberg writes:

> The metaphorical presentation [*Metaphorik*] of the new truth is intoxicated by breaking through the walls of the celestial spheres, by expanding space and multiplying the one world into the universe of infinite worlds. Reason as the overstepping of boundaries that were previously drawn, recognized, and finally hardly perceived any longer—this schema […] stamps the self-understanding of the modern age as it gets under way. But at the same time it marks reason's inability to take small steps and to overcome things gradually, which can be gathered in Bruno's case from the difference between his own use of Copernicus as his point of departure and the distance he establishes from him by a leap [*Sprung*]. This process has an ecstatic character. Reason is bearable only for the few who are able to bear the painful consequences of its violence [*die das Schmerzhafte ihrer Gewaltsamkeit zu ertragen vermögen*]. (Blumenberg 1975, 427–428; 1987, 363–364)

Glossing, in effect, what Cusanus defines as *intellectio* or the highest faculty of knowing, Blumenberg folds Bruno into his metaphorology, which makes such *Sprünge* the engine of intuitive thought. Yet Bruno is also arguing for the literal necessity of infinite worlds. As the renowned Bruno scholar Giovanni Gentile insists: "[T]he knowledge of divinity, as championed by Bruno, is not ecstasy, or immediate union, even though it is union that it has as its end […] It is a rational process, a discourse of the intellect" (cited by Maiorino 1977, 322).

4 Beyond Contingency

Bruno's notion of infinite worlds thus excludes contingency, for it is necessary for no gap to exist between what could be and what is. (Of course, from an intellectual-historical perspective, Bruno's theory is variously contingent, dependent on biographical circumstance, the history of his reading, and events ranging from the Council of Trent to the 1572 supernova.) Briefly put, only given a non-contingent cosmos is it "possible to speak of a divinity which coincides with the world itself" (Ingegno, in Bruno 2004, x). Reading Bruno's 1584 treatise *De la causa, principio, et uno* (*Cause, Principle and Unity*), Alfonso Ingegno observes:

> The principle of the universe, if it is unique, is therefore its own cause, and this means we cannot speak of two separate worlds. Thus, Bruno can state that God needs the world no less than the world needs Him, since if the material infinity of the corporeal were lacking, the spiritual infinity of the divine would also be absent. By linking the world necessarily with the divinity and vice versa, the divinity is established as that which is all in all and in everything. It cannot be 'elsewhere', since its coincidence of spirituality with infinite matter means that 'elsewhere' does not exist.
> (Ingegno, in Bruno 2004, xx)

Moreover, Bruno's audacious remaking of theological doctrines concerning necessity is also how he decisively rejects astrological, that is, external causality.

Bruno's concept of necessity has further cosmological and theological consequences. Cusanus proposes that God's metaphysical *complicatio* necessarily entails a physical *explicatio*. Such endless infolding and unfolding informs, in turn, every aspect of Bruno's description of spatial and material infinity (see Koyré 1957, 42). But having discovered the *vera causa* of the material universe (that is, a cause actually operating in nature, and whose effects are members of the same natural kind), Bruno concludes that the infinite universe and its infinite parts require an infinite encyclopedia to be explicated. In the second volume of his Latin works published in Frankfurt in 1587, he writes:

> [T]he perfection of the universe proceeds from unity, truth and goodness, by the virtue of active force, by the disposition of passive force and by the worthiness of the results. This true perfection can exist only in an innumerable multitude, in immense size and in the evident beauty of order. Thus, by a certain circle of learning (*encyclopaedia*), all things are brought forth, directed and applied.[5] (Bruno 1950, 156)

Such an "encyclopaedia" must be transcribed by humans with their "imaginative logic." Paolo Rossi comments that for Bruno the "encyclopaedia" was synonymous with the "total system;" for the "unity of knowledge and the unity of the cosmos are interchangeable concepts" (Rossi 2000, 85). While Blumenberg comments, Bruno desires "to spread out the prospect of the whole, in a comprehensive intuition, before himself, and to perceive in it the driving claim of each of its members to realize all of its potential and to enter into the universal participation of everything in everything" (Blumenberg 1987, 367). Yet if all this roughly follows Cusanus, there is one crucial exception: as we shall see, Bruno replaces Cusanus's absolutely necessary "Christological bridge" between the metaphysical and physical realms with his own radical subjectivity.

5 Beyond Analogy

While Bruno's primary claims for infinite space and the infinity of worlds are made by the faculty Cusanus describes as *intellectio* (akin to what Spinoza dubs the third kind of intellectual reasoning), more local, specific claims are made by analogy. *For instance,* Bruno remains indebted to analogies and similes from Lucretius's epic cosmological poem, *De rerum natura*, to rail against "those whose fantasy would erect around 'the universe' boundary walls." And he rehearses Lucretius's famous analogy (1.968–1.973) of the spear-thrower who can always surpass any boundary set by proponents of finite space; this, in order to conclude: "none of our sense-perceptions, is opposed to the acceptance of infinity" (Bruno 1950, 231–232). And even when Bruno details, for instance, why the infinite universe is not arranged like the "infoldings of an onion," he affirms more generally that "there is indeed likeness between all stars, between all worlds, and that our own and the other earths are similarly organized" (Bruno 1950, 328).

Catanorchi glosses different meanings of analogy in Bruno's thought. Aside from Bruno's frequent use of simile, she describes how analogy often works to help him logically discover ontological unity in a plurality of predicates (Catarnorchi 2014,

5 Assessing his own reasoning, Bruno claims to have "expounded infinite power intensively and extensively in more lofty fashion than hath ever been done by the whole body of theologians" (Bruno 1950, 235).

3.82–84). Bruno also uses analogy to profoundly modify the *scala della natura*. To know the innumerable links in nature is, he believes, one of the tasks of an authentic thinker; it is instrumental, too, for his *ars memoriae*. But he also, as will become clear presently, subverts the *scala della natura* with his intricate, metamorphic, thoroughly Baroque conception of life and infinite matter, a conception that undermines the classical notion of a hierarchically ordered universe. Conversely, when it comes to identifying God with the infinite cosmos, Bruno leaves analogical reasoning behind. He writes in *The Heroic Frenzies* that divine beauty is without "similitude, analogy, image or species" and that "the highest and most profound knowledge of divine things is negative and not affirmative" (cited by Maiorino 1997, 323). In this respect, Bruno uses similitude to mark the limits of similitude.

If, when it comes to the infinite, the human imagination knows no limits, then by contrast "we should understand that God actually conceiveth infinite dimension and infinite number; and from this conception there followeth the possibility and convenience and opportunity which we posit, namely that as [his] active power is infinite, so also as a necessary result, the subject thereof is infinite" (Bruno 1950, 270). Arguing here not by analogy, but from necessity (or *ex convenientia*), Bruno justifies his perspectivism and its attendant physical consequences. Specifically, he asserts:

> [T]he earth no more than any other world is at the centre; and no points constitute definite determined poles of space for our earth, just as she herself is not a definite and determined pole to any other point of the ether, or of the world space; and the same is true of all other bodies. For various points of view these may all be regarded as centres, or as points on the circumference, as poles, as zeniths and so forth. Thus, the earth is not in the centre of the universe; it is central only to our surrounding space. (Bruno 1950, 280)

Bruno's cosmology, with its infinite dimensions and worlds, also therefore entails relativity of place and motion (see Bruno 1995, 152; Singer, in Bruno 1950, 50). In this manner, Bruno twists the Chain of Being to its breaking point. Yes, he still relies on analogy as a mode of induction and ornamentation, but he also drastically modifies it to explicate two other subjects: the nature of individual worlds and the nature of matter.

6 Infinite Worlds as *Animalia*

Around the turn of the nineteenth century, it was Bruno's pantheistic metaphysics of immanent infinity that interested readers like Jacobi, Hegel, and Schelling. Schelling's *Identitätsphilosophie* took dialogue form in the 1802 *Bruno oder über das göttliche und natürliche Prinzip der Dinge*. Here Schelling, with one eye on the Italian

cosmologist, effectively rejects *analogia entis* as he explains how, as Manfred Durner writes, "a form of absolute identity unfolds into a plurality of forms" (Schelling 2005, xiv (my translation)). But already in 1697, Pierre Bayle, in his massively influential *Dictionnaire historique et critique*, reads Bruno as a Spinozist. With characteristic ambiguity, Bayle seizes on Bruno's cosmology to question the philosopher's faith. Ironically, he also appears to indict him for relying too much on analogy, when he dismissively notes how Bruno argues "that there is an infinity of Worlds similar to this one, & that these are all intellectual animals, which have vegetable and rational individuals, like there are on the earth" (Bayle 1740, 1.680). Indeed, Bruno's pantheism may be said to rest more on his organic conception of cosmological matter than on his vision of the infinity of worlds. Bruno regards planets as *animalia* and he ascribes to them a kind of animism that favors immanence over transcendence. And while his claims concerning these *animalia* are informed mainly by analogy, they also rely on arguments from sufficient reason. In other words, when the scale of Bruno's cosmography narrows, when it concerns objects of more familiar scale and kind, then metaphor plays a larger role.

Both sufficient reason and analogy are involved when Bruno affirms that "the Prime Origin is not that which moves, but is itself still and immobile, it gives the power to generate their own motion to innumerable worlds, great and small animals placed in the vast space of the universe, each with a pattern of mobility, of motion and of other accidents, conditioned by its own nature" (Bruno 1950, 267 (translation modified)). As *animalia*, heavenly bodies are endowed with *anima*; their motion, though influenced by other bodies, is determined chiefly by internal reason (*raggione*). Conversely, while the number of worlds in Bruno's cosmos is infinite, the kinds of worlds he envisions are finite. Following the Renaissance Neoplatonic philosopher Marsilio Ficino, Bruno describes how the "principal" cosmological bodies—per God's providence and their souls' nature—determine their own motions. The stars animate themselves and thus give life to the planets, which helps to sustain them in turn. It is by analogy, then, that Bruno affirms the similarity of the Earth, a "living creature," with other heavenly bodies. The "earth and other worlds," he writes, "are animals," but ones endowed with "greater and more excellent mind than belongs usually to these creatures" (Bruno 1950, 315). Further, the "other globes, which are earths, are not at all different from this one in kind; but [differ] only in being bigger and smaller, [just] as inequality occurs in any other species of animal through individual differences" (Bruno 1995, 154). Yet Bruno also relies on arguments from sufficient reason to explain why other worlds are inhabited: "For it is impossible that a rational being fairly vigilant, can imagine that these innumerable worlds, manifest as like to our own or yet more significant, should be destitute of similar or even superior inhabitants" (Bruno 1950, 323). Thus, here and elsewhere Bruno insists that any rational, fair-minded, but also inspired intellect must reach this same conclusion.

Dilwyn Knox describes how Bruno's decidedly non-mechanistic cosmology "populated the principal [planetary] bodies with life-forms of every kind. Each region of each principal body comprised matter which, circumstances permitting, became a plant or animal, even a rational animal. This last category included human beings and also demons, in other words, rational beings with rarefied bodies made of pure aether or combinations of aether with air, water or earth" (Knox 2019, sec. 3). In short, "[t]he novelty in Bruno's interpretation was the idea that spontaneous generation explained the variety of life in an infinite and infinitely varied universe rather than the survival of a privileged species on this earth" (Knox 2019, sec. 3). As for his physics, Bruno remakes the medieval doctrine of the four elements (fire, air, water, and earth) to envision a non-hierarchical, "homogeneous universe" in which each celestial body is composed and animated by mixture of these elements, just as an alphabet, composed of a certain number of letters, contains all possible sentences (Knox 2019, sec. 3).

Meanwhile, Anne Eusterschulte underscores analogy's epistemological value: "Particularly via the notion of the organism [*Organismusvorstellung*] [...] Bruno makes clear in what manner the unity in nature's multiplicity is to be thought. The universe of immeasurable, countless worlds resembles a living being with a soul; each of these worlds is a living organism. For Bruno the elementary correlation of worlds is like a body with a soul" (Eusterschulte 1997, 380 (my translation)). Alternatively, Blumenberg stresses the Stoic roots of Bruno's organic-metaphorics and how it helps him express "the unity of his universe;" indeed, "enthusiasm for organic totality" [*das Pathos der organischen Totalität*] leads directly, necessarily, "to the atomistic character of all its elements" (Blumenberg 1975, 430–431; 1987, 366–367). I would add, however, that Bruno himself acknowledges the need to distinguish between "truth and metaphor." Metaphor is sometimes necessary to persuade the "common people;" nevertheless, the literal claim "that the universe is infinite and consists of an immense ethereal region" cannot be doubted (Bruno 1950, 182–184). Metaphor, in short, plays a fundamental heuristic and affective role in Bruno's cosmological thinking.

7 Infinite *Maxima* and *Minima*

Bruno's rejection of a mechanistic cosmos rests also on the paradox that sees maximum and minimum as essentially identical. Just as there are an infinite number of worlds or *maxima*, there are infinite number of atoms or *minima*. Drawing eclectically on Pythagoreanism, Epicureanism, and Cusanus, Bruno equates physical atoms with what he calls "souls" or "monads." Infinite in number, each monadic soul acts according to its inner nature and necessity (Singer, in Bruno 1950, 91). But again, such striving can only be harmonized within the *Denkraum* of an infinite cosmos. Thus, even as Miguel Granada has tried to reconcile the "infinite *extensiva*" of Bruno's cosmos with

"infinite *intensiva*, located in the infinite number of celestial worlds," Hilary Gatti argues that Bruno's "infinite *intensiva* [is] located ultimately in the infinite number of indivisible atoms" (Gatti 1999, 115–127). Gatti would thus reconcile the *maxima* of the creation with Bruno's version of substance, which consists of animistic atoms or monadic *minima*. Indeed, "[h]is infinitism can be fully understood only in the light of his reproposal of ancient atomism" (Gatti 1999, 107).[6] On the one hand, then, Bruno proleptically offers an ingenious solution to the problem of substance, a problem that would dominate the philosophy of Descartes, Spinoza, and Leibniz in the century to come. On the other hand, though, his solution verges on the kind of paradox favored by hermetic philosophy and mystical theology. Knox nicely describes the implications:

> Correctly understood, atoms were incorporeal spheres with spatial locations. Soul, working through the intermediary of aether or spirit, joined these incorporeal, identical, spheres to make a body […] Intrinsically dimensionless, their centres coincided with their circumferences. Conversely, since the universe was an infinite, indivisible (*atomus*) sphere, its centre was omnipresent. Both were absolute physical monads, indivisible unities, the centres and circumferences of which coincided. They differed inasmuch as the *maximum* was the 'unfolding' of the *minimum* and a *minimum* was the 'enfolding' of the *maximum*.[7] (Knox 2019, sec. 3)

It appears, then, that this "unfolding" and "enfolding" operate in a realm beyond analogy and contingency.

8 *Coincidentia Oppositorum*

Coincidentia oppositorum is the conceptual means that Bruno, appropriating Cusanus, uses to link *minima* with *maxima*—and, ultimately, to conflate them. More generally still, "[t]he infinity of the universe is envisaged as bound up with the identity of contraries" (Singer, in Bruno 1950, 83). In this respect, paradox or the violation of the law of non-contradiction becomes Bruno's signature mode of thought—ultimately outstripping analogy and arguments from sufficient reason. Blumenberg neatly places this mode in a wider intellectual-historical frame:

6 Gatti notes that in *De immenso* Bruno advances "the idea of an entirely homogeneous, infinite universe, filled throughout with one constantly moving and modifying substance" (1999, 109).

7 See also Bruno 1950, 287.

> There is a thoroughgoing stylistic correlation between the Nolan's mode of thought in many other matters and his Copernicanism, if one sees in the latter above all the scandalizing of consciousness. Paradox is a characteristic element of Mannerist style. […] Infinity enters the modern age's cosmology under the title of "paradox" and is eliminated from it, later, under the title of "antinomy." (Blumenberg 1987, 361)

To this I would add: pondering *coincidentia* is not a metaphoric mode for Bruno, but rather one that trespasses on negative theology. For instance, in *The Heroic Frenzies*, Bruno, perhaps recalling Dante's *Paradiso*, asserts: "The image of light becomes light itself at the point where 'infinite potency and infinite act coincide'" (cited by Maiorino 1977, 325). Further, in *De immenso*, Bruno leans on analogy to assert the universality of this paradox: "Wherefore as rational and irrational in the animal are indifferent, being a single truth, so in the infinite, in the maximum, hot and cold are assuredly one throughout the universe; and we have often shown them coincident in the minimum as in the maximum" (cited by Singer, in Bruno 1950, 86).

More to the point, the coincidence of opposites lets Bruno assert that the "infinity of mobile bodies and motive forces […] all reduce to a single passive principle and a single active principle" (Bruno 1950, 364). Ingegno explains why these opposing principles ultimately coincide: "If one starts from the assumption that the universe is infinite, it no longer makes sense to conceive the coincidence between act and potency as the exclusive property of a fixed point in the hierarchy of being, a privileged point in a finite and physical cosmos conceived as distinct from the intelligible world" (Ingegno, in Bruno 2004, xiv). More briefly put, the many must be reconciled with the one. Bruno writes: "And the infinite number and magnitude coincide with the infinite unity and simplicity in a single utterly simple and indivisible principle, which is Truth and Being" (Bruno 1950, 364).

While Cusanus's doctrine of God's *complicatio* and the universe's *explicatio* serves as his guide in detailing the consequences of this assumption, Bruno diverges from his predecessor by giving cosmic matter new metaphysical value. Matter now becomes absolute possibility. In effect, Bruno sidelines theology and considers the "unity of substance" solely in terms of the *coincidentia* (Ingegno, in Bruno 2004, xix). Now the Platonist world-soul, which is co-eternal with God, becomes the necessary creator of forms. Discovering ontological unity in the coincidence of *maxima* and *minima*, of creator and created, Bruno's cosmology embraces infinity as both a physical and metaphysical rule. "It thus became possible," Ingegno notes, "to imagine a mediation between the human and the divine which, moving through nature, would render unnecessary the solution adopted by Nicholas of Cusa and would in fact do away with all forms of Christology" (Ingegno, in Bruno 2004, xix). Bruno's cosmology, in sum, sublimates religion.

9 Pathos of Infinite Worlds

For Cusanus, even though Christ's choice was made of free will, the cosmos could not be otherwise. But in an extraordinary metalepsis, Bruno comes to see himself as the link between God and the infinite cosmos. More particularly, Bruno glosses his intuition, by which an earthly subject comprehends an infinite cosmos containing an infinite number of animated worlds, by appropriating and redefining the medieval scholastic term *synderesis*.

To understand this term as Bruno uses it, Cassirer's *Individuum und Kosmos in der Philosophie der Renaissance* (*The Individual and the Cosmos in Renaissance Philosophy*) (1926) is essential. First, Cassirer describes how thinkers like Cusanus, Ficino, Pico della Mirandola, Kepler, and Bruno variously reject determinism, especially astrological determinism. This rejection is cast in ethical and affective terms rather than conceptual ones. Spurred by their God-given *ingenium*, these thinkers plumb the nature of the universe and discover how "the new view of the value of humanity" [*die neue Anschauung vom Selbstwert des Menschen*]—and not the new science—can liberate us from "[t]he power of *Fortuna*" (Cassirer 1998, 138–139; 2000, 120). Cassirer thus argues that, in Bruno's 1584 book *Spaccio de la Bestia Trionfante* (*The Expulsion of the Triumphant Beast*): "This principle of conscience and consciousness, the principle of 'sinderesis', as Bruno calls it, replaces the unconsciously active, cosmic-demonic forces. […] Through the heroic passion that ignites within him, man becomes equal to nature and able to comprehend its infinity and its incommensurability [*zur Anschauung ihrer Unendlichkeit und Unermeßlichkeit reif*]" (Cassirer 1998, 141–142; 2000, 122). In short, to intuit the cosmos becomes a heroic, ethical act of self-consciousness.

Cassirer's grand intellectual-historical narrative can be abbreviated, then, to a story in which the objective view of the cosmos offered by mathematics is mediated and perhaps even eclipsed by the cosmologist's radical subjectivity. After pondering the Renaissance's "new concept of space," which conceived of a systematic whole obeying "a strictly unitary law" (Cassirer 2000, 182), Cassirer presents Bruno as an emblematic figure who, through his new "feeling for the world" rather than mathematics, frees cosmology from its Aristotelian chains (Cassirer 2000, 188). Given this, he concludes, "Bruno did not look upon the problem of space as exclusively or even primarily a problem of cosmology or natural philosophy, but, rather, as a question of *ethics*" (Cassirer 2000, 188). This remarkable interpretation makes Bruno into the preemptive opponent of Descartes, whose *cogito* would indeed represent itself as coincident with the new science. Cassirer elaborates: "[W]e grasp the infinite with the same organ with which we grasp our own spiritual being and essence [*geistiges Sein und Wesen*]: the principle of its knowledge is to be sought nowhere but in the Ego, in the principle of self-consciousness." It is in this manner alone that "the Ego assures itself of its own freedom" (Cassirer 1998, 217; 2000, 188). And if this seems to

preempt Kant's antinomy between freedom and necessity, then Cassirer, for his part, proposes another polarity or, more precisely, he offers this analogy: "The infinity of the cosmos threatens not only to limit the Ego, but even to annihilate it completely; but the same infinity seems also to be the source of the Ego's constant self-elevation, for the mind [*Geist*] is like the world it conceives" (Cassirer 1998, 219; 2000, 190). That this enthusiastic account contrasts so dramatically with the gloomy affect described by Blaise Pascal in the seventeenth century when he contemplates an infinite cosmos ("Le silence éternel de ces espaces infinis m'effraie") is, it seems, Cassirer's way of affirming the endless vitality of cosmological speculation.

10 Conclusion

In reading the few documents extant from Bruno's ten-year imprisonment and several interrogations, one cannot help but note the irony of the once peripatetic, now imprisoned Bruno continuing to champion an infinite cosmos filled with innumerable self-determining worlds. But a still deeper irony emerges in relation to the question of contingency. For in denying the contingency of the Creation, Bruno was in partial, if unwilling agreement with his inquisitors.

Up until Bruno's trial, the Catholic Church had never officially considered as heretical the doctrine of the infinity or plurality of worlds (it also largely ignored Copernicanism).[8] Curiously though, the reactionary position which the Church eventually adopts is prefigured in Philipp Melanchthon's 1555 fervently Protestant, anti-Copernican *Initia doctrinae physicae*. Here Melanchthon warns against the idea of a plurality of worlds and the implication that Christ's incarnation and redemption could have occurred on other planets:

> The Son of God is One: our master Jesus Christ was born, died, and resurrected in this world. Nor does he manifest Himself elsewhere, nor elsewhere has He died and been resurrected. It therefore must not be imagined that Christ died and was resurrected more often, nor must it be thought that in any other world without the knowledge of the Son of God, that men would be restored to eternal life. And while these arguments are not physical ones, nevertheless we must consider, that if other worlds are fabricated, then other religions would be dreamt as well as other kinds of men.
> (Melanchthon 1555, 43v)

8 In his *Apologia pro Galileo* (Frankfurt, 1622), Tommaso Campanella asserts that the doctrine of the plurality of worlds is not heretical. But, of course, Campanella was also imprisoned, though not executed, by the Church for his beliefs.

By constraining what can be imagined and thought, even as he ponders the implications of the most audacious of ideas, Melanchthon sets the stage for the Catholic Church's own contradictory misreading or misprision of Bruno's cosmology—a cosmology born from that same intellectual intuition that will partly inform Leibniz's theory of possible worlds and much later David Lewis's modal realism. In other words, Bruno's inquisitors were either very good or very bad readers of Bruno's writings (though they did not possess all of them).[9] Specifically, we can imagine them puzzling out the entailments of his cosmology to seize on the implication that, given an infinity of worlds, there had to be an infinity of Christs. For his part, Blumenberg underscores how infinite worlds challenged the system of Christian dogma:

> According to Bruno's great premise, no individual contingent fact, no person, no saving event, not even an individual world could claim to represent, to contain, to exhaust the power and the will, the fullness and the prodigal self-expenditure of the divinity. But if the creation […] was already an insurpassable reality, the incarnation of God within it could not even be an 'interruption.' (Blumenberg 1987, 373)

This also to say that Blumenberg reaches much the same conclusion as Cassirer regarding Bruno's role in this cosmological drama: "Bruno […] combines with his enthusiasm [*Schwärmerei*] for the infinity of the universe and the infinite number of worlds a pagan rebelliousness against any self-withholding on the part of theology's God, against every saving blessing that competes with the universe—and perhaps also against any redeemer who competes with his own pretensions [*Anspruch*] as salvation-bringer" (Blumenberg 1975, 434; 1987, 370). Detecting this "Anspruch," the Church kills Bruno hoping to snuff out the implications of his infinite worlds. In other words, a kind of rhetorical *implicatio* rather than metaphysical *complicatio* or physical *explicatio* gets Bruno burned at the stake.

A final thought: in 2006 the speculative realist philosopher Quentin Meillassoux published *After Finitude: An Essay on the Necessity of Contingency*, an already seminal book that, it could be said, takes up where Bruno's cosmology leaves off. Assuming an infinite universe and that it is "*a priori* legitimate to think the possible as a Whole," Meillassoux insists "that there is a totality of conceivable possibilities" (Meillassoux 2008, 102–103). Yet Meillassoux also champions what he defines as "absolute contingency" or the radical certainty that there is no such thing as causal necessity. For him the cosmos represents a kind of "hyper-chaos" such that the principle of sufficient reason must be abandoned even while the principle of non-contradiction is retained. How and why Meillassoux turns in the end to the absolutes offered

9 For his part, Bruno proves a sophisticated reader of Scripture in defense of his ideas.

by mathematized science I cannot compass here. I would, however, observe that in removing God completely from the cosmological equation he removes the thinking subject as well. In this manner, what Meillassoux (Meillassoux 2008, 126), like others before him, calls the "Copernican de-centering" is completed—and Bruno disappears.

Figures

Fig. 1 Wellcome Library, London. Public Domain

References

Bayle, Pierre. 1740. "BRUNUS (Jordanus)." *Dictionnaire historique et critique*. 4 vols. Amsterdam: P. Brunel. 1679–1681.

Blumenberg, Hans. 1975. *Die Genesis der kopernikanischen Welt*. Frankfurt am Main: Suhrkamp.

——. 1987. *The Genesis of the Copernican World*. Trans. by Robert M. Wallace. Cambridge and London: The MIT Press.

Bruno, Giordano. 1950. *On the Infinite Universe and Worlds*. Introduced and trans. by Dorothea Waley Singer. New York: Henry Schuman.

——. 1995. *Ash Wednesday Supper,* ed. and trans. by Edward A. Gosselin and Lawrence S. Lerner. Toronto: University of Toronto Press.

——. 2002. *Opere italiane*. 2 vols., ed. by Giovanni Aquilecchia and Nuccio Ordine. Turin: UTET.

——. 2004. *Cause, Principle and Unity*, ed. and trans. by Robert de Lucca. With an introduction by Alfonso Ingegno. Cambridge: Cambridge University Press.

Cassirer, Ernst. 1998. *Individuum und Kosmos in der Philosophie der Renaissance.* Vol. 14. *Gesamme lte Werke,* ed. by Birgit Recki. Hamburg: Felix Meiner.

——. 2000. *The Individual and the Cosmos in Renaissance Philosophy*. Trans. by Mario Domandi. Mineola, NY: Dover Publications.

Catanorchi, Olivia. 2014. "Analogia." In *Giordano Bruno. Parole, concetti, immagini,* ed. by Michele Ciliberto, 3: 82–84. Pisa: Edizioni della Normale.

Digges, Thomas. 1605. *A prognostication everlasting of right good effect, fruitfully augmented by the author, containing plaine, briefe, pleasant, chosen rules to iudge the weather by the sunne, moone, starres, comets, rainbow, thunder, clowdes, with other extraordinary tokens, not omitting the aspects of planets […].* London: F. Kyngstone.

Eusterschulte, Anne. 1997. *Analogia Entis seu mentis. Analogie als erkenntnistheoretisches Prinzip in der Philosophie Giordano Brunos.* Würzburg: Königshausen & Neumann.

Gatti, Hilary. 1999. *Giordano Bruno and Renaissance Science*. Ithaca: Cornell University Press.

Knox, Dilwyn. 2019. "Giordano Bruno." In *The Stanford Encyclopedia of Philosophy*, ed. by Edward N. Zalta. https://plato.stanford.edu/archives/sum2019/entries/bruno/.

Koyré, Alexandre. 1957. *From the Closed World to the Infinite Universe.* Baltimore: Johns Hopkins University Press.

Maiorino, Giancarlo. 1977. "The Breaking of the Circle: Giordano Bruno and the Poetics of Immeasurable Abundance." *Journal of the History of Ideas* 38 (2): 317–327.

Meillassoux, Quentin. 2008. *After Finitude: An Essay on the Necessity of Contingency*.

Trans. by Ray Brassier. London: Bloomsbury.

Melanchthon, Philipp. 1555. *Initia doctrinae physicae […]*. Wittemberg: Johannes Lufft.

Ricci, Saverio. 2014. "Le procès de Giordano Bruno par l'Inquisition." *Lexicon Philosophicum* 2: 97–125.

Rossi, Paolo. 2000. *Logic and the Art of Memory*. Trans. by Stephen Clucas. Chicago: University of Chicago Press.

Schelling, F. W. J. 2005. *Bruno oder über das göttliche und natürliche Prinzip der Dinge*, ed. by Manfred Durner. Hamburg: Felix Meiner.