

CENTRAL ASIAN JOURNAL OF LITERATURE, PHILOSOPHY, AND CULTURE

https://cajlpc.centralasianstudies.org/index.php/CAJLPC

Volume: 07 Issue: 01 | January 2026 ISSN: 2660-6828

Article

The Kaleidoscope of Scientific Ideas in John Banville's Doctor Copernicus: A Literary-Cognitivist Reading

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Citation: Ulug'jon qizi I. S. The Kaleidoscope of Scientific Ideas in John Banville's Doctor Copernicus: A Literary-Cognitivist Reading. Central Asian Journal of Literature, Philosophy, and Culture 2026, 7(1), 326-334

Received: 10th Jan 2026
Revised: 11th Jan 2026
Accepted: 10th Feb 2026
Published: 12th Feb 2026

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Abstract: Purpose. This article examines the artistic and epistemological dimensions of John Banville's novel Doctor Copernicus the first installment of the "Revolutions Trilogy," in order to determine how the novel's non-chronological, "kaleidoscopic" presentation of historical cosmological models functions as a vehicle of literary knowledge. Methods. The novel is read through James Harold's theory of "literary cognitivism" and analyzed by means of close textual analysis combined with intertextual verification: every cosmological model attributed in the novel to Copernicus's teachers (Canon Wodka and Domenico Maria da Novara) is checked against "external sources" — the historical and philosophical texts on which Banville draws (Koestler, Plato, Aristotle, Ptolemy, Cusanus, and others). Results. The analysis shows that the ten cosmological models surveyed in the novel — from Egyptian myth to Pythagoras, the Church Fathers, the Gnostics, Ptolemy, Plato, Aristotle, and Nicholas of Cusa — alternate between perspectival, propositional, and phenomenal knowledge in Harold's sense, and that Banville systematically blurs documented historical fact with artistic invention, producing a recurring problem of "evidentiary warrant." Conclusion. The figure of Copernicus emerges not as the discoverer of a fixed truth but as an epistemological figure formed at the intersection of knowledge, doubt, imagination, and interpretation; the novel represents scientific truth as something constituted through historical, cultural, philosophical, and aesthetic interpretation rather than as an absolute given.

Keywords: Doctor Copernicus; John Banville; literary cognitivism; James Harold; postmodern fiction; kaleidoscope of scientific ideas; perspectival knowledge; propositional knowledge; cosmological models; metafiction; intertextuality; epistemology.

1. Introduction

"Doctor Copernicus" stands as one of the pivotal works in John Banville's scientific trilogy, illuminating the question of the historical figure and scientific thought from an artistic-philosophical perspective. Through the figure of the protagonist, Nicolaus Copernicus, this study examines the formation of scientific knowledge, the artistic interpretation of historical truth, and the postmodern articulation of cosmological views. Banville portrays Copernicus not merely as the founder of the heliocentric theory, but as a complex individual who strove to comprehend the universe and lived amid doubt, wonder, and inner searching. The novel presents a kaleidoscopic array of cosmological models, ranging from the mythological conceptions of ancient Egypt to the theories of

Pythagoras, Plato, Aristotle, Ptolemy, and Nicholas of Cusa. Accordingly, this study links Banville's postmodernist mode of narration with James Harold's theory of "literary cognitivism," thereby revealing the capacity of fiction to convey knowledge.[1]

"Doctor Copernicus" (1976), the first installment of the "Revolutions Trilogy," depicts the problems of scientific knowledge, truth, and their artistic expression through the figure of Copernicus. The problem addressed here is twofold: first, how the principles of postmodernist literature — intertextuality, metafiction, and historical indeterminacy — structure the novel's presentation of the history of cosmology; and second, whether and how this structure can be accounted for by the theory of "literary cognitivism" advanced by James Harold, a philosopher specializing in aesthetics and the philosophy of literature. According to Harold's theory, fiction is capable of offering the reader not only moral knowledge but also propositional (factual), perspectival (a way of seeing the world), and phenomenal (what-it-is-like) knowledge. The fundamental concepts of this theory have been examined in detail in the author's previous study. The aim of the present article is to apply the philosopher's central concepts — perspectival and propositional knowledge, together with the principle of "external sources" — to the analysis of the cosmological conceptions presented in Banville's novel, and thereby to test the explanatory reach of literary cognitivism on a text that deliberately mixes documented history with invention.[2]

2. Materials and Methods

Material. The primary material of the study is John Banville's novel *Doctor Copernicus* (Hanover Square Press, 2023 edition). The novel's own intertextual sources — Arthur Koestler's *The Sleepwalkers* which Banville has named as the work that inspired the trilogy together with primary historical and philosophical texts (Plato's *Timaeus*, Aristotle's *Metaphysics* and *De Caelo*, Ptolemy's *Almagest*, and Nicholas of Cusa's *On Learned Ignorance*) — serve as the "external sources" against which the novel's claims are checked.

Theoretical framework. The analysis is grounded in James Harold's theory of literary cognitivism, which distinguishes several kinds of knowledge fiction may convey — propositional (factual), perspectival (a mode of seeing), and phenomenal (what it is like to be in a situation) — and which introduces the principle of "external sources": confidence in the historical accuracy of a novel's factual claims must rest on sources external to the work itself, since a work of fiction offers no internal evidence for such claims. This creates what Harold terms the problem of "evidentiary warrant" wherever fiction mixes verifiable fact with invention.[3]

Procedure. One of the central artistic representations in the novel is the exposition of cosmological models belonging to various historical periods, delivered to Copernicus by his teachers (Canon Wodka and Domenico Maria da Novara). These models — ranging from the mythological conceptions of the Egyptians to Ptolemaic geocentrism — are presented not in chronological order but in a distinctive "kaleidoscopic," deliberately intermixed fashion, a method that manifests postmodernism's tendency to represent ideas in a non-linear manner. For each cosmological model, the following procedure was applied: (1) the model as rendered in Banville's text was identified and quoted; (2) the claim was verified, in accordance with the principle of "external sources," against the relevant historical or scientific source (Koestler, Plato, Aristotle, Ptolemy, Cusanus, and others); (3) the model was classified according to Harold's categories of knowledge (propositional, perspectival, or phenomenal); and (4) any divergence between the novel's account and the historical record was recorded as an instance of the "evidentiary warrant" problem. This four-step procedure structures the presentation of results below.[4]

3. Results

The "machine" metaphor and the frame of evidentiary warrant

Banville's portrayal of the young Copernicus's psychological response to parental loss is constructed through the metaphor of a machine. At the age of ten, Copernicus interprets his mother's death as "the small flaw in the machine that had caused it," whereas his father's death makes "the machine seem damaged now beyond repair." This metaphor reflects the child's attempt to rationalize an incomprehensible experience by imposing order on a chaotic reality. At the same time, it anticipates Copernicus's later scientific inclination to understand the universe as an ordered and coherent system. The metaphor also introduces a deliberate historical anachronism: the mechanistic conception of the universe is more closely associated with the scientific revolution of the seventeenth century and thinkers such as Descartes and Newton than with Copernicus's period. Thus, Banville appears to use the anachronism symbolically, presenting Copernicus as an intellectual precursor to later scientific thought.[5]

From Harold's theoretical perspective, the passage can be associated with "weak cognitivism," since the literary image communicates both perspectival and phenomenal knowledge. Literature enables readers to understand what it means "to be in a kind of situation, or to be a kind of person," while also demonstrating "how to view things" rather than simply transmitting factual information. At the same time, the passage illustrates an important characteristic of postmodernist metafiction: Banville reconstructs the inner life of a historical personality through imaginative invention. This complicates the distinction between historical fact and fiction and raises the issue of "evidentiary warrant," because readers may potentially interpret an artistically constructed psychological portrait as historically documented reality.

Historical grounding: the trivium and the quadrivium

The novel also incorporates historically grounded elements of medieval education. Banville describes the trivium—grammar, logic, and rhetoric—as part of Copernicus's early education at the school in Włocławek, where Caspar Sturm is presented as his teacher. Unlike the machine metaphor, this episode primarily conveys propositional knowledge and therefore corresponds more closely to the concept of "strong cognitivism." The subsequent quadrivium—arithmetic, geometry, astronomy, and music theory—provides an important intellectual foundation for the novel's central concern with astronomy and cosmology. Banville presents Canon Wodka as an exceptionally curious teacher who moves beyond mathematical instruction to philosophical problems such as Zeno's paradox of the arrow.[6]

Nevertheless, the distinction between historical fact and fictional reconstruction remains problematic. Canon Wodka corresponds to the historical Mikołaj Wódka, who is associated with Copernicus's education, while the sundial attributed to their collaboration is connected with Włocławek Cathedral. The figure of Caspar Sturm, however, lacks the same degree of historical corroboration and may represent a fictional element introduced by Banville. Consequently, the novel does not always allow the reader to determine which details are historically verifiable and which are products of literary imagination. As Harold argues, fictional works cannot themselves provide sufficient evidence for the historical accuracy of their claims; such claims require verification through sources external to the literary text. Banville's novel therefore exemplifies the postmodernist metafictional tendency to merge historical documentation with imaginative reconstruction, making the boundary between history and fiction deliberately unstable.

The kaleidoscopic structure of the cosmological survey

Having depicted the future scientist's educational environment, Banville introduces the novel's central scientific theme: the changing conceptions of the cosmos and the Earth from ancient civilizations to the fifteenth century. In Copernicus's conversations with Canon Wodka, including one set on a riverbank, the evolution of humanity's understanding of the universe is presented in a deliberately kaleidoscopic manner. Rather

than following a chronological sequence, the cosmological models appear in an apparently random order, reflecting the disruption of linear temporality characteristic of postmodernist narrative. This disorder corresponds to the novel's deeper thematic structure: like the young Copernicus, the reader is encouraged to search for order and meaning within a seemingly chaotic collection of ideas. The resulting diversity of perspectives forms the "kaleidoscope of scientific ideas" that can be examined through individual cosmological models.[7]

Egyptian mythological cosmology

The first cosmological model introduced by Canon Wodka is the Egyptian conception of the universe. Its broader intellectual context is found in Koestler's *The Sleepwalkers*, a work that influenced Banville's trilogy and provides an important intertextual source for the novel. The Egyptian model represents the cosmos as a rectangular structure resembling an oyster or box, with the Earth forming its floor. The sky is imagined either as a cow supporting herself on the four corners of the structure, as a woman resting on her elbows and knees, or as a domed metallic covering. The sun and moon gods travel in boats along rivers flowing at a uniform level around the inner walls of the cosmic structure. Lunar and solar eclipses are explained through mythological events, including the moon god's encounter with a wild boar and the swallowing of the sun by a serpent.

From the perspective of Harold's theory, this cosmological model primarily conveys perspectival knowledge. It does not present scientifically verifiable information about the universe; instead, it demonstrates how ancient people imaginatively and symbolically perceived and interpreted cosmic phenomena. The model therefore illustrates literature's ability to represent a particular historical mode of understanding reality, revealing not simply what people believed but how they constructed meaning from the natural world.[8]

Pythagoras and Heraclides: the "singing spheres"

In his discussion of different cosmological traditions, Canon Wodka next refers to the Greek scholars Pythagoras and Heraclides and associates their ideas with the concept of the "singing spheres." The formulation may create a certain degree of ambiguity because the doctrine of the harmony or music of the spheres is traditionally associated primarily with Pythagorean thought, whereas Heraclides developed a different model of planetary motion. The combination of these figures can therefore be interpreted as another example of Banville's tendency to reshape historical knowledge through literary reconstruction.

The Pythagorean concept of the singing spheres represents an important stage in the development of cosmological thought because it connects the movement of celestial bodies with mathematical proportion and musical harmony. In contrast to the Egyptian mythological model, which explains the universe through symbolic narratives and supernatural forces, the Pythagorean approach seeks an underlying numerical order. From Harold's theoretical perspective, this stage of the novel's "kaleidoscope" demonstrates a transition from mythological interpretation toward rational and mathematical conceptualization of the universe. Thus, Banville presents the history of cosmological thought not merely as a succession of scientific facts but as a gradual transformation in humanity's ways of perceiving, organizing, and explaining reality.

The Church Fathers' cosmology

After the transition toward rational forms of thought, Canon Wodka presents the religiously grounded cosmological theories of the Church Fathers. In Banville's concise formulation, they conceived of the Earth as "a temple walled with air." Koestler provides a broader explanation of this model, describing the Earth as corresponding to the Holy Tabernacle and the firmament as being surrounded by water, with the conception grounded in the Book of Genesis. From Harold's theoretical perspective, this model, like the preceding cosmological conceptions, primarily conveys perspectival knowledge. Its significance lies not in its correspondence to objective astronomical reality but in its

representation of a religious-symbolic way of understanding the universe, in which apparently logical explanations function to support and reinforce theological doctrine.[9]

Gnostic cosmology

Banville subsequently introduces the cosmological conception of the Gnostics through Canon Wodka's account. According to the novel, the Gnostics regarded the world as the creation of fallen angels. External historical sources provide a more detailed account of this conception: Gnostic traditions commonly distinguished between the supreme, transcendent God and the lower creator deity known as the Demiurge, assisted by the Archons. The material world was consequently regarded as defective, limited, or even evil. This conception directly contrasts with the worldview of the Church Fathers, for whom creation possessed sacred significance. From Harold's perspective, Gnostic cosmology likewise represents perspectival knowledge, but its mode of apprehension is mystical and pessimistic rather than sacred and affirmative. The contrast between the two models demonstrates that different religious systems can construct radically different meanings from the same physical universe.[10]

Ptolemaic geocentrism and "saving the phenomena"

Canon Wodka's account eventually reaches the Ptolemaic geocentric system, which had been developed in Alexandria many centuries earlier and remained dominant during Copernicus's era. According to this model, the stationary Earth occupies the center of the cosmos, while the Sun and other planets revolve around it. Ptolemy's *Almagest* provides a systematic mathematical formulation of this geocentric conception, treating the Earth as immobile at the center of the celestial sphere.

From Harold's perspective, Ptolemaic geocentrism differs significantly from the preceding mythological and religious models because it represents propositional knowledge supported by mathematical reasoning and systematic observation. Nevertheless, an important epistemological paradox emerges: a scientific model may successfully explain and predict observable phenomena while still failing to represent the actual structure of reality. The Ptolemaic system exemplifies this problem particularly clearly. Its mathematical apparatus could account for the apparent movements of celestial bodies with considerable precision, yet its underlying representation of the cosmos was ultimately superseded by heliocentric astronomy.[11]

This issue is connected with the principle traditionally described as "saving the phenomena." The expression refers to the ability of a mathematical model to reproduce or predict observable celestial movements without necessarily providing a physically true explanation of their underlying causes. Banville attributes this formulation to Aristotle, but the historical attribution is itself problematic. The history of the expression shows that its connection with ancient mathematical astronomy is more complicated, and later scholarship has associated the phrase with Plato as well as with subsequent interpretations of Greek astronomical thought. This discrepancy provides another example of the novel's tendency to transform and rearrange historical knowledge. It also reinforces the question of evidentiary warrant: literary assertions about the history of science require independent verification rather than being accepted automatically as factual.

Plato's *Timaeus*

The next stage in the cosmological sequence is Plato's conception of the universe as presented in the *Timaeus*. Banville describes Plato's cosmos as a living, eternal, and perfect being created by God in spherical form, with the sphere representing the most perfect of all shapes. This representation corresponds closely to Plato's own cosmological argument in the *Timaeus*, where the cosmos is conceived as a single visible living organism encompassing all living beings of its kind. Its spherical form is associated with perfection and symmetry, since every point on its surface is equidistant from the center.

From Harold's theoretical perspective, Plato's cosmology occupies an intermediate position between scientific explanation and metaphysical speculation. Although it presents a systematic account of the structure and nature of the cosmos, its principal

significance is perspectival rather than strictly propositional. Plato does not simply attempt to establish an empirically verifiable astronomical model; he presents the universe as a living and harmonious entity whose structure reflects divine reason and perfection. Consequently, the *Timaeus* represents a philosophical way of seeing the universe rather than merely a collection of astronomical facts. Within Banville's kaleidoscopic presentation, Plato's model therefore contributes another distinct perspective on cosmic order and demonstrates how scientific, religious, and metaphysical modes of thought can coexist within the history of humanity's attempts to understand the universe.[12]

Aristotle's crystalline spheres

Following Plato, Banville presents Aristotle's theory of the crystalline spheres. Aristotle explains planetary motion through a system of fifty-five spheres, each interacting with and moving the next, with the entire system ultimately driven by the sphere of the fixed stars. In the *Metaphysics*, Aristotle provides a detailed calculation of these spheres, distinguishing the spheres associated with individual planets and those intended to counteract their movements. From Harold's perspective, this model differs from the predominantly metaphysical conceptions that precede it because it possesses a mechanical and mathematical structure and therefore approaches propositional knowledge. Nevertheless, like the Ptolemaic system, it was eventually shown to be physically incorrect, since no crystalline celestial spheres exist in the material universe.

The significance of Aristotle's theory is further strengthened by its connection with the machine metaphor introduced at the beginning of the novel. The universe appears as a vast mechanism in which individual components interact according to an ordered principle. Historically, Aristotle developed his theory from the astronomical models associated with Eudoxus and Callippus. His conception was not merely metaphorical: he regarded the celestial spheres as real physical entities. However, his principal objective was cosmological and teleological rather than the development of a practically precise astronomical system. Thus, Banville's presentation of Aristotle reinforces the novel's recurring tension between scientific explanation, philosophical interpretation, and the limits of human knowledge.

Pythagoras' celestial lyre

After presenting Aristotle's mechanical and mathematical conception of the cosmos, Canon Wodka returns to Pythagorean cosmology. Pythagoras is described as comparing the universe to a vast lyre whose strings correspond to the intervals between planetary orbits and whose movements produce a harmonious celestial melody. The same analogy is found in accounts of Pythagorean cosmology, where the mathematical proportions of planetary motion are associated with musical harmony.[13]

Banville does not directly explain why this celestial music cannot be heard by human beings. The explanation derives from Aristotle's account of Pythagorean thought: the sound produced by the planets has existed continuously since birth, causing human beings to become accustomed to it, just as workers exposed to constant noise eventually cease to notice it. From Harold's perspective, this conception represents a form of aesthetic-mathematical knowledge. The universe is understood through the principles of harmony, proportion, and beauty rather than through direct empirical observation. The "music of the spheres" therefore represents a perspectival way of perceiving cosmic order, in which mathematical structure and aesthetic harmony become inseparable.

Nicholas of Cusa's infinite universe

Toward the conclusion of his account of cosmological history, Canon Wodka introduces the ideas of Nicholas of Cusa and presents the universe as "an infinite sphere whose center is nowhere." This conception corresponds to Cusa's philosophical argument in *On Learned Ignorance*, where the universe is described as having its center everywhere and its circumference nowhere. The formulation expresses the idea that an infinite universe cannot possess a single fixed center or boundary.

Within Banville's kaleidoscopic structure, Cusa's conception represents a decisive challenge to the traditional medieval image of a finite, spherical, geocentric universe. The combination of the traditional sphere with the new concept of infinity creates a conceptual contradiction that anticipates the intellectual transformation associated with the Copernican revolution. Wodka's concluding statement that "all theories are but names, but the world itself is a thing" encapsulates the epistemological problem underlying the entire sequence of cosmological models. Every theory attempts to provide a name or conceptual structure for reality, yet none can necessarily be equated with reality itself. The succession of models therefore demonstrates the distinction between explanatory systems and the ultimate truth of the physical world.

The Hermetic cosmology: the Novara episode

Banville extends his presentation of competing cosmological systems to Copernicus's years of study in Italy. During a gathering at the home of Domenico Maria da Novara, an astronomer influenced by Platonic and Pythagorean thought, Copernicus encounters another account of the history of astronomy. Novara introduces ideas associated with the *Corpus Hermeticum*, a collection traditionally attributed to Hermes Trismegistus and later translated into Latin by Marsilio Ficino. According to this cosmological conception, the universe is governed by Seven Governors corresponding to the seven planets.

Although Copernicus had previously encountered similar ideas through Canon Wodka, the mystical character of Hermetic cosmology does not correspond closely with his skeptical intellectual disposition. From Harold's perspective, the Hermetic model represents another form of perspectival knowledge, since it does not attempt to establish an empirically verifiable description of the universe. Instead, it presents the cosmos as a symbolic and mystical system governed by hidden divine forces. Its inclusion in the novel further expands the kaleidoscope of cosmological perspectives and demonstrates how scientific, philosophical, religious, and mystical explanations coexist and compete within the intellectual world surrounding the young Copernicus.[14]

4. Discussion

The results show a consistent pattern across the ten models surveyed: the earlier, mythological and religious models (Egyptian, Church Fathers, Gnostic, Hermetic) convey perspectival or mystical-symbolic knowledge, while the more mathematically formulated models (Pythagoras, Ptolemy, Aristotle) approach propositional knowledge — yet, crucially, propositional status does not guarantee truth: both Ptolemy's geocentrism and Aristotle's crystalline spheres are propositionally framed and were nonetheless false, which indicates that Harold's category of "propositional knowledge" describes a mode of address to the reader rather than a guarantee of accuracy. This is, in our view, the central epistemological point the novel makes through its kaleidoscopic form: it does not present a single ascending line from myth to truth, but a series of "names" — each internally coherent, each historically believed — set against the unreachable "thing" of the physical universe.

A second, recurring finding is the problem of evidentiary warrant. In at least three cases analyzed above — the anachronistic "machine" metaphor, the invented trivium teacher "Caspar Sturm" set beside the historically documented Canon Wodka, and the misattribution of "saving the phenomena" from Plato to Aristotle — Banville blends verifiable historical fact with either invention or deliberate error, without signaling the difference to the reader. This is not, we argue, a flaw in the novel but a structural device: it enacts, at the level of reading experience, the very epistemological uncertainty that the novel's content thematizes at the level of the history of science. The reader who wishes to know "what really happened" must, exactly as Harold's principle predicts, step outside the text to "external sources" — which is precisely what the method of this article has done.

These findings extend Harold's literary cognitivism beyond its original scope in an important respect. Harold's framework was developed largely with realist historical fiction in mind (e.g., Styron's *Nat Turner*); the present analysis suggests that the framework applies with particular force to postmodernist fiction that deliberately foregrounds its own mixture of fact and invention, since the kaleidoscopic, non-chronological arrangement of models in *Doctor Copernicus* makes the evidentiary-warrant problem thematically visible rather than incidental. The limitation of the present study is that it examines a single novel in the trilogy; a comparative analysis of *Kepler* and *The Newton Letter* using the same procedure would test whether this pattern holds across Banville's scientific trilogy as a whole.[15]

5. Conclusion

In John Banville's *Doctor Copernicus*, the figure of Nicolaus Copernicus emerges not as a historical seeker of scientific truth but as a complex epistemological figure formed at the crossroads of knowledge, doubt, imagination, and interpretation. Through Copernicus's childhood psychology, his education, his conversations with his teachers, and his acquaintance with cosmological theories, the writer depicts the gradual formation of scientific thought. The mythological conceptions of the Egyptians, the Pythagorean music of the spheres, Plato's perfect cosmos, Aristotle's crystalline spheres, Ptolemy's geocentric model, and Cusa's infinite universe are given not as a single linear history but as a kaleidoscope of scientific ideas — a form that manifests the historical indeterminacy, intertextuality, and fragmentariness characteristic of postmodern literature. From the standpoint of Harold's literary cognitivism, the novel offers the reader not only factual, propositional knowledge but also perspectival knowledge — the capacity to see the world through the thought-forms of different eras. At the same time, Banville deliberately blurs the boundary between historical fact and artistic invention, so that the novel shows scientific truth to be shaped not as something absolute but through historical, cultural, philosophical, and aesthetic interpretation.

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