

THE PHILOSOPHER, THE EMPEROR, AND MATHEMATICS: MICHAEL PSELLOS'S EPISTEMOLOGY OF PROOFS IN CONTEXT

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(aceito para publicação em dezembro de 2025)

Abstract

This paper explores the epistemology of mathematical proofs in the work of Michael Psellos (1018–1081), a central figure of the Byzantine intellectual milieu in eleventh-century Constantinople. While Psellos is primarily celebrated for his contributions to philosophy, theology, and rhetoric, his engagement with mathematics—especially the epistemological and pedagogical status of proofs—has received little attention. Psellos's metaphysical commitment to the truth-bearing capacity of logical reasoning situates him within the Neoplatonic tradition, yet his Christian framework imposes limits on the reach of human knowledge. His selective presentation of mathematical reasoning in the *De omnifaria doctrina* (OD) (Universal Doctrine), a pedagogical work addressed to a young Byzantine nobleman, later ascended to the emperor soil, reveals a deliberate pedagogical strategy: to introduce the future Byzantine emperor to mathematical ideas while deferring their rigorous demonstrations. By distinguishing the epistemic function of proofs (as conveyors of certain knowledge) from their pedagogical function (as staged tools for intellectual formation), Psellos articulates a sophisticated vision of mathematics as both a cognitive and spiritual discipline. This study reconsiders Psellos not merely as a transmitter of ancient knowledge but as a philosopher who reshaped Greek mathematical traditions within a Christian-Neoplatonic synthesis that ultimately contributed to the Neoplatonic revival of the Renaissance.

Keywords: Michael Psellos, Philosophy of mathematics, Epistemology of proofs, Neoplatonism

**[O FILÓSOFO, O IMPERADOR E A MATEMÁTICA: A EPISTEMOLOGIA DAS PROVAS DE
MICHAEL PSELLOS EM CONTEXTO]**

Resumo

Este artigo explora a epistemologia das provas matemáticas na obra de Michael Psellos (1018–1081), uma figura central do meio intelectual bizantino na Constantinopla do século XI. Embora Psellos seja principalmente celebrado por suas contribuições à filosofia, teologia e retórica, seu envolvimento com a matemática — especialmente o status epistemológico e pedagógico das provas — recebeu pouca atenção. O compromisso metafísico de Psellos com a capacidade de verdade do raciocínio lógico o situa dentro da tradição neoplatônica, mas sua estrutura cristã impõe limites ao alcance do conhecimento humano. Sua apresentação seletiva do raciocínio matemático em *De omnifaria doctrina* (OD) (*Doutrina Universal*), uma obra pedagógica dirigida a um jovem nobre bizantino que mais tarde ascendeu ao trono imperial, revela uma estratégia pedagógica deliberada: introduzir o futuro imperador bizantino às ideias matemáticas, adiando suas demonstrações rigorosas. Ao distinguir a função epistêmica das provas (como transmissoras de conhecimento certo) de sua função pedagógica (como ferramentas encenadas para a formação intelectual), Psellos articula uma visão sofisticada da matemática como disciplina cognitiva e espiritual. Este estudo reconsidera Psellos não apenas como um transmissor do conhecimento antigo, mas como um filósofo que reformulou as tradições matemáticas gregas dentro de uma síntese cristã-neoplatônica que acabou contribuindo para o renascimento neoplatônico da Renascença.

Palavras-chave: Filosofia da matemática, Epistemologia das provas, Neoplatonismo

1. Introduction

Today, the reliability of mathematical knowledge is often taken for granted, grounded in the capacity of proofs to secure deductive certainty. But this view—though widespread—is itself the outcome of a long and contingent historical development. Ancient and medieval mathematical cultures have not always regarded proof with the same status, nor conceived of its function in the same way. The ancient Greek mathematical tradition, particularly as seen in Euclid, was the first to emphasize deduction as central to mathematical practice. Yet the transmission of this model through late antiquity, the Byzantine world, and into the Latin West, involved reinterpretation and adaptation.

In the Byzantine Empire, where Ancient Greek remained the language of science and philosophy, Michael Psellos (1018–1081) stands out as a major figure in both preserving and reshaping the Greek intellectual legacy (Barber and Jenkins 2006; Lauritzen 2010; Kaldellis and Polemis 2015; Moore 2005; Papaioannou 2013; Jeffreys and

Lauxtermann 2017; Jenkins 2017; Lauritzen 2021). While Psellos is well known as a philosopher, theologian, historian, and rhetorician, his engagement with mathematics—especially the epistemological significance of proof—remains largely unexplored (Tannery 1892a, 1892b; Moore 2005, 252–265; Petakos 2010; Bardi 2023). This oversight is especially surprising given Psellos’s deep immersion in Neoplatonic philosophy, where mathematical reasoning plays a crucial role in the soul’s ascent toward metaphysical truth.

Psellos’s *De omnifaria doctrina* (OD) [Universal doctrine], a comprehensive pedagogical treatise written for the young Byzantine nobleman Michael Dukas, later Emperor Michael VII (1071–1078), provides a rich source for studying his conception of mathematics. Structured as an all-encompassing handbook, OD covers theology, psychology, physics, and astronomy, among other subjects. It also includes explicit references to mathematical and geometrical reasoning. In key chapters, such as OD 127 and OD 143, Psellos presents mathematical results—drawn from Greek authors like Aristarchus of Samos—while withholding the actual proofs (Heath 1913; Berggren and Sidoli 2017). These omissions are not incidental but reflect a considered educational strategy. Psellos affirms the certainty and indispensability of mathematical demonstration, yet he also calibrates the presentation of such material according to the intellectual readiness of his audience.

Although Psellos does not construct or explicate proofs, his treatment of the concept of proof—through strategic omissions, epistemological hierarchies, and comparisons with revelation—reveals how mathematical reasoning was perceived, valued, and delimited within Byzantine intellectual culture. This approach contributes to the history of proofs not through technical innovation, but by exposing the philosophical and pedagogical frames within which proofs were taught, withheld, or subordinated to theological ends.

This article argues that Psellos’s approach to mathematical proofs must be understood through a dual lens: epistemologically, he holds a metaphysical commitment to the truth-bearing capacity of logical reasoning, in line with the Platonic and Neoplatonic traditions; pedagogically, he withholds proofs in order to guide learners through a graduated path of intellectual development. By distinguishing between these two functions—epistemic (how Psellos values proofs for establishing knowledge) and pedagogical (why and how he withholds them)—we gain new insight into how Byzantine thinkers actively reinterpreted classical mathematics within Christian frameworks.

The case of Psellos thus challenges the reductive view of Byzantine scholars as passive preservers of Greek knowledge. On the contrary, Psellos appears as an interpreter and synthesizer, adapting mathematical methods to fit a broader vision of education and spiritual ascent. His conception of mathematics as both rigorous and subordinate to divine revelation would shape not only Byzantine intellectual culture but also influence the revival of Platonism in Renaissance Italy, where his legacy—directly and indirectly—helped sustain the link between mathematical abstraction and metaphysical inquiry.

2. Biography and Intellectual Profile

Michael Psellos (1018–1081) was a towering figure in the intellectual revival of eleventh century Byzantium. Educated in Constantinople's elite system, he mastered both the Christian curriculum of the trivium and quadrivium and the philosophical legacy of antiquity. His scholarly production, spanning theology, philosophy, history, rhetoric, and the natural sciences, earned him the prestigious title of *Consul of the Philosophers* at court—a testament to his status as the leading philosopher of his time.

Psellos is best known for his *Chronographia* (Reinsch 2014), a historical and psychological portrait of emperors, and for his philosophical essays and letters. But among his many contributions, the *De omnifaria doctrina* (OD) stands out as an educational treatise with encyclopedic ambitions. Composed for the young Byzantine nobleman, later Emperor Michael VII Dukas (r. 1071–1078), OD is structured to introduce a range of disciplines—metaphysics, ethics, psychology, physics, astronomy—offering a systematic path of instruction for the imperial elite. Though not a mathematician by professional training, Psellos reveals an acute awareness of the structure and significance of mathematical reasoning.

This awareness is evidenced by his use of classical mathematical sources and by the inclusion of mathematical content in OD. Notably, Psellos references the astronomical and geometric arguments of Aristarchus of Samos, invokes phenomena like halos in atmospheric optics, and mentions planetary conjunctions in relation to eschatology. In these discussions, he clearly acknowledges the rigor of geometric demonstration—only to defer or omit it.

Two aspects reinforce the historical importance of Psellos's mathematical engagement. First, several Byzantine scholia on Euclid are attributed to him, suggesting sustained attention to foundational Greek mathematics (Moore 2005, 310–311; Stamatis 1977, 91). Second, his reputation as a learned authority extended into early modern Europe: in 1647, the Dutch Elsevier press published an anonymous mathematical compendium,¹ attributed chiefly to Psellos, bundling quadrivial material—arithmetic, geometry, music, and astronomy—into a university manual alongside works by Aristotle and Commandino. Though of disputed authorship, this attribution reflects the persistence of Psellos's image as a mediator of mathematical knowledge.

More than a transmitter, however, Psellos was a philosophical interpreter of mathematics. Drawing deeply on Neoplatonic metaphysics, especially the legacy of Proclus, he saw mathematical reasoning as a preparatory discipline—a means to train the mind in order to ascend to intelligible truths. Yet as a committed Christian thinker, Psellos also positioned divine revelation above all human reasoning. In this delicate balance between reason and faith, mathematics was both necessary and limited: epistemically powerful, pedagogically delicate, and ultimately, as usual in the Middle Ages, subordinate to theology.

It is this double vision—rooted in ancient epistemology but refracted through Christian theology—that undergirds Psellos's implicit epistemology of proofs. His life and

¹ Original title: *Michaelis Pselli compendium mathematicum aliaque tractatus eodem pertinentes*.

legacy reflect not only the complexity of Byzantine intellectual life, but also the active shaping of ancient traditions in new contexts. Through his selective engagement with mathematical texts and his philosophical framing of their significance, Psellos contributed to the long-term transformation of proof culture in the medieval Christian world and beyond.

3. Mathematics in Michael Psellos's *De omnifaria doctrina* (OD)

3.1 Structure and Aims of the OD

Psellos's *De omnifaria doctrina* (OD) is a doxographical compendium intended to instruct Emperor Michael VII Dukas in the entirety of human and divine knowledge. Organized into distinct sections—ranging from theology and psychology to physics and astronomy—it reflects Psellos's ambition to provide a universal framework of understanding, rooted in both Christian doctrine and classical philosophy. Leendert Westerink's edition (Westerink 1948) identifies multiple recensions of the text, which consistently follow an encyclopedic progression: theology (1–20), psychology (21–65), ethics (66–82), physics and physiology (83–119), astronomy (120–138), and cosmological matters (139–178), among others.

While OD presents a broad array of disciplines, mathematical content is largely concentrated in sections devoted to astronomy and physical phenomena. Psellos draws on Greek authorities such as Aristarchus of Samos and invokes geometrical reasoning in discussions of celestial and meteorological events. However, his treatment of mathematical demonstration is marked by a recurrent feature: he references proofs, affirms their validity, but withholds them from the reader. This dynamic is not accidental. It encodes a deeper tension—between Psellos's metaphysical commitment to the rigor of proofs and his pedagogical strategy of deferring them. Works like OD were meant to be read to a young pupil, with the listening experience being pleasant to the ear and designed to instill curiosity about the subject matter. They do not definitely belong to the mathematical genre.

As an all-encompassing work, the content of OD is rooted in Psellos's extensive engagement with both Christian and classical sources, showcasing his ability to synthesize these diverse traditions into a cohesive intellectual framework. For Psellos, the purpose of this text was not merely to impart knowledge but to guide the emperor in understanding the deeper philosophical and theological implications of that knowledge. Each section of OD is carefully crafted to introduce complex ideas in an accessible manner, often drawing from earlier doxographical collections and authoritative texts such as those by Plutarch, Olympiodorus, and Maximus the Confessor.

Although Psellos indulges in referring to Neoplatonic classifications of knowledge, he refers to the Christian doctrine as a supreme yardstick, a standard measurement for other kinds of knowledge. Nevertheless, Psellos's interest in Greek philosophy, especially the works of Proclus, puts him in a odd position, for he has so internalized Greek philosophy that he apparently deems Platonic philosophy superior to Christian revelation. Notably, the Patriarch John Xiphilinos will accuse him of being a Platonist who refutes Christian doctrine, and therefore of being unorthodox, and Psellos in turn will defend his position by referring to mathematical knowledge mentioned in

Christian sources (Maximos the Confessor) and by repeating once again the superiority of Christian revelation as stated in *Chronographia* and *OD* (Criscuolo 1990; Jeffreys and Lauxtermann 2017, 151–152).

3.2 The Epistemic Status of Proofs in OD 127 and 143

OD 127 discusses the relative sizes and distances of the Sun, Moon, and Earth based on Aristarchus's calculations. Psellos cites numerical ratios that reflect ancient geometric analysis, such as the Sun being "18 times larger and less than 20 times" the size of the Moon, or having a proportional relationship of "6,859 to 27" with respect to the Earth. He then comments:

"These calculations are not proposed by the astronomers in such a simple way, without a proof, but they are the result of indisputable geometric proofs. Now is not the time to discuss it, but you, divine emperor, after having learned these problems without the proofs, should ask me about them later." (Psellos, OD 127; my translation; complete text in Appendix)

Here, Psellos's language affirms the epistemic certainty of mathematical proof: they are "indisputable" and logically secure. Yet he also suspends their presentation. The deferral is not due to any skepticism about their truth; it reflects a pedagogical calibration. For Psellos, the mathematical proposition is valid and knowable—but only for a student intellectually prepared to follow its reasoning.

A similar dynamic appears in OD 143, on the geometric nature of lunar halos:

"The proof of the halo circle and the figure of the iris is geometric and, therefore, is difficult for the emperor to grasp." (Psellos, OD 143; my translation; complete text in Appendix)

Again, proof is not dismissed but recognized as demanding. The emperor, though divinely tutored, is not presumed ready for such complexity. Psellos's deference to geometric rigor coexists with his educational restraint. This dynamic reveals an implicit hierarchy of access to truth: the proof exists and guarantees certainty, but it must be approached in due time, through disciplined study.

3.3 OD 161: The Limits of Proof and the Superiority of Revelation

The contrast between mathematical proof and divine revelation comes into sharper relief in OD 161, titled *How could the end of the world be known through the proofs of the Greeks?* Psellos recounts Greek astronomical calculations that purport to predict universal cataclysms based on planetary cycles and conjunctions. Saturn, for example, is said to complete a major revolution every 265 years; the total cosmic revolution recurs every 1,753,200 years. These figures are framed within an effort to use astronomical proof to predict the end of time.

Yet Psellos decisively asserts:

“No one knows the last day and the last hour, except, according to the expression of the Gospel, the Father, His coeternal Son and the Spirit who proceeds from the Father. However, the Greeks strive to know this too with strange proofs.” (Psellos, OD 161; my translation; complete text in Appendix)

Here, the limits of mathematical demonstration are foregrounded. While valid within the domain of the physical cosmos, proofs cannot penetrate eschatological truth. Psellos’s critique is not directed at the internal logic of the Greek arguments, but at their misplaced confidence. Mathematical reasoning is epistemically powerful, but ontologically bounded: it cannot reach into the realm of divine providence, which exceeds human comprehension and rests on revealed knowledge.

This passage sharpens the metaphysical frame that governs Psellos’s view of mathematics: while geometrical proofs convey certainty in their proper domain, they are ultimately subordinate to theology, which alone delivers knowledge of ultimate truths. This hierarchy underscores his Neoplatonic-Christian synthesis, in which mathematics serves both as an intellectual discipline and a steppingstone toward higher, suprarational knowledge.

Summary of Section 3

Across OD 127, 143, and 161, Psellos consistently marks a distinction between the truth-bearing function of mathematical proofs and their instructional presentation. His metaphysical commitment to the certainty of logical reasoning coexists with a pedagogical strategy of deferral, and a theological boundary on the scope of reason. Through this, Psellos formulates an implicit epistemology of proofs—not by theorizing proofs themselves, but by revealing how, when, and why they should (or should not) be accessed. In doing so, he articulates a model of mathematics as both intellectually rigorous and spiritually circumscribed.

4. Psellos’s Philosophical and Educational Agenda

4.1 Neoplatonic Framework and Christian Doctrine

Michael Psellos’s worldview is deeply shaped by a synthesis of Neoplatonic metaphysics and Orthodox Christian theology. He does not treat mathematics as an isolated discipline but as part of a structured hierarchy of knowledge with both ontological and pedagogical implications. Drawing especially on the legacy of Proclus, Psellos sees mathematics as occupying a middle position: superior to opinion (*δόξα*) but subordinate to intellectual intuition (*νόησις*) and ultimately to divine revelation (*πρόνοια* or foreknowledge).

This Neoplatonic scaffolding is explicitly Christianized. In OD 94 (Duffy and O’Meara 1989, text no. 49.15–21), Psellos distinguishes three levels of knowledge:

1. Foreknowledge (*gnosis/pronoia*) – the prerogative of God alone.
2. Intellectual knowledge (*nous*) – belonging to the universal mind and concerning eternal truths.
3. Human rational knowledge – subdivided into opinion (*doxa*, for mutable things) and science (*episteme*, for immutable realities like the soul and intellect).

Mathematics, which operates within the domain of *episteme*, thus plays a central epistemic role: it delivers certainty, cultivates logical discipline, and trains the soul for ascent. Yet it remains ontologically subordinate to divine knowledge. This dual positioning allows Psellos to validate the truth-bearing capacity of mathematical reasoning (epistemic function) while also subordinating it to spiritual ends. The authority of proof is upheld, but its scope is defined and delimited by theological constraints.

4.2 Pedagogy of Ascent and the Withholding of Proofs

Within this philosophical framework, Psellos develops a carefully staged pedagogy of intellectual ascent. His educational model is structured not only around content but around timing, audience, and receptivity. Mathematical proofs—demanding, abstract, and rigorous—require prior formation in logic, terminology, and philosophical grammar. Presenting them prematurely risks miscomprehension and intellectual discouragement. Thus, when Psellos defers the presentation of geometric proofs in OD 127 and OD 143, this should not be interpreted as anti-mathematical or evasive. Rather, it reflects a pedagogical realism: knowledge must be tailored to the student's developmental stage. Emperor Michael VII, despite being Psellos's imperial pupil, is not assumed to be ready for the full burden of geometrical demonstration. Psellos instead introduces mathematical results as objects of curiosity and anticipation, hoping to stimulate further inquiry. In this way, the withholding of proof becomes a pedagogical gesture of respect for both the subject and the student.

This approach aligns with Neoplatonic educational practices, where mathematics serves as a purificatory and preparatory discipline—training the soul for metaphysical contemplation. Psellos adopts this model but filters it through his Christian commitment to humility before divine mysteries. The epistemic dignity of proof is preserved, but the pedagogical route to it is carefully orchestrated.

4.3 Proof, Certainty, and the Limits of Reason

At the core of Psellos's epistemology lies a fundamental tension: proof is the highest form of human reasoning, yet it remains categorically distinct from divine revelation. Mathematical reasoning is certain within its own domain, but it cannot bridge the ontological gap between creation and the Creator. This tension becomes especially visible in OD 161, where Psellos critiques Greek attempts to predict the end of the world through planetary cycles. The Greeks, he writes, "strive to know this too with strange proofs," but such efforts are misplaced. No geometric or astronomical reasoning, no matter how precise, can disclose what belongs solely to divine will.

This critique does not undermine the legitimacy of proofs within their rightful field—astronomy, geometry, physics—but it reinforces the principle that truth is stratified. Logical reasoning is essential for philosophical ascent, but faith and revelation alone provide access to final truths. Psellos’s epistemology thus involves both affirmation and negation: he affirms the truth-bearing power of proofs while negating their sovereignty. They are instruments, not ultimate.

Summary of Section 4

Psellos’s treatment of mathematical proofs must be read within his broader philosophical architecture, in which knowledge is hierarchical, education is progressive, and divine truths ultimately surpass human logic. His epistemology of proofs is implicit but firm: proofs yield certainty within their domain and serve as vital steps in the intellectual and spiritual cultivation of the soul. Yet they are also withheld pedagogically and subordinated metaphysically. In articulating this vision, Psellos demonstrates a distinctive Byzantine model of the relationship between mathematical rigor, philosophical ascent, and theological limitation.

5. The Long-term Impact of Psellos’s Epistemology of Proofs

5.1 From Byzantium to the Renaissance: Psellos as Mediator

Although Michael Psellos was not a mathematical innovator, his philosophical and pedagogical engagement with mathematics had lasting consequences for both Byzantine and Western intellectual traditions. By integrating Neoplatonic metaphysics with Christian theology—and by acknowledging the epistemic value of proofs while strategically withholding them—Psellos helped to redefine the place of mathematical reasoning within a Christianized vision of the cosmos.

His approach influenced subsequent Byzantine thinkers who continued to navigate the tension between Greek scientific heritage and Orthodox theology. More significantly, Psellos’s legacy reached beyond Byzantium. During the fifteenth century, as Renaissance humanists in Italy revived interest in Platonic thought, they did so in part through the mediation of Byzantine intellectuals who brought Greek texts—and Greek frameworks—to the Latin West. Psellos’s writings, especially those grounded in Neoplatonism, contributed to the philosophical atmosphere that nurtured thinkers like Marsilio Ficino and Giovanni Pico della Mirandola. His role in preserving and reframing ancient learning, including mathematical ideas, helped sustain the connection between logic, metaphysics, and cosmology that Renaissance Platonists would inherit.

Though no formal system of mathematical pedagogy is directly attributed to Psellos in Western sources, the fact that a *Compendium Mathematicum* bearing his name was printed in 1647 by Elsevier alongside other classical and Renaissance authors signals his posthumous reputation as a transmitter of ancient scientific wisdom. Even if the attribution was symbolic or strategic, it reflects how Psellos had come to be seen as part of the broader genealogy of Greek science and its transmission.

5.2 A Byzantine Contribution to the History of Proofs

Psellos's treatment of mathematical proofs, while not explicit or technical, has relevance for the philosophical and cultural history of proofs. He does not write a theory of demonstration in the manner of Euclid or Proclus, nor does he engage with problem-solving in the manner of Islamic or Latin algebraists. Instead, his contribution lies in how he situates proofs in a broader hierarchy of knowledge and a carefully staged pedagogy.

By asserting the authority of mathematical proofs while omitting them in practice, Psellos reveals how the epistemology of proofs could be encoded in silence and deferral. His approach highlights that the function of proof is not only to persuade or demonstrate, but to discipline and prepare—serving as a threshold that marks both intellectual competence and spiritual readiness.

This implicit epistemology contributes to our understanding of how mathematical reasoning was handled in non-specialist, philosophical, and theological settings. Psellos stands at the intersection of classical logic, medieval Christian pedagogy, and Neoplatonic cosmology. His selective use of proof—its affirmation, its pedagogical withholding, and its limitation before divine revelation—offers a rare glimpse into the cultural boundaries of mathematical knowledge in a world where faith and reason were in constant negotiation. Revisiting Psellos through this lens allows us to correct a common misconception: that Byzantium merely preserved Greek mathematics in inert form. On the contrary, figures like Psellos interpreted, adapted, and reframed mathematical reasoning according to evolving spiritual and intellectual priorities. In doing so, they shaped how ancient mathematics could survive and be reborn in contexts far removed from its original formulation.

6. Final Remarks

Michael Psellos occupies a distinctive place in the intellectual history of Byzantium—not as a mathematician in the technical sense, but as a philosopher, teacher, and synthesizer of Greek and Christian traditions. His engagement with mathematics, especially as it appears in the *OD*, is notable for its implicit epistemology of proofs: he affirms their rigor and indispensability, yet withholds them from direct presentation, channeling their authority through carefully calibrated educational and metaphysical filters.

Psellos's epistemology of proofs rests on a metaphysical commitment to the truth-bearing capacity of logical reasoning. This aligns him with the Platonic and Neoplatonic conviction that mathematics serves as a ladder to intelligible reality. Yet, in the Christian framework to which Psellos firmly adheres, this ladder does not reach the top by reason alone. Divine truth transcends even the most rigorous geometrical proof. Consequently, Psellos integrates mathematics into a hierarchy of knowledge, where it functions both as a tool of intellectual purification and as a subordinate to the higher realm of revealed truth.

At the same time, Psellos's pedagogical choices—his decision to introduce mathematical results while deferring their demonstrations—highlight his commitment to a staged model of education. Proofs are not simply logical structures; they are thresholds, both cognitive and spiritual, that a learner must be prepared to cross. In this light, Psellos's omissions become conceptually rich. They mark a respect for the complexity of

mathematical reasoning and a belief in the necessity of intellectual maturity for its proper reception.

This dual structure—epistemic affirmation and pedagogical deferral—defines Psellos's unique stance toward mathematical knowledge. It positions him not merely as a transmitter of ancient texts but as an active interpreter of their meaning and role in the formation of the soul. His work contributes to the history of proofs not by expanding their technical repertoire, but by illuminating their cultural function within a Christian-Neoplatonic worldview.

One might ask: if Psellos regards mathematical proof as ultimately inferior to divine revelation, does he truly merit a place in the history of mathematics? The answer is yes—provided that the history of mathematics is understood not only as the evolution of techniques and discoveries, but also as the history of how mathematics has been framed, taught, authorized, and constrained across different cultures.

Psellos's case contributes in four distinct ways:

1. Framing over discovery: He shows how mathematical knowledge was embedded in a broader intellectual and theological system. Even without producing new theorems, his worldview shaped the reception and meaning of mathematics in Byzantium.
2. Subordination as cultural fact: His insistence that proof must bow before revelation is itself a historically significant position. It illustrates a common medieval response to ancient science—respectful yet bounded.
3. Proof as boundary object: For Psellos, mathematical reasoning marks the frontier between human intellect and divine wisdom. This boundary status reveals the cultural limits of proof in Christian pedagogy.
4. Transmission and transformation: Psellos was not a passive preserver of Greek mathematics. His pedagogical structuring of proofs and philosophical interpretation of their place in the hierarchy of knowledge helped shape how Greek science was transmitted to the Latin West.

By revisiting Psellos through this lens, we gain a more nuanced understanding of how mathematical reasoning was framed, refracted, and constrained within medieval Byzantine thought. We also recover an essential chapter in the long history of proofs—one that reveals how their authority was both upheld and circumscribed, depending on the epistemic ambitions and spiritual horizons of the culture that received them.

In this sense, Michael Psellos is a key figure in the history of philosophy of mathematics. His legacy lies in his capacity to transform the status of proof from a purely logical procedure into a spiritual and educational tool, embedded in a broader vision of human knowledge. That vision, articulated through silence as much as through assertion, remains a vital contribution to our understanding of how mathematical proofs were understood—not just as instruments of demonstration, but as signs of truth, thresholds of initiation, and markers of the limits of reason itself.

Acknowledgment

I wish to express my gratitude to the anonymous reviewers for their insightful comments and criticism. This article is an outcome of the project “Cross-Cultural Scientific Exchanges between Christians, Muslims, and Jews in Byzantine Astronomy (from 5th to 16th centuries),” funded by Rita Levi Montalcini Program 2021 (MUR – Italian Ministry of University and Research). I am thankful for the support provided by both the funding agency and my affiliated institution.

Appendix

Except where indicated, translations into English are mine.

OD 94 (Duffy and O’Meara 1989, text no. 49.15–21; translation D. O’Meara)

The first and highest of all [kinds of] knowledge (*gnosis*) is that of fore-knowledge (*pronoia*), which is the activity of God. For God, being above all beings and having a power above intellect itself and being one, in the proper sense, by means of unity alone, is said to fore-know all things. The second kind of knowledge is the intellectual knowledge belonging to the universal intellect (*nous*) which thinks all things wholly. The third [kind of] knowledge coming after this is that belonging to our rational soul, which is divided into opinion (*doxa*) and science (*episteme*): opinion is knowledge of things which move or change, science is of the immutable, such as soul, intellect and the like.

OD 127 (original Greek Westerink 1948, 67–68)

The Size of the Sun, the Moon, and the Earth

According to the excellent astronomer Aristarchus, the Sun has a greater proportion of 6,859 in relation to 27. Its diameter, compared to that of the Earth, has a greater proportion of 19 in relation to 3 and less than 43 in relation to 6. And, again, the diameter of the Sun, compared to that of the Moon, is 18 times larger and less than 20. The distance that separates the Sun from the Earth is 18 times larger and less than 20 times the distance that separates the Moon from the Earth. The Sun, compared to the Moon, has a proportion greater than 5,832 in relation to 1 and less than 8,000 in relation to 8.

These calculations are not proposed by the astronomers in such a simple way, without a proof, but they are the result of indisputable geometric proofs. Now is not the time to discuss it, but you, divine emperor, after having learned these problems without the proofs, should ask me about them later.

OD 143 (original Greek Westerink 1948, 74)

The Halo

The small halo that appears under the Moon is, in fact, an appearance, but it has no subsistence and has characteristics contrary to those of the iris. It mostly manifests itself as a full circle, more rarely it is less than a circle. It appears, above all, around the Moon, more rarely around the Sun, more often at night and less during the day, mostly near the meridian circle and rarely on the horizon. It is always one and monochromatic, that is, white. It

consists of uniform and homogeneous clouds and is also formed by the reflection of visual rays. The mirror surface from which the reflection takes place must be compact, smooth and diaphanous, so that the image of what is visible appears.

The proof of the halo circle and the figure of the iris is geometric and, therefore, is difficult for the emperor to grasp.

OD 161 (original Greek Westerink 1948, 82)

How could the end of the world be known through the proofs of the Greeks

No one knows the last day and the last hour, except, according to the expression of the Gospel, the Father, His coeternal Son and the Spirit who proceeds from the Father. However, the Greeks strive to know this too with strange proofs.

Saturn makes its greatest revolution (*apokatastasis*) every 265 years, Jupiter every 427, Mars every 284, the Sun every 1,461, Venus every 1,151, Mercury every 480, the Moon every 25. The cosmic revolution occurs every 1,753,200 years. Then the conjunction of all the stars takes place in the 30th degree of Cancer or in the 10th degree of Leo and the total cataclysm of the universe occurs. The particular cataclysms occur according to the revolution of the minor years of the stars, since for each planet there are major, medium, and minor years.

Statements

The author reports there are no competing interests to declare.

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