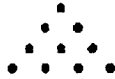


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Introduction to the Early Christian Theology of Arithmetic

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Thank you to Lawrence Shirley for his kind invitation to have me, sight unseen, address the annual meeting of the NASGEm here in Philadelphia.

My presentation tonight falls into two parts: first, an overview of the problems I am addressing in my dissertation; second, examples of research in progress that will be of special interest to other ethnomathematicians, from whom I hope to learn so as to enrich my work. I certainly hope that questions at the end of my presentation will be mutually beneficial.

Dissertation proposal

Early Christian theologians and exegetes regularly used numbers to explain the world and the Bible, and thereby not only drew from, but contributed to, the variegated systems of number symbolism in the Mediterranean world of late antiquity. More Christian authors than not employed numbers as symbols of divine and human realms and as exegetical tools. As widespread a phenomenon it was, it has attracted little, or piecemeal, scholarly attention. In my dissertation I propose to explore competing views in the second and third century on how numbers and arithmetic were to be used in theological discourse. On one side are Valentinian and related systems of gnosis that used arithmology and isopsephy (better known as gematria) in their metaphysics and theology. Several of these authors describe God in terms of pairs of emanations, which they term *aeons*. They present the *aeons* with an eye to numerical considerations. Later in this presentation I'll consider specific arithmetical issues that arise.

On the other side are the catholic apologists, most notably Irenaeus and Hippolytus, who criticize these mathematical tendencies. These two apologists take their theological opponents to task specifically for, among other reasons, attempting to use a Pythagorean and mathematical a priori construct to reshape the Christian gospel. To these critics, numbers have been employed in a capricious manner, used to justify whatever view of gospel that they might dream up. But neither Irenaeus nor Hippolytus, should be taken to be critics of number symbolism *per se* since they themselves constructively use it, particularly when discussing Scripture.

Several questions emerge. What did the Valentinians think they were doing with their numbers? What was the thrust of the catholic apologists' concern? Were the apologists consistent? That is, does their own constructive use of number symbolism fall subject to their own criticism? If so, why the duplicity? If not, what were the principles they used to justify and develop their own sense of a catholic, legitimate use? And if such justification existed, could the Valentinians have enlisted those same principles to justify their own arithmology?

Ultimately, what did numbers mean to these competitors? How did they function? Were they a kind of symbol? If so, how are we to understand the term "symbol"? If not, what role did numbers play in their theology?

To answer these questions, I am comparing the catholic–gnostic debates over numbers to analogous ones in philosophical circles of late antiquity. Iamblichus, a fourth century Neoplatonist philosopher, had a keen Pythagorean acumen. Despite this interest in Pythagoreanism, he criticized the numerological tendencies of his predecessors Numenius and Amelius. Thus, mirroring Irenaeus and his criticism of Platonic gnosis, both Iamblichus and Proclus (the latter dependent upon the former) seem to have rejected one kind of arithmology in favor of another.

Furthermore, Plutarch's writings, which date from the early second century, suggest that he was at once enchanted by, yet critical of, number symbolism. Because of his rhetoric, it is difficult to discern exactly what Plutarch thought of numerical speculation. Does he have a consistent position on what constitutes legitimate number symbolism, or is he confused, indecisive, or self-contradictory? How do Plutarch's and Irenaeus's positions compare with each other?

My study will be one of the first to attempt to explain and analyze the origin and early development, not just of Christian number symbolism, but of Greco-Roman number symbolism in general.

Of interest to ethnomathematicians

The audience I hope to reach includes, understandably, theologians, Bible scholars, and historians of religion, especially of Christianity. But I hope for a wider audience too: those interested in the way various cultures of the past and present have employed numbers to think about God, the world, and themselves. The mathematics in question are not sophisticated, and so will be of little interest to historians of mathematics. What is important here is how ancient Western civilization constructed their universe numerically, and, in turn, constructed their arithmetic so as to reflect their universe.

In the first place I would like to point out that what we ethnomathematicians term "modern Western mathematical constructions"—the mathematical structures that we are trying to study on par with other, non-traditional models—emerge in the recent past, not the ancient. It is often easy to think that modern ways of teaching and learning mathematics, ways that rely so heavily on Euclid and are confined to the study of arithmetic, algebra, geometry, trigonometry, calculus, and so forth, must extend back, in one form or another, to Euclid's era.

True, Euclid's was the standard textbook from his own day to the modern. But, there is little to suggest, I would argue, that Euclid was read, received, and thought of in the manner we tend to label "Euclidean." Note, for instance, Proclus, the sixth century CE philosopher who wrote, among other things, a commentary on the first book of Euclid. This particular work has two prologues, the first of which altogether omits any reference to Euclid, and rather outlines a Platonic view of mathematics, replete with visions of how the disciplines lead toward, eventually, dialectic, and participation in the realm of imperceptibles. Proclus argues that the mathematical disciplines are meant to lead a person into ineffable union with the divine. His wording in this lengthy preamble depends largely upon Iamblichus of two centuries prior, who himself probably followed an ancient tradition, which saw mathematics as this kind of protreptic to a higher life of moral purity, religious consummation, and, yes, even theology.

Proclus's second prologue finally addresses the goal and structure of Euclid's *Elements*, and there he argues that Euclid has in mind a goal identical to that outlined in the first prologue. The geometrician is to move his contemplation from the realm of imagination to that of understanding. To aid this goal, Proclus argues, Euclid organized his work so that it dealt with rectilinear objects first, since they most clearly reflect the world of sense-perceptible objects, whereas curves and circles, taken up formally in Book 3, represent the realm of intelligibles. Thus, the student is to learn first of the mundane shapes: triangles and squares. Triangles constitute the foundation for the elements of fire, air, and water; squares, the basis of the last element, earth. Thus, once he grasps the elements of the world, the student can then

progress to higher metaphysical levels, represented by curves.

Proclus was not a mathematician, yet his comments reflect a common attitude in late antiquity, a time when the educated class saw the mathematical disciplines as important guides to even more rarified philosophical and theological disciplines. This is generally not what we think of when we hear today someone level at another the accusation, "Euclidean!"

In fact, the ancient definition of "mathematics," and the range of disciplines this covered, is quite different from our own. First, the Greek term *mathemata* simply referred to "matters learnt." In late antiquity, this was used specifically of four disciplines—arithmetic, geometry, music, and astronomy—a foursome that would become known in the Western medieval world as the *quadrivium*. Thus, Sextus Empiricus's diatribe, entitled *Against the Mathematicians*, is not directed against those whom we would today consider to be mathematicians, but against those who rely upon the whole quaternity of mathematical disciplines—whether arithmetic, geometry, music, or astronomy—as a basis for truth. Up to the eighteenth century, the English word *mathematics* often retained the expansive sense used in antiquity, and could be applied to astronomy or to music. But the accelerated expansion of all the sciences in that century led to the more narrow definition we use today. (This might give NASGEm the pretext they need to conduct a hostile takeover of societies of ethnoastronomy and ethnomusicology!)

The second place I feel my research can be of assistance in our discipline is in teasing out a little-known ancient debate over the role numbers play in the world. From Aristotle's testimonies to the doctrines of the Pythagoreans, we see that the urge to settle the relationship between the gods and numbers was an ancient one. Aristotle reports an old Pythagorean saying, $\tau\omicron\upsilon\ \rho\alpha=\eta\ \kappa\alpha\iota\ \tau\alpha\ \rho\alpha/\eta\ \tau\omicron\iota\upsilon\ \tau\omicron\iota\varsigma\ \iota\iota\eta\ \nu\omicron\delta\iota\sigma\tau\alpha\iota$. ("The universe and everything are divided in threes.") The Pythagoreans held all things to be grounded in the number three since this is the first number to exhibit beginning, middle, and end. The ancient Pythagoreans observed that this, and other features, led to the use of threes in worship.

There are moments in which Aristotle commends the Pythagoreans, particularly on their view that numbers are essentially physical entities, but overall he criticizes them for their numerical approach to the world, which, Aristotle argues, cannot be justified by our experience. Aristotle argues that the Pythagoreans have misconstrued the entire nature of the world because of their numerical proclivities. His argument against them centers on metaphysical concerns, and it touches only lightly on questions of theology.

The debate that emerges in the second century between Irenaeus and his gnosis-loving opponents, however, centers on theology primarily, and the constitution of the world as a subsequent matter. Irenaeus outlines in derision what we patrologists term the Great System of the Valentinians. In this system, God is seen as either a monadic or dyadic principle that unfolds, by itself, into series of pairs of *aeons*, each pair conceived as simultaneously androgynous and male and female. First, this God—whether monad or dyad, there is some conflict—multiplies into two male/female pairs, and this pair of pairs each engender a new pair of acons, producing an octet. Then the third and fourth pair each engender five and six pairs, respectively, producing a full retinue of thirty aeons. This, the Valentinians argue, is what was meant by the thirty years of Christ's life before he began his ministry. The thirty aeons are alluded to in the gospel parable of the workers in the vineyard, where shifts arrive for work in the first, third, sixth, ninth, and eleventh hours. The sum is thirty, thus pointing to this reality. Marcus Magus—not a Valentinian, but a contemporary treating similar themes—argues that the sum of the numerical value of the first seven letters in the Greek alphabet, also point to this reality. *Alpha* through *epsilon* (one through five) is fifteen, and, since the number six wasn't represented by a letter, *zeta* and *eta* (seven and eight) are another fifteen.

The Valentinian and Marcosian systems go on, in greater arithmetical complexity, weaving together

primal narratives that follow certain numerical patterns. The narratives tend to diverge from, and even contradict, each other, but the entire set of theologies suggest that the Valentinians and Marcosians were attempting to address points raised by Nichomachus and other mathematicians and philosophers.

Irenaeus's hostile response was provoked primarily by what he considered to be a fatal theological error of the Valentinians and their allies: the construction of a God not revealed in the one Jesus Christ. Although it is quite likely that the Valentinians meant their account of the aeons to be more a parable and metaphor, Irenaeus ignores this, and argues that their account dissolves the unity of God, the unity of his Word—God Incarnate—and the unity of the faith. After identifying their central error, Irenaeus argues that they arrived there by a faulty method, by rearranging Scripture according to their preconceived notions of mathematical harmonies, or magical incantations, rather than by adhering to the single voice of the catholic churches scattered across the civilized world. He states:

"Is it a meaningless and accidental thing, that the positions of names, and the election of the apostles, and the working of the Lord, and the arrangement of created things, are what they are?—we answer them: Certainly not; but with great wisdom and diligence, all things have clearly been made by God...and men ought not to connect those things with the number thirty,(5) but to harmonize them with what actually exists, or with right reason. Nor should they seek to prosecute inquiries respecting God by means of numbers, syllables, and letters. For this is an uncertain [and arbitrary] mode of proceeding.... But, on the contrary, they ought to adapt the numbers themselves, and those things that have been formed, to the true theory lying before them. For the Tradition does not spring out of numbers, but numbers from the Tradition."

Thus, for Irenaeus, God himself and the Tradition he granted to the Church are the determiner of numbers. A generation later Hippolytus, another catholic apologist, was to sharpen the criticism: Marcus and Valentinus were Pythagoreans and Platonists, not Christians.

Most philosophers of the second century held number to be one of the highest, if not *the* highest, realms of the cosmos (and therefore uncreated and eternal). But Irenaeus and his successors saw numbers as created things that were to conform to God's sovereign plan. It is hard to tell whether the Valentinians would have agreed with Irenaeus or the philosophers, since virtually all of the many Valentinian writings of the second century have perished.

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Third, the eventual dominance of Irenaeus's orthodox perspective has shaped the popular perspective and interpretation of arithmetic through the centuries, and led to a culture of Christian number symbolism. In his work, *On the Trinity*, St. Augustine argued that no number in Scripture was arbitrary or superfluous, and in *On Christian Doctrine*, he claimed that ignorance of numbers resulted in ignorance of the Scriptures, which used numbers so extensively. Noting that there were few arithmetical resources available to an exegete of the Bible, Augustine proposed the creation of a dictionary of the numbers used in Scripture. He admitted that such a volume might have already been written, but if so it lay in obscurity since he was unaware of it.

This curious example of an ancient scholar's desideratum suggests that Augustine was probably hoping for a Christian alternative to a secular genre popular in Greek literary circles, the *theologoumena arithmetikes*, "Theology of Arithmetic." (Hence, the title of my dissertation.) These were brief textbooks consisting of ten chapters, each devoted to one of the numbers one through ten. In each chapter the author summarized the metaphorical and symbolic values for each number, covering subjects as diverse as medicine, theology, geometry, astronomy, and the shape of the letters of the alphabet. For instance, the number six could be characterized as representing marriage since it was the smallest product of female and male numbers. It was considered to be the first perfect number, insofar as it was the sum of its own

factors. It was considered to be a number instrumental in a person's good health. And it was assigned to the Muse Thaleia. Like ancient bestiaries, which were first emerging around this same time, *theologoumena arithmetikes* provided a kind of exegetical toolkit with which an author or reader could explore and explain disparate aspects of the world.

Now, we have extant portions of at least three different *theologoumenae arithmetikes*. These are by Nichomachus of Gerasa, Anatolius of Laodicea, and someone from the circle of Iamblichus, all from the second, third, and fourth centuries respectively. Undoubtedly there were many more that have now perished. The second of these authors, Anatolius of Laodicea, was a Christian who, prior to being elected bishop, established a school of Aristotelian philosophy in Alexandria in the 270's. Even though his text has little or nothing explicitly Christian about it, Anatolius's project seems to anticipate more formally Christian arithmological works attributed to Epiphanius, Bede, and Isidore from the fourth through seventh centuries. In these later texts Augustine's wishes are fulfilled: the authors cull the Bible and sort entries according to numerical order and provide a kind of handy reference for armchair exegetes, or possibly simple textbooks for Christian schoolboys.

This Christian numerical culture differs from its pagan model in several respects. First, there is the prominence of Scripture, as received in the Tradition. Numbers are considered to be important according to their occurrence in Scripture, and the Pythagorean tradition is slowly and subtly modified to reflect this change in priorities. Thus, the number eight gets new life. Prior to the arrival of Christianity eight was an interesting number, but not all that theologically significant. Of the first ten numbers, it and nine have the shortest entries in the *Theologoumena Arithmetikes*. The number seven had the longest. With the arrival of Christianity, a kind of reversal takes place, where eight becomes the fulfillment of seven. The most obvious, early instance of this, the Christian observation of Sunday as a fulfillment of the Sabbath, was simply the preamble to a numerically-oriented argument that Christian apologists were to lobby against Jews for some time to come. The Jews retained seven for their numerical sign of perfection, but Christianity had gone one step further, finding super-perfection in Christ, who, in some circles, was referred to as the *Octet*.

Another feature is the reluctance of most Christian theologians to reinterpret the Trinity in terms of mathematical models. This, I think, is an important aspect often overlooked, since most people who encounter the word *Trinity* simply assume that the number three is the operative concept. Now, it is true that the Greek word *trias*, and its Latin counterpart, *trinitas*, are common terms describing collections of three. But the patristic explanation and discussion of the Trinity is anything but mathematical, certainly not like the highly arithmetical models offered by Neoplatonists and theurgists of the same period. On the basis of my research, I would argue that orthodox Christian theologians knew and patently rejected any approach to the godhead that started on the basis of mathematics, on the same basis of their earlier rejection of second century Valentinianism. The Trinity as a mathematical object is something that emerges in orthodox and catholic circles much later, in the medieval period, especially in the West, where new currents of philosophy provided theologians with the impetus to defend and to define doctrines of God with the initial, irrefutable, premises of philosophy. It is this new kind of philosophical theology that has colored modern-day impressions of the Trinity as a mathematical construct. But patristic Trinitarian theology is self-consciously non-mathematical.

This brief report is meant to introduce you only to the hors d'oeuvres of my research. There is much more that may interest those present, such as the way Homer's *Iliad* was used to teach multiplication, the way specific numbers in the Bible were interpreted, or the way numbers were used to legitimize new political arrangements in the Roman Empire. I have thoroughly appreciated, so far, reading the NASGEm bulletins and the ethnomathematical research treats other eras and cultures, since this has allowed me to think about the uniqueness, or lack thereof, of the theology of arithmetic in the ancient Mediterranean world. I look forward to collaboration in the long term future.