

Calvin University

## Calvin Digital Commons

---

Beets Paper Contest

Religion

---

2019

### Mathematics of the Infinite God in the Works of Nicholas of Cusa

Lauren Henderson  
*Calvin University*

Follow this and additional works at: [https://digitalcommons.calvin.edu/religion\\_beets](https://digitalcommons.calvin.edu/religion_beets)



Part of the [Mathematics Commons](#), and the [Religious Thought, Theology and Philosophy of Religion Commons](#)

---

#### Recommended Citation

Henderson, Lauren, "Mathematics of the Infinite God in the Works of Nicholas of Cusa" (2019). *Beets Paper Contest*. 10.  
[https://digitalcommons.calvin.edu/religion\\_beets/10](https://digitalcommons.calvin.edu/religion_beets/10)

This Paper is brought to you for free and open access by the Religion at Calvin Digital Commons. It has been accepted for inclusion in Beets Paper Contest by an authorized administrator of Calvin Digital Commons. For more information, please contact [dbm9@calvin.edu](mailto:dbm9@calvin.edu).

Mathematics of the Infinite God in the Works of Nicholas of Cusa

Lauren Henderson

Religion 131

Professor Smit

December 3, 2019

Word Count: 2756

Thesis:

The geometrical analyses of infinity exemplified in the work of Nicholas of Cusa can aid in understanding the complex nature of God's attributes, specifically the perceived tension between his simplicity and his quality of encompassing and upholding all things.

Outline:

1. Introduction
  - a. Introduction of topic and thesis
  - b. Introduction to Nicholas of Cusa
2. Justification of using mathematics in thinking about God
  - a. Mathematics used in theology historically
    - i. Other theologians have used math
    - ii. Nicholas of Cusa introduced unique ideas about infinity
  - b. We cannot conceptualize God due to his infinitude
    - i. No proportion between infinite and finite
    - ii. According to Nicholas of Cusa, mathematics can be used to understand the uncertain
3. An infinite line coincides with infinitely large geometrical objects
  - a. Infinite circle
  - b. Infinite triangle
4. Applying these concepts to attributes of God
  - a. An infinite line can be used to understand the oneness of God
    - i. Infinity is not composite, there cannot be multiple infinite things
    - ii. Comparing God's oneness to an infinite circle ("Maximum circle")
    - iii. Infinity as the falling together of contradictions
  - b. The infinite God as the actualization of all possibility
    - i. Supported by Nicholas of Cusa's infinite line analogies
    - ii. Geometric analogy of curved lines participating in straightness
  - c. God has many attributes but cannot be accurately and fully described
    - i. Use of negations as descriptors (i.e. immutability, simplicity, etc.)
    - ii. Incomprehensibility of infinity
    - iii. God as the full realization of many attributes at once
5. Conclusion

It is very challenging to conceptualize the infinitude of God. Human minds are not equipped to understand infinity in the way that it applies to God's essence and eternity. However, mathematical conceptions of infinity can provide insight into how we can grasp infinity. The 15<sup>th</sup> century philosopher, mathematician, astronomer, and theologian Nicholas of Cusa used his knowledge of mathematics to inform the ways he thought about God. The geometrical analyses of infinity exemplified in the work of Nicholas of Cusa can aid in understanding the complex nature of God's attributes, specifically the perceived tension between his simplicity and his quality of encompassing and upholding all things.

Nicholas of Cusa was born in 1401 in Cues, Germany. He studied mathematics, astronomy, cosmology, philosophy, and theology.<sup>1</sup> His methods of thinking about any one of these subjects was informed by the others, which is especially evident in his works that apply mathematical concepts to the knowability of God. Jasper Hopkins, in *A Concise Introduction to the Philosophy of Nicholas of Cusa*, states that Nicholas of Cusa made "a contribution which, viewed historically, is distinctive."<sup>2</sup> Nicholas of Cusa's many interests allowed him to contribute to such problems as squaring the circle in mathematics, while also advancing the fields of metaphysics and theology.

Nicholas of Cusa was not the only person to apply the concept of infinity to his theology. Gregory of Nyssa was the first Christian thinker to propose that God is infinite in a theologically rigorous way.<sup>3</sup> Nicholas of Cusa also often cited Dionysius the Areopagite in many of his works.

---

<sup>1</sup> Jasper Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa* (Minneapolis: University of Minnesota Press, 1978), 2.

<sup>2</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 1.

<sup>3</sup> Wolfgang Achtner, "Infinity in Science and Religion: The Creative Role of Thinking About Infinity," *Neue Zeitschrift für systematische Theologie und Religionsphilosophie* 47, no. 4 (2005): 400.

Dionysius developed apophatic theology, in which it is impossible to reach an understanding of God's infinity.<sup>4</sup> In his work *De Docta Ignorantia* (Learned Ignorance), Nicholas of Cusa extends these ideas to actual infinity in more concrete ways.

The way that Nicholas of Cusa used and conceptualized infinity is unique and was a novel contribution to the theology of the time. His ability to skillfully combine mathematics, cosmology, and theology allowed him to argue that God cannot be knowable due to his infinitude.<sup>5</sup> Though he extended many ideas from Dionysius, Nicholas of Cusa was the first to discuss infinity as a “falling together of contradictions or opposites.”<sup>6</sup> This conception of infinity provides a new and complex way of understanding how God can be the complete totality of multiple attributes at once. Nicholas of Cusa makes clear that though infinity can fluidly encompass contradictory ideas, Absolute Infinity is also characterized by Oneness.<sup>7</sup>

The central idea of *De Docta Ignorantia* is that human intellect will never be able to know God comprehensively due to his infinite nature. This does not mean that we will not understand God better in the next life or that we must be separate from him due to our misunderstanding; it means that we can spend eternity pondering the nature of God and learning more about his infinite beauty and holiness without ever reaching an end of our discoveries. There is no proportion or comparison between the infinite and the finite that we can grasp onto to begin to understand God.<sup>8</sup> There is infinite difference between anything finite and infinite by nature of those properties.

---

<sup>4</sup> Achtner, “Infinity in Science and Religion,” 398.

<sup>5</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 41.

<sup>6</sup> Achtner, “Infinity in Science and Religion,” 401.

<sup>7</sup> Nicholas of Cusa, *De Docta Ignorantia*, trans. Jasper Hopkins (Minneapolis: The Arthur J. Banning Press, 2001), 10.

<sup>8</sup> Nicholas of Cusa, *De Docta Ignorantia*, 7.

The lack of proportionality between the finite and the infinite is due in part to the fact that infinity encompasses all possibility.<sup>9</sup> God is the actualization of infinite possibility and is therefore unknowable. Human intellect can only speak of God's traits analogically or through negations.<sup>10</sup> These negations refer to traits such as his simplicity, eternality, immutability, and infinity. God's description as being infinite is unique. Infinite suggests only that God is not-finite, beyond proportion or description; it does not suggest anything concrete about his nature besides its indescribability.<sup>11</sup>

Nicholas of Cusa argues that some understanding of God's nature can be reached through mathematics, believing that "spiritual matters... are investigated symbolically."<sup>12</sup> One can use abstract concepts to study the uncertain because they are more concrete than "perceptible things." Perceptible objects and concepts are more susceptible to instability than abstract concepts because of the "material possibility abounding in them." We can, therefore, trust the abstract realm of mathematics as a tool for gaining insight into the divine. Nicholas of Cusa refers to the "mirror-of-mathematics" as a reflection of divine truth.<sup>13</sup> He cites many philosophers that predate him, such as Pythagoras, Augustine, and Aristotle, who used numbers and mathematical concepts to search for deeper truths.<sup>14</sup> Mathematics has often been used as a tool for the intellect to comprehend the abstract and come closer to understanding the unknowable.<sup>15</sup>

---

<sup>9</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 42.

<sup>10</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 23.

<sup>11</sup> Donald Duclow, "Gregory of Nyssa and Nicholas of Cusa: Infinity, Anthropology, and the *Via Negativa*," *The Downside Review* 92, no. 307 (1974): 104.

<sup>12</sup> Nicholas of Cusa, *De Docta Ignorantia*, 18.

<sup>13</sup> Nicholas of Cusa, *De Theologicis Complementis*, trans. Jasper Hopkins (Minneapolis: The Arthur J. Banning Press, 2001), 747.

<sup>14</sup> Nicholas of Cusa, *De Docta Ignorantia*, 19.

<sup>15</sup> J.M. Counet, "Mathematics and the Divine in Nicholas of Cusa," in *Mathematics and the Divine: A Historical Study*, ed. T. Koetsier and L. Bergmans (Amsterdam: Elsevier B. V., 2005), 276.

The symbolism that Nicholas of Cusa uses to inform his theological considerations can lead to positive assertions about God, rather than the negative attributes that seem to be the only route to any divine understanding. It is important to note, though, that Nicholas of Cusa is not implying that through math human intellect can fully understand God. Rather, the positive assertions gleaned from his mathematical analysis “serve not to remove ignorance but to inculcate it.”<sup>16</sup> The importance of knowing the extent of ignorance, especially in the realm of theological understanding, is the main subject of one of Nicholas of Cusa’s most influential works, *De Docta Ignorantia*, and is not contradicted by his use of mathematics to provide informative analogies pertaining to the infinitude of God.<sup>17</sup>

The study of mathematics is equipped to delve into uncertainty because it is simultaneously abstract, yet ingrained in the universe. Nature provides abounding examples of numerical patterns and beautiful geometric shapes, displaying magnificent intricacies yet following along with identifiable physical principles. The abstract realm of mathematics can provide analogical paths to ideas about philosophical concepts that deal with “invisible realities.”<sup>18</sup> Such concepts are beyond direct comparison but can be understood analogically and often symbolically.<sup>19</sup>

Before analyzing the divine truths Nicholas of Cusa extracts from his mathematics, his mathematical principles themselves must be discussed. The mathematical analysis of infinity that is most relevant to the topic of this paper is the ability of an infinite line to encompass an infinite circle, an infinite triangle, and an infinite sphere simultaneously.<sup>20</sup> Nicholas of Cusa uses the

---

<sup>16</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 19.

<sup>17</sup> Duclow, “Infinity, Anthropology, and the *Via Negativa*,” 105.

<sup>18</sup> Counet, “Mathematics and the Divine,” 276.

<sup>19</sup> Nicholas of Cusa, *De Docta Ignorantia*, 18.

<sup>20</sup> *Ibid.*, 20.

concept of an “Absolute Maximum” to describe infinity and God, and uses geometrical figures to symbolize the Absolute Maximum.<sup>21</sup>

In *De Docta Ignorantia*, Nicholas of Cusa first describes the way in which an infinite line coincides with an infinite circle.<sup>22</sup> This link is made by analyzing the curvature of the circumference of a circle. When the diameter of a circle is increased, the curvature of its circumference decreases, just as when one looks closer and closer at a point on a circle it starts to appear as a straight line. Increasing the diameter of a circle decreases how curved it appears. We can therefore imagine increasing the size of a circle to infinity and seeing that it becomes “minimally curved and therefore maximally straight.”<sup>23</sup> An infinitely large circle with maximum straightness coincides with an infinite line. Neither can be extended to lengths greater than infinity and both appear “maximally straight.” In such a circle, the diameter and the circumference are the same, as both are infinite and an infinite object cannot be composed of multiple parts.<sup>24</sup>

Nicholas of Cusa also makes the case that a maximum triangle is also a maximum circle and a maximum line.<sup>25</sup> This argument, unlike that for a circle, has multiple facets. The first can be grasped when one imagines a triangle as a line sweeping through part of the area of a circle, encompassing the area enclosed by the arc and two radii. If the line sweeps a full 360 degrees, this method for forming a triangle can form a circle. He also points out that rotating this circle about its diameter creates a sphere. All these geometric figures, the triangle, circle, and sphere,

---

<sup>21</sup> Counet, “Mathematics and the Divine,” 277.

<sup>22</sup> Nicholas of Cusa, *De Docta Ignorantia*, 21.

<sup>23</sup> *Ibid.*

<sup>24</sup> *Ibid.*, 26.

<sup>25</sup> *Ibid.*, 22.

are contained in the possibility of a finite line. Since the infinite is the actuality of all possibility, an infinite line encompasses all of these shapes.<sup>26</sup>

A triangle can also be observed to coincide with an infinite line by evaluating the simplicity of the maximum line. Increasing the degree of an angle in a triangle will cause the shape to appear more and more flat, like a line. Triangles can also be seen to approach lines by lengthening two of the sides. When these triangles are increased to maximum size, they are the same as a maximum line. There are no composite infinite things, therefore the three sides of the maximum triangle are one and compose one infinite line.<sup>27</sup>

Nicholas of Cusa's conclusion that an infinite line is also an infinite triangle, infinite circle, and infinite sphere is filled with the potential for theological analogies that can help us understand God's attributes.

One such attribute is the simplicity and oneness of God. The first way in which Nicholas of Cusa uses his mathematical conclusions to understand God's oneness is in how he understands infinity itself. He believes that infinity is not composite, that "there is nothing greater than what is infinite... there cannot be two infinite things."<sup>28</sup> Nicholas of Cusa uses this logic to deduce that the maximum triangle is the same as the maximum line.<sup>29</sup> If God is infinite, he cannot be separated into parts. Every attribute that can describe him is completely him, not just a part of him. To Nicholas of Cusa, "God's infinity and unity are identical."<sup>30</sup>

---

<sup>26</sup> Counet, "Mathematics and the Divine," 277.

<sup>27</sup> Nicholas of Cusa, *De Docta Ignorantia*, 23.

<sup>28</sup> *Ibid.*, 24.

<sup>29</sup> Counet, "Mathematics and the Divine," 277.

<sup>30</sup> Achtner, "Infinity in Science and Religion," 399.

Nicholas of Cusa elaborates more on how mathematical infinity can inform our understanding of God's unity by relating an infinite circle to God's simplicity. The maximum circle has an infinite diameter, but because there cannot be more than one infinite thing, this infinite diameter is also the maximum circumference, as well as the infinite center of the circle.<sup>31</sup> The absolute unity of all the "parts" of a finite circle when it is transformed into the maximum circle displays the unity of God. All of God is present infinitely "as the Simple and the Indivisible."<sup>32</sup> Nicholas of Cusa also uses the concept of a maximum circle to illustrate God's ability to encompass contradictions due to his infinitude.

As discussed previously in this paper, Nicholas of Cusa, in his unique view of infinity, posits that infinity is the falling together of contradictions. In a maximum circle, "*other* and *different* are not opposed to identity."<sup>33</sup> An infinitely large circle simultaneously has no beginning or end yet is both a beginning and an end in all places. The geometry of lines can also help in the understanding of this concept, as the circumference of the maximum circle is simultaneously maximally straight and curved.<sup>34</sup> The Bible also uses language that ties together contradictions, such as when God declares, "I am the Alpha and the Omega... who is, and who was, and who is to come, the Almighty."<sup>35</sup> God is simultaneously the beginning of everything - the cause of our existence, and also the end for which we were created. In another work, *De Visione Dei*, Nicholas of Cusa states that the infinite exists above the "coincidence-of-contradictions."<sup>36</sup> Just as the infinite circle can hold perfect unity and contradictions together

---

<sup>31</sup> Nicholas of Cusa, *De Docta Ignorantia*, 36.

<sup>32</sup> *Ibid.*, 35.

<sup>33</sup> *Ibid.*

<sup>34</sup> Achtner, "Infinity in Science and Religion," 403.

<sup>35</sup> Rev. 1:8

<sup>36</sup> Nicholas of Cusa, *De Visione Dei*, trans. Jasper Hopkins (Minneapolis: The Arthur J. Banning Press, 2001), 705.

with no tension, God can encompass contradictions infinitely and still be accurately described as One and Simple.<sup>37</sup>

Due to his oneness, God contains “everything which is possible.”<sup>38</sup> Just as an infinite line encompasses all finite lines, and is therefore the essence of a finite line (essence in the Aristotelian sense), “the unqualifiedly Maximum is the Essence of all things.”<sup>39</sup> Because God is the only infinite thing, he contains the essence of and upholds the existence of all things. Through the same logic as the previous math, we can also see that because the infinite line is the essence of finite lines, every finite line participates in infinity to an extent. This idea can be extrapolated to suggest that “Infinite Being is present in every finite being.”<sup>40</sup> Since God is Being itself, we can see that based on the conceptions of infinity of Nicholas of Cusa, we all participate in being through God.<sup>41</sup> This is supported by the long-held belief by theologians that God is continuously upholding creation in existence through his providence.

Mathematically, the act of all finite beings participating in infinite being can also be symbolized as curved lines participating in straightness. Nicholas of Cusa points out that a curved line shares, if only barely, the quality of being straight; if a line is less curved, it participates more in straightness. Along the same lines, a finite straight line participates in infinity more the longer it is. Therefore, a curved line participates in infinity by way of participating in the straightness of a minimally curved line.<sup>42</sup> Nicholas of Cusa relates this to the complex ways in which all things participating in the being of God, who is Being itself.<sup>43</sup>

---

<sup>37</sup> Counet, “Mathematics and the Divine,” 278.

<sup>38</sup> Nicholas of Cusa, *De Docta Ignorantia*, 10.

<sup>39</sup> *Ibid.*, 27.

<sup>40</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 42.

<sup>41</sup> Nicholas of Cusa, *De Docta Ignorantia*, 28.

<sup>42</sup> *Ibid.*, 29.

<sup>43</sup> *Ibid.*, 38.

Nicholas of Cusa also uses his mathematics to symbolize how God has many attributes, yet cannot be accurately described.<sup>44</sup> The first way in which he does this is through his definition of infinity. Infinity is immutable due to its simplicity – there are not parts that can be added or taken away, it is, metaphysically, a “primordial whole.”<sup>45</sup> Similarly, God is immutable; he cannot be changed through time as humans can, as he does not exist within time in the same way we do. To Nicholas of Cusa, God’s immutability goes hand in hand with his “Absolute Goodness.”<sup>46</sup> Since God is immutable and wholly good, he will not desert his creation and will remain “Absolute Truth” for all eternity.

Though we can prescribe descriptors to God such as “good,” “loving,” and “just,” they are only analogous to who God actually is. Our human understanding of love, even at its best, is weak compared to the way in which God is love. As discussed earlier, since infinity cannot be proportional to the finite, we can use negations as descriptions of God.<sup>47</sup> Instead of implying that we know what he *is*, we emphasize what he *is not*. Describing God as infinite is already following this line of thinking – God is *not* finite. Through his use of mathematics, Nicholas of Cusa illustrates why God’s infinitude hinders our ability to describe him. Infinity cannot be put into a box; since it is the actualization of all possibility, there is not just one way to describe it.<sup>48</sup>

Nicholas of Cusa describes this inability of language to accurately represent God by using the incompressibility of infinity. Just as infinite circles and triangles coincide in an infinite line, the infinite God contains all possibilities and is the essence of all things.<sup>49</sup> This geometrical

---

<sup>44</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 25.

<sup>45</sup> Duclow, “Infinite, Anthropology, and the *Via Negativa*,” 103.

<sup>46</sup> Nicholas of Cusa, *De Visione Dei*, 711.

<sup>47</sup> Duclow, “Infinite, Anthropology, and the *Via Negativa*,” 104.

<sup>48</sup> Hopkins, *A Concise Introduction to the Philosophy of Nicholas of Cusa*, 24.

<sup>49</sup> Nicholas of Cusa, *De Docta Ignorantia*, 28.

principle does not suggest, though, that an infinite line can be described as “a circle.” In the same way, God cannot be accurately described by one of his attributes. Nicholas of Cusa states, “Absolute Infinity is not contractable in any form,” emphasizing that describing God with one attribute is impossible due to his infinite nature.<sup>50</sup> Trying to compress God’s character into one attribute will not be fruitful in a quest for divine truth; rather, the illusion of complete understanding will be misleading.

The geometry of the infinite circle, triangle, and sphere outlined by Nicholas of Cusa also helps one to understand how God can be the full actualization of multiple traits at once, such as being infinite love and infinite beauty. Since God is infinite, and “every part of what is infinite is infinite,” any of God’s attributes must be the fullest form of themselves.<sup>51</sup> Due to infinity’s inherent implication of oneness, Nicholas of Cusa is not suggesting that God has multiple parts, rather that any qualities that God possesses, he is completely and infinitely.

The attributes of God that Nicholas of Cusa uses his mathematics to describe, such as his infinitude, make him more difficult to understand. They remind us that God is not small like we are – he is the creator of all things and the reason we exist. We do not have adequate language to describe him. Though he is indescribable and we are ignorant, God’s infinitude does not make him farther from us, rather, it makes his desire for a relationship with us finite humans even more beautiful. Because God is eternal and infinite, making him infinitely different from us, he is also infinite love which “endures forever.”<sup>52</sup> God’s ability to encompass infinite love, justice, wisdom, and truth simultaneously is why we should take comfort in how different from us he is due to his infinitude. Though it seems impossible for God to be completely simple and also be

---

<sup>50</sup> Nicholas of Cusa, *De Theologicis Complementis*, 769.

<sup>51</sup> Nicholas of Cusa, *De Docta Ignorantia*, 23.

<sup>52</sup> 1 Chron. 16:34

the essence of all things and exemplify multiple attributes, the work of Nicholas of Cusa shows that God's infinitude can hold together these contradictions in one perfect, whole, God.

## Bibliography

- Achtner, Wolfgang. "Infinity in Science and Religion: The Creative Role of Thinking about Infinity." *Neue Zeitschrift für systematische Theologie und Religionsphilosophie* 47, no. 4 (2005): 392-411.
- Counet, J.M. "Mathematics and the Divine in Nicholas of Cusa." In *Mathematics and the Divine: A Historical Study*, edited by T. Koetsier and L. Bergmans, 273-290. Amsterdam: Elsevier B. V., 2005.
- Cusanus, Nicholas. *De Docta Ignorantia*. In *Complete Philosophical and Theological Treatises of Nicholas of Cusa: Volume One*. Translated by Jasper Hopkins. Minneapolis: The Arthur J. Banning Press, 2001.
- Cusanus, Nicholas. *De Theologicis Complementis*. In *Complete Philosophical and Theological Treatises of Nicholas of Cusa: Volume Two*. Translated by Jasper Hopkins. Minneapolis: The Arthur J. Banning Press, 2001.
- Cusanus, Nicholas. *De Visione Dei*. In *Complete Philosophical and Theological Treatises of Nicholas of Cusa: Volume Two*. Translated by Jasper Hopkins. Minneapolis: The Arthur J. Banning Press, 2001.
- Duclow, Donald. "Gregory of Nyssa and Nicholas of Cusa: Infinity, Anthropology, and the *Via Negativa*." *The Downside Review* 92, no. 307 (1974): 102-108.
- Hopkins, Jasper. *A Concise Introduction to the Philosophy of Nicholas of Cusa*. Minneapolis: University of Minnesota Press, 1978.

