

The Boiling Circle Limitations of the Infinity Symbol and a New Suggestion

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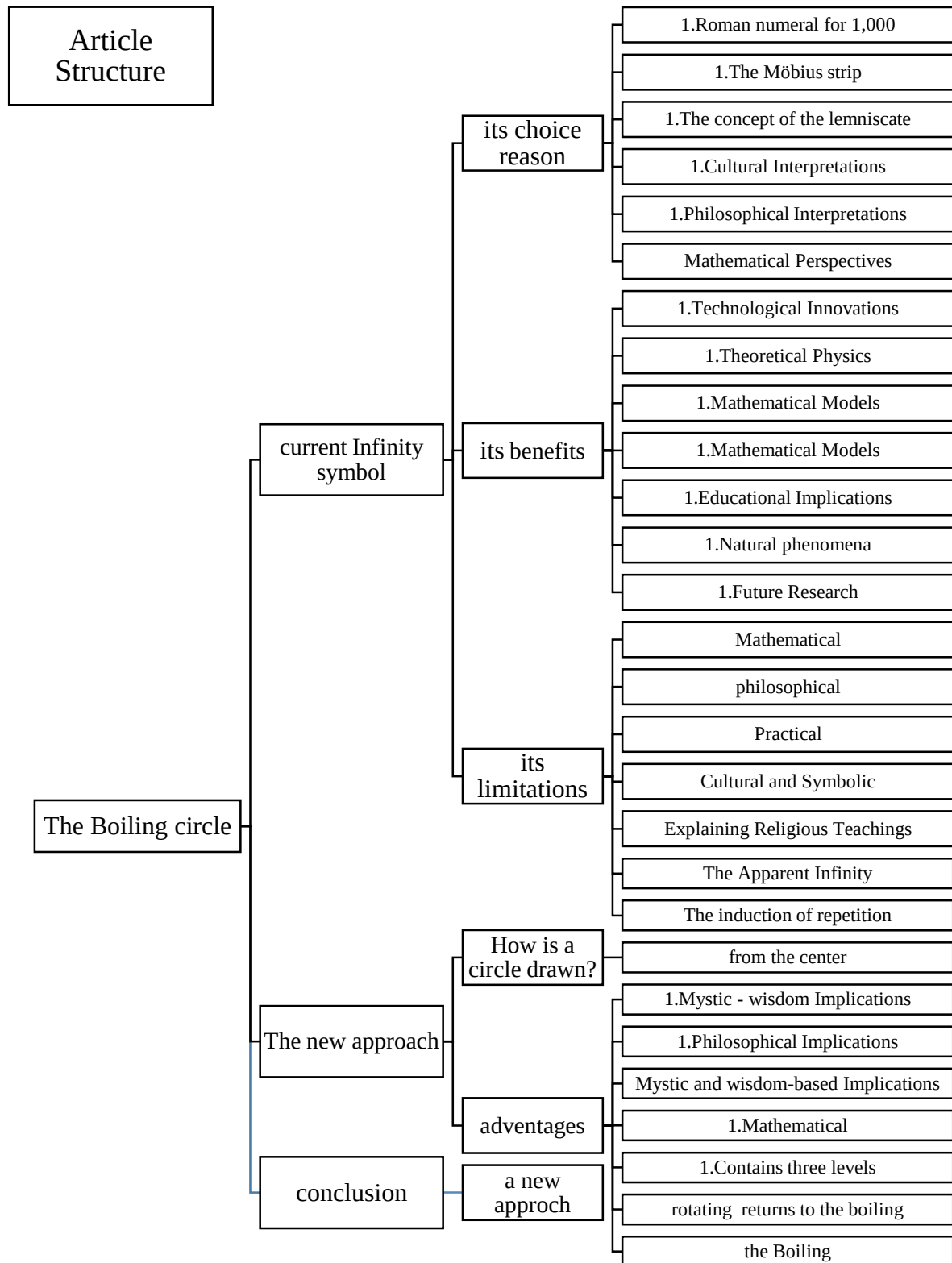
The concept of infinity has consistently drawn the attention of mathematicians, scientists, and philosophers throughout history. This simple yet powerful representation has influenced our understanding of boundlessness and endlessness for centuries. However, as our knowledge of existence, humans, and the universe expands, and by entering the realm of diverse and different intellectual civilizations, it seems necessary to consider a fresh perspective on how we visualize and conceptualize infinity. This article delves into a transformative recommendation for the reimagining of the infinity symbol, aiming to reflect better our current understanding of existence and cosmic structures and mathematical-philosophical concepts. Although the symbol of infinity is synonymous with boundlessness, it is constrained within its bounds and limitations. In this article, we'll investigate the current symbol of infinity and its limitations. We'll then introduce a new perspective on the infinity symbol and propose an innovative symbol: the boiling circle. This article will also dive into the potential impact of this new symbol on philosophy, mathematics, and science. By the end, readers will gain insights into how a simple change in symbolism could lead to new ways to think about and explore the concept of infinity, potentially opening doors to fresh discoveries and understandings in various fields of study.

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Introduction

The infinity symbol (∞), introduced by John Wallis in 1655, has become a fundamental cornerstone in multiple fields of study, including mathematics, physics, and computer science. Its primary function is to represent unbounded values, deeply contributing to the understanding of concepts such as limits, calculus, and set theory (Albrecht, 2011, 865). In the realm of physics, the infinity symbol holds a pivotal role in theories about dimensions and infinite quantities, particularly within the domains of cosmology and quantum mechanics (Martínez, 2006, 22). This symbol serves as a fundamental representation of the boundless and the unfathomable, enabling physicists to grapple with the complexities inherent in the study of the universe and the microscopic world. Its inclusion in various mathematical and conceptual frameworks has been instrumental in advancing our understanding of the nature of reality and the underlying principles governing the cosmos and the quantum realm. Similarly, computer science utilizes the infinity symbol to denote infinite loops and algorithms, thereby facilitating the modeling of complex computational processes (Núñez, 2017, 89). Notwithstanding the multitudinous applications of the infinity symbol, it is not without its inherent constraints. This article endeavors to elucidate these limitations and proffer a novel symbol for a more exacting depiction of the infinite. The widely recognized lemniscate¹ has traditionally served as the standard model for illustrating the infinite; however, its failure to encapsulate the subtleties of the concept makes it an inadequate representation. The quest for a more comprehensive symbol is, therefore, a salutary pursuit, one that may yield a more refined and unambiguous means of illustrating the infinite.

Problem Statement

The infinity symbol, a fundamental mathematical concept, is plagued by ambiguity across various disciplines. In mathematics, the symbol represents both potential and actual infinity, leading to confusion in interpretation. Similarly, in physics, the use of infinity often gives rise to paradoxes and inconsistencies, challenging the validity of theoretical frameworks. Computer science also faces computational inconsistencies and errors due to the representation of infinity in algorithms.

Moreover, the infinity symbol fails to fully capture the philosophical complexities surrounding the concept of infinity. Philosophical discussions on the nature of infinity and its relation to tangible and intangible realities are not adequately conveyed by the symbol. This limitation becomes particularly significant when considering the principles of Islamic wisdom.

¹ The word "lemniscate" (from Latin, meaning "decorated with ribbons") refers to a specific mathematical curve, most famously the lemniscate of Gerono and the lemniscate of Bernoulli. These are *shapes*, infinite in extent in the sense that they extend without end.

In conclusion, while the infinity symbol plays a crucial role across multiple fields, its ambiguities and associated challenges demand attention and re-examination. A new symbol that can encompass the varied interpretations and applications of infinity might enhance clarity and efficacy in philosophical, mathematical, physical, and computational contexts. Addressing these limitations is crucial for advancing our understanding and application of concepts involving unboundedness, ultimately leading to more robust frameworks within these disciplines.

Methodology

This study employs a mixed-methods approach to investigate the limitations of the infinity symbol and propose a new alternative. The research begins with a comprehensive literature review to identify the various contexts in which the infinity symbol is used and the specific challenges it presents. This is followed by a study of expert's ideas in mathematics, physics, computer science, philosophy, and mysticism to gain insights into the practical implications of these limitations. Finally, a qualitative analysis is conducted to evaluate the effectiveness of the proposed new symbol in addressing these challenges. The author sincerely state that during the preparation of this work used Islamic Wisdom Library Software, and AI tools in some minor cases, to find resources an enhance the article. After using this service, the author reviewed and edited the content as needed and took full responsibility for the content of the publication.

Literature Review

The concept of infinity has a long and complex history, dating back to ancient Greek philosophers such as Xenon and Aristotle, who grappled with the paradoxes of infinite divisibility and the nature of the infinite. In the 17th century, John Wallis introduced the infinity symbol in his work *De Sectionibus Conicis*, revolutionizing the way mathematicians approached the concept of unbounded quantities (Scott, 1981, 69). Since then, the symbol has been adopted in various scientific disciplines, each with its interpretation and application.

In mathematics, the infinity symbol is used to denote limits, infinite series, and cardinalities of infinite sets (Gowers, 2008, 79). However, this versatility also leads to ambiguity, as the symbol can represent different types of infinity depending on the context (Ian, 2017, 117). In physics, infinity appears in theories such as general relativity and quantum mechanics, where it often leads to singularities and paradoxes (Barrow, 2008, 64). In computer science, the symbol is used in algorithms and data structures, but its use can result in computational inefficiencies and errors (Gowers, 2008, 81).

Proposed Solution

To address these limitations, this article outlines the essential elements and principles necessary for the reevaluation of the infinity symbol. The proposed principles incorporate elements from

existing notation and can be designed in such a way that it be easily distinguishable from the traditional infinity symbol. The effectiveness and impact of this symbol can only be assessed by considering a set of important principles from the relevant knowledge sources related to infinity in the fields of mathematics, physics, philosophy, religious teachings, and wisdom.

Infinity symbol: its choice, benefits, limitations

The initial phase of my analysis will focus on the key debates surrounding the symbol of infinity: What motivated Wallis to select this symbol? What benefits does it offer in terms of communicating associated ideas, and what constraints does it encounter that hinder its ability to evoke other established concepts?

Theories behind Wallis's Choice

Wallis's choice of this symbol is not thoroughly documented, but several theories attempt to explain his decision. One plausible explanation suggests that Wallis selected the symbol to represent the mathematical concept he was exploring, drawing upon its visual simplicity and universal recognition. Alternatively, some scholars argue that the symbol's historical significance in various fields, such as logic and set theory, may have influenced Wallis's preference. We will point out some aspects of this choice: Roman numeral for 1,000

One theory posits that Wallis drew inspiration from the Roman numeral for 1,000, denoted as “CIC.” When written in a particular style, this numeral bears a resemblance to the infinity symbol, suggesting a possible connection between the two. This theory is intriguing because it highlights how historical symbols and notations can influence modern mathematical concepts. The Roman numeral system, with its unique and sometimes complex representations, offers a rich source of inspiration for various symbols used in contemporary mathematics. Wallis's choice to use a symbol resembling “CIC” for infinity could reflect an attempt to bridge ancient numerical systems with emerging mathematical ideas of his time ([Russell, 1996, 104](#)).

The Möbius strip

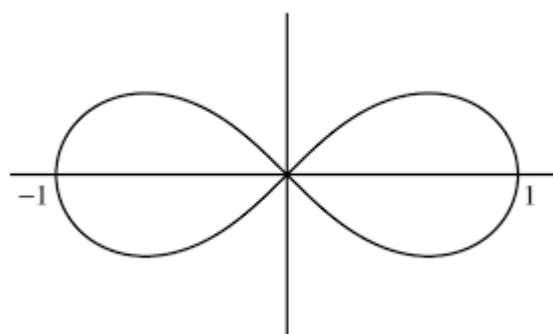
In examining the choice of the symbol by Wallis, an intriguing theory suggests a connection to the Möbius strip, a geometric figure characterized by its single-sided surface and continuous boundary. This unique property of the Möbius strip allows it to embody the concept of endlessness, making it a fitting representation for various philosophical and theoretical frameworks. According to scholars, the resemblance of Wallis's symbol to the Möbius strip invites contemplation on the themes of infinity and continuity inherent within his work. Such a perspective not only enriches our understanding of



Wallis's intentions but also emphasizes the deeper significance that mathematical forms can hold in broader intellectual discourse (Heeffer, 2011, 109).

The concept of the lemniscate

One of the compelling theories about Wallis's choice of the infinity symbol relates to the concept of the lemniscate,¹ a figure-eight curve that can be drawn in a single, continuous motion. The lemniscate, studied by the Swiss mathematician Jacob Bernoulli, is a symbol of balance and harmony, reflecting the idea of an unending loop. This geometric shape, with its smooth, flowing lines, visually represents the notion of something that has no beginning and no end (Scott, 1981, 127).



Additionally, some scholars suggest that Wallis might have been influenced by the ancient Greek symbol for the ouroboros, a serpent eating its tail. The Ouroboros is a powerful symbol of cyclicity, renewal, and eternal return, concepts that align closely with the idea of infinity. While there is no direct evidence linking Wallis to the ouroboros, the symbolic parallels are intriguing and add another layer of depth to the choice of the infinity symbol (Scott, 1981, 128).

Cultural Interpretations

The infinity symbol transcends the realm of mathematics, holding profound significance in various spiritual and philosophical traditions. In Hinduism, it represents Brahman, the infinite and unchanging cosmic spirit. Similarly, in Buddhism, the symbol signifies the endless cycle of birth, death, and rebirth, emphasizing the interconnectedness of all life (O'Flaherty, 1986, 43).

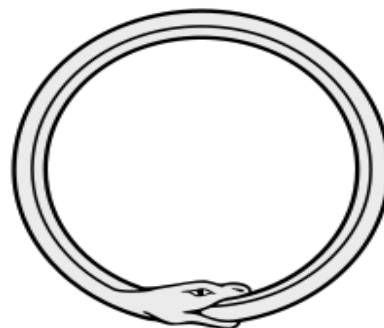


In contemporary culture, the infinity symbol has been embraced as a representation of eternal love and friendship.

¹ The infinity symbol (∞) is called a lemniscate because of its shape, which resembles a ribbon or a figure-eight. The term "lemniscate" comes from the Latin word "*lēm̄niscātus*," meaning "decorated with ribbons," and the Greek word "*λημνίσκος*" (*lēm̄nískos*), meaning "ribbon." The name was first used in mathematics by the Swiss mathematician Jacob Bernoulli in the late 17th century to describe a specific type of curve that has this shape. Over time, the term has come to be associated with the infinity symbol as well.

It is widely used in jewelry, tattoos, and art to symbolize unending bonds and limitless possibilities. The symbol's simplicity and elegance make it a versatile and powerful motif that resonates with people across different cultures and belief systems (Heeffer, 2011, 90).

The circle and infinity are also evident in various cultural symbols and artistic expressions. The Enso symbol in Japanese calligraphy, often referred to as the "infinity circle," represents the interconnectedness of all things, captured in a single, fluid brushstroke (O'Flaherty, 1986, 44). The Ouroboros, an ancient symbol of a serpent or dragon consuming its tail, symbolizes the cyclical nature of life, death, and rebirth, with origins in ancient Egypt and Greece (O'Flaherty, 1986, 44).



The relationship between infinity and the circle extends to mathematical applications as well. In projective geometry, the concept of circular points at infinity plays a crucial role in the study of conic sections and the properties of circles. In the field of complex analysis, the Riemann represents the extended complex plane, with the north pole signifying the point at infinity, allowing for a more comprehensive understanding of complex functions (Katz, 1998, 16).



In conclusion, the infinity symbol's cultural significance transcends the boundaries of mathematics, finding deep-rooted meaning in various spiritual, philosophical, and artistic traditions. Its versatility and timeless appeal continue to captivate and inspire people across diverse cultures and belief systems.

Philosophical Interpretations

Philosophically, the circle and infinity have been used to represent the eternal and the boundless. The circle, with no beginning or end, symbolizes eternity and the cyclical nature of existence. This idea is prevalent in many cultures and philosophies, including Zen Buddhism, where the Enso symbol—a hand-drawn circle—represents enlightenment, the universe, and the void (Rucker, 1982, 21).

The concept of infinity, on the other hand, challenges our understanding of the finite world. Philosophers like Georg Cantor have explored the nature of infinity, revealing its paradoxical properties and its role in the foundation of mathematics. Cantor's work on set theory and the different sizes of infinity has profound implications for our understanding of the universe and the infinite possibilities it holds (Kline, 1972, 65).

Mathematical Perspectives

In mathematics, the circle and infinity are deeply intertwined. One of the most notable connections is through the concept of pi (π), the ratio of a circle's circumference to its diameter. Pi is an irrational number, meaning it has an infinite number of decimal places without repeating. This infinite nature of pi highlights the endless complexity contained within the simple shape of a circle (Martínez, 2006, 92).

Another mathematical connection is found in inversive geometry, a branch of geometry that studies transformations preserving angles. Inversive geometry involves the inversion of points concerning a circle, mapping points inside the circle to points outside and vice versa. This transformation introduces the concept of a point at infinity, which is essential for making the inversion a total function (Barrow, 2008, 108).

Conclusion

The paramount significance of delving into the historical background of the symbol of infinity stems from the fact that it reinforces the preference for the circular nature of this symbol. Considering the points discussed, it appears that the primary rationale behind the selection of the infinity symbol in the shape of a "circle" can be traced back to the very concept of infinity that it encapsulates. The infinite nature of the universe, the perpetual cycle of life, and the boundless nature of human potential all find resonance in the circular representation of the infinity symbol. This geometric form evokes a sense of continuity, wholeness, and the absence of definitive beginnings or endings, which aligns seamlessly with the philosophical underpinnings of the concept of infinity. The circular infinity symbol, therefore, serves as a visual embodiment of the infinite, the eternal, and the ever-present, thereby conveying the profound and multifaceted connotations inherent in this mathematical and philosophical construct. To prevent the public perception of the circle from being evoked, it has been represented as a "twisted" circle, so that the previous interpretation—namely, the meaning of a circle—is eliminated, and the new meaning, which is infinity, can take hold. Since our proposal for a new conception of the circle is based on a different interpretation of the circle, we refer to this common circle as the "rotating circle"; this circle signifies repetition and perpetual rotation. It starts from one point and returns to the same point. We consider this circle to be distinct from our proposed circle, which will be referred to the suggested circle as the "boiling circle" in the following sections of the article, particularly from section 2 onwards.

Advantages and Benefits of the Infinity Symbol

Technological Innovations

The rotating circle has also inspired numerous technological innovations. One of the most notable examples is the gyroscope, a device that utilizes the principles of rotational motion to

maintain orientation. Gyroscopes are used in a variety of applications, from navigation systems in aircraft and spacecraft to stabilizers in smartphones and cameras (Whitworth, 1866, 76). The concept of the rotating circle is also fundamental in the design of engines and turbines. The continuous rotation of these components is essential for converting energy into mechanical work, illustrating the practical applications of infinite rotational motion in engineering (Martínez, 2006, 89).

Theoretical Physics

In theoretical physics, the rotating circle is a key element in the study of black holes and the nature of spacetime. The Kerr metric, which describes the geometry of spacetime around a rotating black hole, reveals fascinating insights into the relationship between rotation and infinity. The event horizon of a rotating black hole, much like the circumference of a rotating circle, represents a boundary beyond which the concept of infinity becomes tangible (Rucker, 1982, 67).

The study of rotating black holes has led to the discovery of phenomena such as frame dragging, where the rotation of a massive object warps spacetime and drags nearby objects along with it. This effect, predicted by Einstein's theory of general relativity, underscores the profound connection between rotational motion and the fabric of the universe (Whitworth, 1866, 71).

Mathematical Models

Mathematically, the rotating circle is often modeled using differential equations that describe its motion. These equations take into account factors such as angular velocity, centripetal force, and friction. Solving these equations provides insights into the behavior of rotating systems and their stability (Rucker, 1982, 67).

One of the most intriguing mathematical models involving rotating circles is the study of chaotic systems. When a circle rotates in a non-uniform manner, it can exhibit chaotic behavior, where small changes in initial conditions lead to vastly different outcomes. This sensitivity to initial conditions is a hallmark of chaos theory and highlights the unpredictable nature of infinite processes (Martínez, 2006, 90).

Educational Implications

The rotating circle also serves as a powerful educational tool for teaching the concept of infinity. By visualizing the continuous motion of a circle, students can grasp the abstract idea of an unending process. This visualization aids in understanding more complex mathematical concepts, such as infinite series and limits (Rucker, 1982, 67).

In physics education, the rotating circle is used to introduce students to the principles of rotational dynamics and angular momentum. Demonstrations involving rotating wheels and

gyroscopes help students visualize the conservation of angular momentum and the effects of torque, making abstract concepts more tangible (Pierre, 1998, 114).

Natural phenomena

Several natural phenomena exhibit cyclical patterns reminiscent of a rotating circle. The diurnal cycle, or the rotation of the Earth on its axis, resulting in the succession of day and night, is a prime example. This 24-hour cycle governs temperature fluctuations, biological rhythms, and human activity. Similarly, the annual cycle, a consequence of Earth's revolution around the Sun, dictates seasonal changes, impacting weather patterns, plant life cycles, and animal migrations. The hydrological cycle, or water cycle, involves the continuous movement of water through evaporation, condensation, precipitation, and collection, forming a closed loop essential for life on Earth. These cycles, while differing in timescale and mechanisms, all share the fundamental characteristic of repeating patterns, mirroring the imagery of a rotating wheel or circle, illustrating the interconnectedness and cyclical nature of Earth's systems. Further research on these topics can be found in introductory texts on meteorology, astronomy, and Earth science.

Future Research

The rotating circle continues to be a subject of active research in various fields. In mathematics, researchers are exploring new ways to model and understand the behavior of rotating systems. In physics, the study of rotating black holes and their implications for our understanding of the universe remains a vibrant area of inquiry. In engineering, innovations in materials science and nanotechnology are leading to the development of more efficient and durable rotating components. These advancements have the potential to revolutionize industries ranging from energy production to transportation (Rucker, 1982, 67).

Conclusion

The rotating circle, with its rich mathematical, philosophical, and cultural significance, offers a unique perspective on the concept of infinity. Its endless motion serves as a powerful metaphor for the infinite, challenging our understanding of space, time, and existence. From ancient philosophy to modern science, the rotating circle continues to inspire and illuminate our quest to comprehend the infinite.

The infinity symbol, which we refer to as the rotating circle, has become a ubiquitous representation of the concept of infinity in mathematics and beyond. Despite its widespread use and symbolic significance, the infinity symbol has several disadvantages and limitations that merit discussion. This article explores these issues, focusing on mathematics, physics, philosophy, wisdom, mysticism, religion, and practical perspectives.

Mathematical Limitations

One of the primary limitations of the infinity symbol is its ambiguity in mathematical contexts. The symbol is often used to represent different types of infinity, such as potential infinity and actual infinity, without clear distinction. The distinction between potential and actual infinity lies in their ontological status. Potential infinity represents a process without end, a capacity for unending generation or extension. It's a "potential" for infinity, a limitless "possibility". We can always add one more number to any finite set, or always conceive of a larger magnitude. This concept doesn't posit the existence of a completed infinite entity. Actual infinity, conversely, asserts the existence of a completed, fully realized infinite entity. It is not a process, but a being or collection already possessing infinite extent. This is a more contentious concept, debated extensively in mathematics and philosophy. Set theory, for instance, embraces actual infinity through the concept of infinite sets like the set of all natural numbers. However, concerns remain regarding the consistency and comprehensibility of dealing with such entities. The crucial difference, therefore, hinges on the completeness of infinity. Potential infinity describes an unending "process", whereas actual infinity posits an already "complete" infinite totality. The former is generally less controversial, while the latter raises profound questions about the nature of being and existence.

Moreover, the infinity symbol does not adequately capture the nuances of different sizes of infinity. Georg Cantor's work on set theory revealed that there are multiple levels of infinity, each with its cardinality. For instance, the set of real numbers is uncountably infinite, while the set of natural numbers is countably infinite. The infinity symbol fails to differentiate between these distinct types of infinity, which can be problematic in advanced mathematical discussions ([Whitworth, 1866, 72](#)).

Philosophical Disadvantages

Philosophically, the infinity symbol can be seen as a superficial representation of a deeply complex concept. Infinity, as a notion, has been a subject of philosophical inquiry for centuries, with various interpretations and implications. Because infinity can be assumed in every direction that can be conceived; however, the mentioned symbol can only be assumed in one direction; so, it reduces this rich and multifaceted idea to a simple, finite form. This reductionism can be seen as a limitation, as it oversimplifies the profound and often paradoxical nature of infinity ([Heeffer, 2011, 62](#)).

Additionally, the infinity symbol's association with mathematical infinity can overshadow other philosophical interpretations of the concept. For example, in metaphysical and theological contexts, infinity often refers to the boundless nature of the divine or the infinite potential of the universe. The mathematical connotations of the infinity symbol may not fully encompass

these broader philosophical meanings, leading to a narrow understanding of infinity (Martínez, 2006, 92).

Practical Limitations

In practical terms, the infinity symbol can be problematic in various applications. In computer science, for instance, representing infinity in programming languages and algorithms can be challenging. Most programming languages do not have a built-in representation for infinity, requiring workarounds that can introduce errors and inefficiencies. This limitation highlights the gap between the abstract concept of infinity and its practical implementation (Pierre, 1998, 112).

Furthermore, the infinity symbol's visual simplicity can be a disadvantage in design and communication. While its elegant form is aesthetically pleasing, it can be easily misinterpreted or overlooked in complex diagrams and texts. This issue is particularly relevant in educational settings, where clear and unambiguous representations are crucial for effective learning (Rucker, 1982, 67).

Cultural and Symbolic Limitations

The infinity symbol also has cultural and symbolic limitations. Its adoption in popular culture, such as in jewelry and tattoos, can dilute its mathematical and philosophical significance. The symbol's widespread use in commercial contexts may lead to a superficial understanding of its deeper meanings, reducing it to a mere fashion statement (Heeffer, 2011, 56).

Moreover, the infinity symbol's Western origins may not resonate with all cultural traditions. Different cultures have their symbols and interpretations of infinity, which may not align with the Western mathematical representation. This cultural bias can limit the symbol's universality and relevance in a global context (Whitworth, 1866, 74).

Limitations in Explaining Important Religious Teachings

The concept of infinity holds profound implications within the realm of religious teachings. While the symbol of infinity can serve as a powerful representation of the divine, its inherent limitations must be acknowledged when attempting to elucidate religious doctrines about the nature of God. Theologians and scholars have long grappled with the challenges of reconciling the infinite nature of the divine with the finite capacities of human understanding. This delicate balance requires a nuanced approach, one that recognizes the transcendent qualities of the divine while also respecting the inherent boundaries of human cognition.

Furthermore, the application of the concept of infinity in the context of religious discourse necessitates careful consideration. The infinite, as a mathematical and philosophical construct, may not fully capture the complexities and mysteries inherent in the divine. Theologians must exercise caution to ensure that the symbolic representation of infinity does not oversimplify or

distort the profound and multi-faceted nature of religious teachings related to the concept of God.

The symbol of infinity proposed by Wiles cannot adequately justify the essential theological concepts of the infinite nature of God or the eternal existence of paradise (Heeffer, 2011, 45). While the mathematical properties of infinity may be intriguing, they do not necessarily align with or provide a comprehensive explanation for the metaphysical and spiritual understandings of infinity within religious traditions (Hatcher, 1990, 23). The limitations of mathematical representations must be recognized when attempting to reconcile them with the profound theological teachings on the boundless nature of the divine and the afterlife.

The symbol of infinity proposed by Wiles is insufficient in representing the true meaning of the divine name "Al-Zahir wa Al-Batin" (The Outward and The Inward), as it lacks the profound depth and interiority inherent in the concept (Quran, 57:3).¹ The circular nature of the infinity symbol fails to capture the multi-dimensional nature of the divine essence, which transcends the limitations of geometric representation.

The spiritual realm within religious traditions, particularly in the Islamic faith, can be conceptualized across three distinct layers: the material, the abstract, and the intermediary (Babaei, 2019). This multidimensional framework stands in contrast to the one-dimensional symbolism of the Ouroboros, which fails to capture the nuanced and layered nature of spiritual transcendence (Pierre, 1998, 109). The complex interplay between the physical, the metaphysical, and the bridging elements is a hallmark of the Islamic tradition, offering a more comprehensive understanding of the divine.

The Apparent Infinity: A Limitation on the Unbounded

The statement "An infinity that holds true in only one direction – such as the symbol ∞ – is not infinite but limited" presents a compelling critique of incomplete conceptions of infinity. While the symbol ∞ evokes a sense of boundless extension, its graphic representation, a horizontally oriented lemniscate, implicitly suggests a limitation. True infinity, in a philosophical, mathematical, religious, and wisdom-related sense, transcends directional constraints. It lacks a beginning and an end, existing simultaneously in all directions, not just one.

The unidirectional "infinity" of the symbol, therefore, represents a bounded process, a progression without apparent limit *in that specific direction*. Consider a line extending infinitely in only one direction. While it seemingly stretches without end, its boundedness in the opposite direction significantly restricts its overall scope. It is analogous to a ray, possessing a starting point and lacking a termination only along its positive axis. Such a system, while

¹ This is a verse from the Quran (57:3). It translates to: "He is the First and the Last, the Evident and the Hidden, and He is Knowing of all things". This verse emphasizes God's absolute transcendence and complete existence and knowledge.

vast, clearly lacks the comprehensive unboundness of true, multidirectional infinity. True infinity transcends even descriptions like "multidirectional" or "omnidirectional," as these themselves are concepts from the realm of limitation and the materialistic world.

This distinction highlights a fundamental philosophical point regarding the nature of infinity. A genuine infinity cannot be captured or fully represented by a limited model or symbol. The visual representation, while evocative, ultimately fails to encompass the true conceptual immensity of an unbound reality. The symbol ∞ serves as a useful shorthand, but it should not be mistaken for a complete definition. The apparent infinity it suggests, confined to a single dimension, remains ultimately finite in its overall scope.

The induction of repetition, wandering, and a futile life

The notion of the "circle of wandering" is a profound metaphor that depicts life as a continuous, aimless journey, devoid of a clear beginning or end. This interpretation, often found in the works of poets and philosophers, presents existence as a series of repetitive cycles, lacking ultimate purpose or direction.

The concept of the circle of wandering is rooted in the idea of the inherent meaninglessness of human existence, which is associated with existentialist thought. This view emphasizes the individual's struggle to find purpose amidst a world perceived as inherently devoid of meaning. The repetitive patterns of joy, sorrow, success, and failure experienced throughout life are seen as a testament to the futile nature of human endeavors.

The theme of wandering and existential reflections can be found in the writings of various prominent thinkers, such as Yves Bonnefoy, Franz Kafka, Friedrich Nietzsche, and Jean-Paul Sartre. Their works explore the complexities of the human condition, inviting readers to grapple with the perceived lack of inherent purpose in the world.

The notion of the infinity symbol, with its unceasing, cyclical form, serves as a poignant metaphor for the sense of purposelessness and futility that can permeate the human psyche. This conceptualization challenges individuals to confront the intricacies of their mortality and the perceived absence of inherent meaning in existence.

Conclusion

In conclusion, while the infinity symbol is a powerful and widely recognized representation of the concept of infinity, it has several disadvantages and limitations.

Mathematically, it fails to distinguish between different types of infinity. Philosophically, it oversimplifies the complex concept of infinity. Practically, it poses challenges in computer science and communication. Culturally, it has Western origins that may not resonate universally. Religiously, it cannot adequately represent the divine's boundless nature or the afterlife's mysteries. The symbol predominantly conveys the notion of "ceaseless recurrence"

instead of the idea of infinity. The "circle of wandering" is a metaphor that depicts life as a continuous, aimless journey without purpose, reflecting the existentialist view of the inherent meaninglessness of human existence.

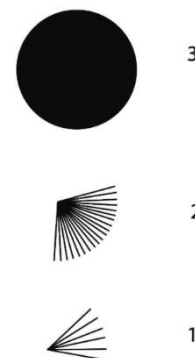
By acknowledging these limitations, we can appreciate the complexity of infinity and strive for more accurate and inclusive representations:

The new approach: choice reasons and benefits

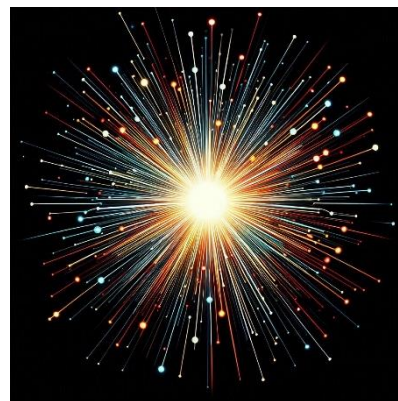
The key to comprehending the metaphor of the circle and the circularity inherent in various truths of existence lies in examining how a circle is delineated and the philosophical and mystical justifications that accompany this depiction. Without this consideration, numerous interpretations within philosophical and mystical discussions may be disregarded, leading to a loss of the crucial connection between the metaphor (the circle) and its advocate and owner (epistemological discussions).

How is a circle drawn? A new approach

We typically create a circle by using a compass or similar instrument to draw a rotational line, establishing a center point, and perceiving the surrounding perimeter as a real and tangible entity. In simple terms, we place the compass point or pen nib on the page; starting from a point, we draw a rounded line, returning to the same starting point. The actual method of creating a circle is different from its visual representation. The circle is constructed by extending from the center to the Environment. In both mystical and philosophical perspectives, a point generates a line. The essence of a circle is encapsulated in its center point, while the radius and circumference are merely expressions of this central point. It is crucial to note that in this representation, the circumference should remain untouched; instead, it emerges naturally from the infinite variations of the radius. Consequently, the circumference is fundamentally conventional and is only relevant in the context of the radii.



If we extend lines in every direction from the center point of a circle, the outline of the circle seems to emerge; however, in truth, there is no actual perimeter. What exists are the radii that extend from the center, which are also simply constructs of that center. Should the center cease to exist, all radii and the perceived perimeter would likewise vanish? The circumference of a circle seems to exist; It only appears to exist, but it does not exist. Just as when we rotate a fire-poker in our hands, it appears circular, while it is not. At every moment in time and at every point in space, an existence is presented from the center of gravity of the power input from our hand on the handle of the fire-poker, which acts as the center, constantly revolving around the handle. As a result, the handle rotates, causing the fire poker to rotate, and from their combination, a circle appears (Babaei, 2021, 164).



In reality, it is our illusion that dictates the fire-poker's circularity in space. Otherwise, in rational analysis, at every moment, our hand exerts an existence and manifestation on the center of the fire-poker, and as a result of the fire-poker's rotation, a circle is seen in space. It is with this understanding of drawing a circle that many mystical and philosophical teachings, such as the relationship between God and the world, the relationship between unity and multiplicity, the meaning of the apparent and the hidden, the meaning of the beginning and the end, and so on, will become clearer. The sublime mystical point of *Sheikh Mahmoud Shabistari* alludes to this point:



All this is your illusion, this apparent form, that a point becomes a circle from rapid motion. (Shabistari, 2003, 8)

We will designate this new circle as the "Boiling Circle," since it resembles the radii that surge upward and outward from the center, akin to a spring that rises from the earth and forms a circular boundary around itself. This terminology will serve to distinguish it from the previously mentioned rotating circle.

Advantages of Boiling circle

Mystic and wisdom-based Implications

The greatest flaw in the symbol of the rotating circle representing infinity lies in its connection to profound religious, mystical, and philosophical teachings. Because the majority of the

teachings of this group emphasize the depth and essence of existence, while the mentioned symbol pertains to its outward appearance. Whereas, the Boiling Circle is depicted as a circle with rays emanating from its center, symbolizing a versatile and ever-expanding existence. This contrasts with the traditional Rotating Circle, which represents a static and repetitive motion. The Boiling Circle can be seen as a metaphor for the infinite potential and continuous creation inherent in the universe. This point is very much in harmony with the tradition of knowledge, wisdom, and mysticism in Islam, which holds that the Divine Truth is in a state of manifestation at every moment. I reiterate that the circumference of the circle has no limit and is expanding endlessly.¹ Because we do not interfere with the environment; and the environment arises from the infinite manifestations of rays and point. The Boiling Circle represents the dynamic and ever-changing nature of existence, with rays emanating from the center, symbolizing the continuous creation and renewal of the universe. It is important to note that in this tradition, the world is not a real existent; that is, it is not something that exists; nor is it something that came into being or was created; rather, it is "coming into being every moment" and "becoming every moment." What truly exists is the Supreme Truth; other beings exist only in relation to It. This is like the relationship between the center point of a circle and its radius and circumference: the radii, and consequently the shape of the circle, exist only because the point exists. Of course, we know that the totality of the radii and the circumference are simply that point and its manifestations.

If we want to depict this symbolism more tangibly and simply, it is similar to opening our fist; when we open our fist, a circle is formed. It is interesting to know that there is a verse in the Quran that speaks about the creation of heavens and the earth, saying: "They were closed up, and We opened them" (Quran 21:30). Furthermore, "Khalq" means creation, originally signifying the opening of a flower bud; It means: the opening of a flower bud is called "Khalq." We see that the opening of a flower bud also depicts this boiling circle. In Islamic tradition, the rose, one of the most fragrant flowers in the world, is known as the "Muhammadian rose," symbolizing creation and the first level of existence after the level of God Almighty, known as the "Muhammadian Reality."

In Islamic mysticism, the concept of infinity is closely linked to the divine. The new symbol, with its rays emanating from the center, can be seen as a representation of the divine light spreading throughout the universe. This aligns with the Sufi concept of the "Light of Lights" (Nur al-Anwar), which is the source of all creation and knowledge. If we express this concept in the language of Islamic mysticism, every limitation is an expression of the Absolute. (See Ibn Arabi, 1999, vol.2 380 for the absolute and limited relationship).

¹ Although, at an opportune moment, I will offer a different interpretation of this infinite progression.

Philosophical Implications

The new symbol of infinity, inspired by the Boiling Circle, has profound philosophical implications. It suggests that infinity is not a static concept but a dynamic process of continuous creation and expansion. This aligns with the Islamic philosophical view of the universe as a manifestation of the divine, constantly unfolding and revealing new aspects of the infinite.

According to the tradition of Islamic philosophy, all infinities that are discussed in mathematics and physics, such as numbers, time, space, etc., are all types of Existence. As a result, due to the infinity of existence, they are infinite; like shadows that exist in the presence of light and like the rays of a circle that exist concerning the center of the circle. Of course, in this consideration, we should not fall into the trap of "separating the radius and circumference from the center of the circle"; because the point, with all its implications, means that the point is both the point itself and the radius, as well as the infinite circumferences.

A precise explanation of religious and mystical experiences

Most accounts of immersion in the transcendent, given by mystics and those with religious experience, are depicted as the circle we described. According to Meister Eckhart, "God is an infinite sphere whose center is everywhere and whose circumference is nowhere."¹

The notion of God as "an infinite sphere whose center is everywhere and whose circumference is nowhere" offers a philosophical interpretation of divinity that emphasizes God's omnipresence and limitless nature. This analogy implies that God is not confined to a particular place or form, but rather pervades all locations, surpassing physical limitations. Nicolas of Cusa explores the essence of God in relation to infinity, using this idea to elucidate the divine presence (Cusa, 1997, 36). Such a viewpoint enhances the understanding of the connection between the divine and the cosmos, prompting believers to perceive God as an integral component of the intricate tapestry of existence, rather than as a distant, human-like figure.

In the discourse surrounding God as an infinite and omnipresent sphere, Meister Eckhart's teachings highlight the profound connection between the divine and the human spirit. A notable instance of this can be observed in one of his sermons, where he articulates:

The Birth of the Word in the Soul is the divine self-revelation, where the soul becomes a vessel for the infinite presence of God. As God is everywhere, so too should the soul seek to recognize and realize that divine presence within (Eckhart, 2009, 98).

¹ Cited in Armand A. Maurer, *History of Medieval Philosophy* (New York: Random, 1960), p. 418.

This viewpoint aligns with the philosophy of Nicolas of Cusa, who posits that God surpasses physical constraints and resides within every individual, encouraging a deeper relationship with the divine essence. He suggested that God is without boundaries, allowing humanity to extend outward toward the divine from any point, with no ultimate limit to this journey. Describing the Transcendent as a boundless sphere implies that the act of transcendence radiates outward from the self in all directions. God exists at the infinite periphery of existence, and individuals must extend beyond their own confines to encounter the divine.

Using similar analogies, Nicholas of Cusa described God as the greatest possible circle with the smallest possible curvature. In brief, God is the "coincidence of opposites." It is in this regard that transcending outward to the circumference is also at the same time a transcending inward toward the center. The Beyond is also the Within, toward a Center.

One of the most comprehensive ways to characterize this aspect of transcending outward is to refer to it as the Beyond or the Out There. An individual engaged in this dimension of spirituality feels compelled to extend beyond their inner self. They move away from their core to engage with the surrounding environment, which appears boundless. The Transcendent exists externally, and the individual strives to connect with it by surpassing their own limitations. This movement is not defined by verticality but is simply an outward journey from the self (Geisler, 2003, 40-42).

Mathematical

Mathematical infinity is a hierarchy of increasingly complex levels. Here are five key distinctions:

- **Countable Infinity** ($\aleph_0$, Aleph-Null): This is the smallest infinity. A set is countably infinite if its elements correspond one-to-one with the natural numbers (1, 2, 3...). Examples include the set of all natural numbers, even numbers, and integers.
- **Uncountable Infinity** (c): Larger than countable infinity. An example is the set of real numbers. Cantor's diagonal argument shows that not all real numbers can be listed. Examples include the set of all real numbers between 0 and 1, all points on a line segment, and the power set of natural numbers (cardinality $2^{\aleph_0}$).
- **Ordinal Infinity** (ω and beyond): Describes both the size and order of set elements. ω represents the order type of natural numbers, $\omega + 1$ comes after ω , and larger ordinals like ω^2 and $\omega\omega$ exist, used in advanced set theory and topology.
- **Large Cardinals**: Extremely large infinities hypothesized by extending Zermelo-Fraenkel set theory (ZFC). Examples include inaccessible cardinals and measurable cardinals, which have specific measure properties.

- **Infinity in Non-Standard Analysis:** Extends real numbers to include infinitesimals and hyperreals. Examples include hyperreal numbers like $1/\epsilon$, where ϵ is an infinitesimal, and the use of these concepts in limits and calculus.

With a new drawing of a circle, every mathematical infinity act as a radius towards the center or an origin from the center towards infinity. We will mention at an opportune time that: one in mathematics is like a point in a circle; just as a circle comes into being from a point, numbers also come into being from one. Similarly, since these two (the circle and the number) symbolize God, all creation also comes into being from God. The ratio of the center of the circle to the circle, and the ratio of one to all numbers, symbolizes the ratio of God to creation. Based on the previous symbol (rotating circle), this cannot be said, but according to the current symbol (Boiling circle), each set of infinities can be considered a radius tending towards infinity.

Contains three levels

According to the principles of divine wisdom, truth is one thing but more than “two”; therefore, has at least three levels. So, in the most desirable state for the majority of philosophers, mystics, and scholars of religious sciences, they speak of three levels of a single truth when referring to reality. The reason for this claim is that they believe in a purely immaterial being, a physical being, and an intermediary between the two (Babaei, 2019). So, the world of knowledge is greater than "two". The previous symbol cannot evoke this trinity because it lacks any depth and is monotonous. However, in a new perspective, each cycle of the circle can evoke a level of existence, which guarantees the aforementioned triads of beginning, middle, and end.

Even the rotating circle returns to the boiling circle.

With the new approach, our circle includes the previous circle, and our symbol includes the previous symbol, but not vice versa. Because, based on our approach, existence has both "length and depth" as well as "width and surface." As a result, within the breadth of existence, one can also consider a circle that revolves around itself and has a continuous repetition. However, at the same time, its longitudinal and profound aspects are not forgotten.

Conclusion

The concept of the "Boiling Circle" offers a nuanced reimagining of the traditional infinity symbol, transitioning from a static representation to one that embodies dynamic existence and continuous creation. Unlike the conventional rotating circle, which implies a repetitive and fixed notion of infinity, the Boiling Circle features radii that emanate outward from a central point, symbolizing an ever-expanding universe filled with infinite potential. This reflection aligns with Islamic mystical traditions that frame God as a boundless entity, suggesting that all existence continuously comes into being from the Divine. Additionally, this model resonates with philosophical principles of existence, emphasizing a hierarchy of infinities that connect

back to a singular source. The integration of these perspectives underscores the importance of depth within existence, allowing for a richer understanding of spiritual experiences. By recognizing the multilayered nature of truth—that there are at least three levels of existence—this new symbol accommodates both the simplistic and the profound, inviting a more comprehensive exploration of the relationships between the divine, the finite, and the infinite. Ultimately, the Boiling Circle reconciles traditional and contemporary views of infinity, enriching both mathematical and mystical narratives.

Synopsis of the Main Research Outcomes

John Wallis's choice of the lemniscate symbol ∞ for infinity remains debated. Several theories exist, including its resemblance to the Roman numeral for 1000 (CIO), the Möbius strip's continuous loop representing endlessness, and the lemniscate's figure-eight shape symbolizing an unending loop. Further theories suggest links to the ouroboros (a serpent eating its tail), representing cyclical renewal, and its resonance with various cultural and spiritual interpretations of infinity, such as Brahman in Hinduism or the cyclical nature of life in Buddhism. The symbol's use transcends mathematics; it's prevalent in jewelry, tattoos, and art representing eternal concepts. Mathematically, the symbol's connection to the circle is highlighted through concepts like pi (π), an irrational number with infinite decimal places, and inversive geometry, which utilizes a point at infinity. The symbol's enduring appeal lies in its simple yet powerful representation of limitless possibilities, bridging mathematical concepts with broader cultural and philosophical interpretations.

The infinity symbol (∞), while effectively representing endlessness, has limitations. Its ambiguity in mathematics is a key drawback; it doesn't differentiate between potential and actual infinity, nor between different sizes of infinity as described by Cantor's set theory. Philosophically, it oversimplifies a complex concept, reducing nuanced interpretations to a simple visual. Practically, it presents challenges in computer science and design due to its lack of precise representation and potential for misinterpretation. Culturally, its Western origins limit its universal applicability, and its popular use dilutes its deeper significance. In religious contexts, the symbol fails to adequately represent the multi-faceted nature of the divine or concepts like paradise and falls short of capturing the complex theological concepts of infinity. The symbol's cyclical nature can even be interpreted negatively, representing a purposeless, wandering existence. Therefore, despite its widespread use, the infinity symbol's limitations highlight the need for more nuanced representations of infinity across various disciplines.

The traditional understanding of a circle as a drawn line is challenged. In the new approach of this article, the nature of the circle is considered as its central point, with radii extending outward. Here, the environment is not drawn; rather, it appears as a manifestation of rays. The circumference merely appears and can extend infinitely in all directions. This "boiling circle"

metaphor emphasizes the dynamic creation from a central source, contrasting with the static perception of a completed circle. The author uses the example of a rotating fire poker to illustrate the illusion of a fixed circumference. This re-conceptualization clarifies mystical and philosophical ideas like the relationship between unity and multiplicity, and God and the world, aligning with the Sufi poet Shabistari's notion of a point becoming a circle through rapid motion. This new perspective offers a deeper understanding of circular metaphors in various belief systems.

The "Boiling Circle" offers a superior alternative to the traditional "Rotating Circle" as a symbol for infinity, particularly within mystical, philosophical, and religious contexts. The Rotating Circle, with its repetitive, static nature, fails to capture the dynamic and ever-expanding nature of existence emphasized in many traditions. The Boiling Circle, conversely, depicts rays emanating from a central point, symbolizing continuous creation and manifestation. This aligns with the Islamic concept of God's continuous act of creation, where the universe is not merely created but is "coming into being every moment." The circumference, representing the created world, is a consequence of the central point (God), not an independent entity. This is likened to the opening of a flower bud, echoing Islamic doctrine about creation and the Islamic symbol of the rose. The Boiling Circle's dynamism reflects the "Light of Lights" in Sufi thought, where infinity is not a static concept but a process of continuous unfolding.

Philosophically, the Boiling Circle supports the view of infinity as a dynamic process, aligning with Islamic philosophy's understanding of the universe as a constant manifestation of the divine. All mathematical infinities (numbers, time, space) are understood as types of existence, stemming from the infinite essence. Importantly, the symbol avoids the trap of separating the periphery from the center, emphasizing the interconnectedness of all aspects. The Boiling Circle provides a more precise representation of mystical experiences described by figures like Ibn Arabi in Islamic tradition and Meister Eckhart, who depicted God as an infinite sphere whose center is everywhere and circumference is nowhere. This concept, further explored by Nicholas of Cusa, highlights God's omnipresence and the possibility of transcending outward towards the infinite while simultaneously moving inward towards the divine center. This "coincidence of opposites" transcends simple circularity.

Mathematically, the Boiling Circle accommodates various levels of infinity, including countable and uncountable infinities, ordinal numbers, and large cardinals. Each set can be viewed as a radius extending towards infinity from the central point, creating a richer mathematical representation than the simple, repetitive cycle of the Rotating Circle. The Boiling Circle also incorporates a layered understanding of reality. It acknowledges at least three levels of existence: purely immaterial, purely material, and an intermediary level, reflecting a more nuanced view of reality than the previous symbol.

Finally, the Boiling Circle encompasses the Rotating Circle. The dynamic, multi-layered nature of the Boiling Circle acknowledges both the static, repetitive aspects of existence (represented by the Rotating Circle) and its deeper, more profound, ever-expanding dimensions. It offers a more complete and accurate representation of infinity across diverse fields, from mysticism and philosophy to mathematics and religious experience.

The rotating circle emerges from the heart of quantitative natural sciences, while the bubbling circle arises from the depths of wisdom, mysticism, and philosophical and religious teachings. The difference between science, true wisdom, and divine religion is that science operates within a circumference, while wisdom, mysticism, and religion move in a radius; a radius toward a center. The reason for humanity's confusion in the contemporary world is that it has lost the center of its circle. Contemporary humans have become radii without a center, and consequently, radii without a circle. Rays without a center will be "like dust and particles scattered about."

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