

A Comparative Study of “Numbers” in Mythology and Science within the Perspective of Ernst Cassirer’s Philosophy of Symbolic Forms

Man Yang*

School of Foreign Studies, Suzhou University, Suzhou, Anhui, China

**Corresponding Author.*

Abstract: This study aims to compare the differences and connections between the concepts, function, manifestation, and value dimensions of “number” in mythology and science from the perspective of Cassirer’s philosophy of symbolic forms. It reveals the symbolic nature of “number” in mythology, analyzes the pure form of “number” in science, and explains how “number” constructs the logical system and cognitive framework of the scientific world as a pure formal symbol in the scientific system. By comparing the concept, manifestation, function, and value of “number” in mythology and science, this study reveals the philosophical and cultural significance behind them. In Ernst Cassirer’s symbolic form philosophy, mythology and science, as important forms of human culture, together with other cultural forms such as art, constitute an integral part of “humanity”. The primary research methods are literature review, comparative analysis, and case study. By systematically reviewing the discussions on mythology, science, and other fields in Cassirer’s philosophy of symbolic forms, typical mythological stories and scientific theories are selected for a detailed comparative analysis of the use of “number” within them. The study has found that, emanating from the intuitive form of mythological thinking, “numbers” in mythology serve as one of the fundamental structures of the mythical world. In mythology, numbers exist as potent entities, transcending mere symbolic status. On the contrary, in science, “numbers” serve as an abstract symbolic language that follows clear and explicit structural principles, elucidating the essence and relationships between various scientific phenomena.

Keywords: Philosophy of Symbolic Forms; Mythology; Science; Number; Comparative Study

1. Introduction

According to Cassirer’s perspective, humans inhabit a “symbolic universe”, where they confront a cosmos of culture. “Language, mythology, art, and religion are the various segments of this symbolic universe, akin to different threads weaving the fabric of the symbolic net, an intricate tapestry of human experience. Every advancement humanity achieves in thought and experience refines and strengthens this symbolic net” [1]. Language, art, mythology, religion, history, and science are vital modalities of human culture, representing significant manifestations of the externalization of human’s internal capabilities. “Each of these functions creates its own symbolic form, which, even if not resembling intellectual symbols, at least shares equal status with them as products of the human spirit. None of these symbolic forms can be reduced to or derived from others simply; each selects a particular perspective, within and through which it constructs its own real aspect” [2]. Each symbolic form is an externalization of human creativity, embodying an aspect of human’s essential power. Consequently, each symbolic form is irreplaceable and holds equal significance.

The three theoretical frameworks in Cassirer’s mythology of thought are the forms of thought, intuition, and life. In the purely cognitive sense, the form of thought is undoubtedly paramount. However, contrary to scientific cognition, mythical thought stems from emotions and will. It possesses an enduring and distinctive configuration, revealing an objectively stable formal world beneath. Mythology lacks the abstract symbols found in mathematical thinking; its entirety is concrete,

manifesting as intuition. For Cassirer, emotions ignite mythological fantasies, serving as the genuine substrate of mythical thought. Thus, merely approaching mythical thought from the aspect of the form of thought is insufficient; one must also trace back from the pure form of thought to its forms of intuition and life. These forms are never separate from each other; from the most primitive products of mythology to its most advanced and purest configurations, they remain intertwined. This explains the unique self-sufficiency and inherent characteristics of the mythical world. Among them, the form of intuition better encapsulates the emotional qualities of mythology, serving as the foundation of mythical theory. The intuitive form of mythology, namely, the structure and configuration of the spatio-temporal world within mythical consciousness, encompasses space, time, and number.

Science represents the culmination of human intellectual development and can be regarded as the highest and most distinctive achievement of human culture. As early as the time of Pythagoras, Greek philosophy had discovered the language of numbers, a discovery that marked the birth of modern scientific concepts. Science is not merely an accumulation of knowledge but also the pinnacle of human symbolic activities, embodying the highest achievement in the development of abstract symbols.

Cassirer notes that the fundamental distinction between science and other human activities (such as mythology, religion, art, etc.) lies in the systematic and abstract nature of its language. Scientific language is more specific and systematic than everyday language, as it does not merely describe isolated, fragmented facts but rather presents a more abstract and novel order and set of principles. This order and set of principles constitute the worldview and methodology through which science explains the world, making it a powerful tool for understanding and transforming nature. He emphasizes that scientific activity is the epitome of symbolic thinking. Scientists construct symbolic systems to transform complex natural phenomena into comprehensible and predictable models, thereby revealing the inherent laws and essence of nature. This process not only embodies human creativity and rationality but

also showcases the immense role of symbolic thinking in comprehending and transforming the world.

2. The System of Sacred Numbers in Mythological Consciousness

Mythological thinking is a kind of concrete and emotional thinking. Therefore, the numbers in mythology also present a kind of emotional integrity that is completely different from rational thinking. It is another form of structure in the mythological world besides space and time.

In mythological thinking, numbers present a kind of emotional wholeness that is completely different from rational thinking. Things with the same number are the same thing. Like space and time, numbers also contain elements of universality and particularity. Here, numbers are not simply ordinal numbers, not just marking a universal position, but have their own unique properties. In mythology, numbers exist as powerful entities, not just as symbols. Therefore, numbers in mythological thinking are carriers of religious significance. The manipulation of numbers involves incorporating all existing objects, all facts, and all “secular” things into a mythological-religious sanctification process.

2.1 “Trinity” - the Sacred Number “Three”

From primitive thinking to later cultural religions, examples of the embodiment of the number “three” can be seen everywhere. Especially later on, the focus on the “Trinity” in Christianity brought the mythological-religious power of the sacred number “three” to its extreme. The special status of the number “three” was already reflected in the works of the Greek Dark Ages. As an important document of Greek mythology and culture, Hesiod's “Theogony” plays a very important role with the number three. In “Theogony”, starting from the first generation of gods Uranus, all the way to Zeus, there are three generations, which we call the three generations of gods, three divine families. When describing the descendants of these gods, they also follow a ternary narrative structure. In the family of gods, there are three Cyclopes, three hundred-armed gods, and three groups born from the blood of Uranus-Elynus, the giant race, and the nymph goddesses; in the Titan family, the Ocean God has three

thousand river god sons and three thousand ocean daughters, and the Ocean God's daughters give birth to three daughters, Hymen and Thea have three children - the Sun God, the Moon God, and the Dawn Goddess; the monster with a human head and snake body, Ercyna, and the monster Typhon give birth to three monsters. In the Olympian family, there are three goddesses of fate, three vengeance goddesses, three goddesses of time, three goddesses of grace, as well as multiples of three - six, nine and twelve, which also occupy a large amount of space in these numbers. The descendants of Gaia and Uranus, the twelve Titans, six men and six women; Zeus and Demeter spend nine nights together, and she gives birth to nine Muses, etc. In addition, in the prologue part, the Muses sing three times. Zeus, Hades, and Poseidon divide the world into three parts.

Throughout Greek mythology, the three power struggles between the divine reigns of Uranus, Cronus, and Zeus presage the transformation of social consciousness. As analyzed by Mattéi in "Platon et le Miroir du mythe", "This triadic doctrine, whether manifested in functional forms (Dumezil), theological forms (Goldschmidt), or structural forms (Vernant), primarily represents the number of gods rather than humans. Here, we once again approach Hegel's assertion that the universal spiritual force resides within the triad (Dreiheit), and the spiritual force of ancient Greece is embodied in the successive reigns of Uranus, Cronus, and Zeus" [3]. Thus, the number three possesses a sacred emotional matrix.

The unity of three is initially manifested in the division of power among Zeus's three brothers, who together embody the sovereignty over the entire universe. However, the concept of the 'Holy Trinity' is not as prominently featured in Greek mythology; rather, it is more prevalent in Norse mythology due to its early Christian influences. At the dawn of creation, the brothers Odin, Vili, and Vé kill the giant Ymir and become the masters of all worlds. Throughout subsequent narratives, these three deities are often depicted making decisions together, essentially fulfilling a single role-the rulers of the world. The nine worlds are dependent on the sole Yggdrasil, the cosmic tree, which has three massive roots extending to Asgard, Jotunheim, and Niflheim. At the ends of these roots lie three wells that nourish

Yggdrasil. Nevertheless, these elements exist solely for and as part of the singular cosmic tree, underscoring the divine significance of three. Similarly, Norse mythology includes the Norns, the three fates, and among the Aesir, twelve are leaders. Giants construct the walls of Asgard in three winters, and Odin's nine-day sacrifice on the tree yields the powerful Runes. His grandfather gifts him nine songs imbued with divine power, and in his battle with the giantess Gullveig, "he burned her three times, yet she was reborn each time" [4]. Dwarves present Odin with a bracelet that multiplies into eight identical ones every nine nights. Heimdall establishes three classes for humanity and after Balder's death, Hermod rides for nine days and nights to the river of the dead to retrieve his spirit. These examples all underscore the importance of the number three.

We should seek more from Christianity. The combination of the Father, Son, and Holy Spirit establishes this unity, which expresses a certain natural form of human life. The numbers three and one are endowed with equal sacred significance here. Augustine pointed out in "The Trinity" that a unity is manifested in the equal and indivisible entity, so there are not three gods but only one god; despite the fact that the Father gave birth to the Son, the Father is not the Son; the Son was born by the Father, so the Son is not the Father; and the Holy Spirit is neither the Father nor the Son, but only the spirit of the Father and the Son, who is equal to the Father and the Son and belongs to the unity of the three [5].

2.2 The Sacred Number Stemming from the Worship of Space-Time

Cassirer believed that the foundation of the sanctification of numbers lies in the uniqueness of mythical spatial perception, temporal sensibility, or self-awareness. If the number three represents the uniqueness of self-awareness, then numbers such as four, seven, and five stem from the veneration of cardinal directions. The sanctity of the number four arises from its precise representation of the relationship between any given reality and the fundamental forms of the universe, where each element corresponds to one of the four cardinal directions. As previously discussed, specific attributes, seasons, elements, and so forth, are associated with the orientations of

east, south, west, and north. Since mythical thinking presents the relationships and configurations of the world in concrete and intuitive forms, the veneration of the number four later manifested as the adoration of the cross shape. During the Middle Ages, when the four ends of the cross were equated with the four quarters of heaven, and the cardinal directions of east, west, north, and south corresponded to specific stages of the Christian salvation narrative, the cross became a representation of a particular primal cosmic-religious theme [6]. The number five, building upon the foundation of four, adds veneration for the central position, which, in numerous cultures, is a symbol of sanctity and dignity, as exemplified by the Aesir gods residing at the center of the universe. The number seven is initially associated with the temporal consciousness of the seven-day cycle. In the Mayan Tzolkin calendar, a year comprises 13 months, each with 28 days, which are divided into four parts, each consisting of the perfect number of seven days, thereby conferring upon seven the status of a perfect number. In ancient Greece and Rome during the era of astrology, the number seven seems to be related to the worship of the seven planets.

In mythology, numbers serve as vehicles for emotions, wherein people harbor a sense of reverence and fear towards their divine nature. Cassirer points out that numbers unify realms of sensation, intuition, and emotion, fostering harmony between all things and the soul.

3. Number As a Scientific Symbol

In Cassirer's philosophy, the concept of "number" in science is a core notion that embodies not only the fundamental functions of human knowledge but also a crucial step in the process of scientific rationality and objectification. Cassirer regarded numbers as a novel symbolic system that compared to linguistic symbolism, exhibits clearer and more definitive structural laws, conferring unparalleled superiority in the construction of scientific knowledge.

For Cassirer, numbers transcend mere tools of measurement; they are symbols of a logical kind that embody the relationships and structures among things. The symbolic system of numbers is particularly prominent in science, enabling the systematization and precision of

scientific knowledge through their application. The concept of number originated from early human life practices. Primitive humans, striving for survival, gradually developed a perception of quantitative changes, leading to the initial awareness of numbers. One of the tasks of science is to construct a universal ordered world, allowing individuals to employ conceptual systems to organize and regulate diverse sensory materials, thereby attaining stable and consistent beliefs [7]. In the early stages of scientific development, science necessitated the introduction of a new measure and different logical standards of truth to explain natural phenomena and order. The function of science is to seek order.

The initial thinking of classification stems from the similarity category of a thing, while scientific classification must follow certain principles. It is artificial, reflecting human efforts to incorporate diverse and individual natural phenomena under human concepts and universal laws, and it embodies the achievements of human subjectivity and distinct spiritual imprints. Thus, the world enters a logical and orderly state of the universe, operating according to its nature. Various names in linguistics and the initial scientific names can be seen as the results and products of the same classification instinct.

Since the Pythagorean School established the first philosophy of number and provided a conceptual model for the universe using numbers, quantity and shape have determined the form of all natural objects. Numbers are conceived as a truly universal element that encompasses everything. They extend the use and function of numbers to various fields of existence. Pythagoras described numbers as follows: numbers are divided into two types, one is the number as the actual principle, which can be used to create objectively existing substances, and the other is a paradigm to represent all things. Once the essence of numbers is known, the essence of all things is also understood. Analyzing in terms of its order, the first one is the number as the source or material. Based on this understanding, we seek common similarities between other things and numbers, and use these refined characteristics to universally define the properties of objects that exist in the objective material world [8]. The discovery of the language of numbers also marks the birth

of modern scientific concepts.

The symbol system of numbers is a distinct logical category from that of language. Linguistic symbols lack a fixed systematic order, with each term carrying a unique, discrete significance. In the case of numbers, however, their significance is defined by their position within the sequence. Heidegger posited that the essence of numbers is a priori determination we impose on objects, representing our assumptions rather than inherent qualities [9]. This implies reliance on an intrinsic determination.

In science, numbers form an abstract symbol system that represents conceptual relationships. In theoretical thinking, the diversity of phenomena is subsumed under the unity of ideas, with purely quantitative elements and rules used to measure entities. As science evolves, the symbolic system of numbers supplants and eliminates the symbolic system of everyday language. Both the grand cosmos and the minute world within atoms require such an orderly symbolic system for explanation.

In science, “number” is a multidimensional concept, with each mathematical concept offering a distinct perspective on the world, aiding in the better comprehension and management of life’s uncertainties, opportunities, and complexities. [10] It not only reflects the subjectivity and creativity of the human spirit but also serves as a vital tool for constructing scientific knowledge and expressing rationality. Mathematically, it is a symbol; in its role in people’s lives, it is both a tool and a methodology. [11] Through the application of numbers, humanity delves deeper into exploring and understanding the natural world, thereby fostering the ongoing advancement and growth of science.

4. Conclusion

In the early stages of human thought, the symbols of “number” were imbued with divine power and enveloped in an aura of magic. Consequently, the numbers in mythology carried humanity’s awe and reverence for nature, manifesting as a concrete externalization of human emotions. Within the theoretical framework of science, numbers transform disparate contents into conceptual unity, converting them into various unified symbols. The development of modern

theoretical science not only attributes the specific nature of perception but also the essence of pure intuition, space, and time, to the essence of pure numbers. Numbers serve merely as an expression of conceptual relationships. In theoretical thinking, the diversity of phenomena ultimately converges into the unity of ideas, with pure quantitative factors and rules employed to measure things. Hence, numbers are a vital interpretive tool in scientific thinking.

The “numbers” in mythology represent meaningful entities, tangible realities that endow all existing things, facts, and “mundane” aspects with sacredness. In contrast, the “numbers” in science can be viewed as the study of relationships and types of relationships, serving as a tool to uncover nature and reality. The evolution from the “numbers” of mythology to those of science illustrates the progression of human thought from the concrete to the abstract.

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