European Journal of Science and Theology, April 2026, Vol.22, No.2, 25-39

THE WEB OF THE WORLD: NETWORK CONCEPTS IN MYTHOLOGICAL COSMOLOGIES

Vladimir Djoković*

Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Serbia

(Received 9 February 2026, revised 22 March 2026)

Abstract

Formal graph (network) theory has proven to be an effective approach for studying the organization and behavior of complex interconnected systems. This study argues that mythological and cosmological models across various cultures employed network structures long before their mathematical formalization. The Norse Yggdrasil, Indra's net, the Kabbalistic Tree of Life, and some other mythic systems can be interpreted as early, intuitive models of complex networks (small-world, scale-free, peer-to-peer, multiplex, etc.). By analyzing mythological cosmologies through the lens of contemporary network theory, and *vice versa*, my aim is to show that both models share a common cognitive foundation. The main thesis is that they are based on pre-conceptual mental structures, i.e., cognitive schemas, particularly the **link image schema**, which is central to our understanding of relations and connectivity and, consequently, foundational to the conceptualization of networks, both formal and symbolic. Conversely, the paper proposes that formal network theory can serve as a hermeneutic key for re-examining the structural logic of mythic models. It has been suggested that a Bose–Einstein condensation–like process, emerging from statistical analyses of scale-free networks, offers a framework for interpreting metaphysical concepts such as Pierre Teilhard de Chardin's Noosphere, which at first sight do not exhibit an explicit network structure.

Keywords: network, small-world, free-scale, myth, formal graph, archetype, cognitive schemas, statistical physics

> *"The universe (which others call the Library) is composed of an indefinite and perhaps infinite number of hexagonal galleries, with vast air shafts between, surrounded by very low railings. From any hexagon one can see the floors above and below—endlessly."*
>
> (Jorge Luis Borges, 'The Library of Babel')

1. Introduction

In my previous paper [1], the focus was on symbolic forms and their role in our representations of the external world. Building on Ernst Cassirer's

* Corresponding author e-mail: djokovic@vin.bg.ac.rs

'Philosophy of Symbolic Forms' [2] and George Lakoff's work on the theory of cognitive schemas and conceptual metaphors [3], I discussed the possible existence of universal thought forms through which we construct our models and theories. An attempt was made to show that scientific and mythological/religious models share a common cognitive foundation [1]. For instance, 'Logos', one of the most significant terms in philosophy and religion, was related to the container cognitive schema introduced by Lakoff and Johnson [3] and to various scientific theories. The relationship is established by assuming that the conceptualization of mathematical notions such as points, lines, functions, sets, etc., is based on the same cognitive schemas used to create our everyday representations [4].

In the present study, the argument is taken a step further by tracing basic ideas found in modern network theories to various mythological images and religious models, suggesting again their common cognitive origin. The aim is to show that many mathematical frameworks employed in the study of networks can be seen as having counterparts or analogies in mythological and religious narratives created across various cultures. To do that, I will start again with Lakoff's cognitive schemas, recurrent patterns in our sensorimotor experience that give coherence and structure to our understanding [5]. In particular, the focus will be on the **link schema**, which underlies how ties and connections are conceived and, consequently, how networks are formed [6]. After that, I will consider metaphysical and religious models such as the well-known Indra's net, Norse myths about Yggdrasil, Kabbalah's Etz Chaim (the Tree of Life), and many others with less recognizable network structures. Although they are not intentionally designed as networks, these myths will be compared to modern network theories to show that human thought was able to instinctively grapple with network paradigms long before their mathematical formalization. Conversely, it will be argued that models of network theory do not describe only their infrastructure and connectivity; they may also serve as a hermeneutic key for understanding deep-seated, network-inspired metaphors about reality, divinity, and society itself. The network theory is thus used here as a modern analytical framework that allows contemporary researchers to interpret and understand these myths from a different perspective. In this sense, conclusions obtained through the application of tools from statistical physics to scale-free networks might be used to explore the network origins of modern religious concepts such as Pierre Teilhard de Chardin's Noosphere.

2. Classical and small-world networks

The studies within cognitive linguistics suggest that a relatively small number of primitive image schemas such as **link**, **part-whole**, **center-periphery**, **straight-curved**, **near-far**, **cycle**, etc., are responsible for structuring spatial relations in world languages [5]. Furthermore, these embodied concepts are among the sources of the logical forms used in abstract reasoning [6]. For the present study, the most important is the **link schema**, since it is one of the primary ways in which we are able to establish connectedness in our understanding. *"Without links, we could neither be nor be human"*, claims Mark Johnson in his

book *The Body in Mind* [6, p. 85]. We understand physical connection from birth, being linked to our caregivers through touch, sight, and sound. We hold hands; we recognize branches connected to trees and roots connected to the ground. From there, there is a natural step toward understanding non-physical links to our parents, friends, and siblings, which in turn leads to the abstract concept of the link itself [6]. The linkages do not need to be solely spatial or physical; we also learn about temporal connections between two events along the time axis. In its simplest form, the structure of the link image schema consists of two connected entities, which makes the perception of similarity possible [6]. Both the link and the entities can be interpreted abstractly. If the link is interpreted abstractly, we talk about similarity relations and/or functional unities. Interpreting the entities as abstract objects leads us to the notion of formal systems or networks [6].

Formal networks or graphs (as they are called in most of the mathematical literature) represent a set of entities with connections between them. The entities are usually called vertices or nodes, while the connections are termed edges [7]. Obviously, the **link image schema** is central to our understanding of how these networks are formed, but other primitive image schemas are important as well. The **center–periphery** schema is necessary for understanding hubs and central nodes; the **part–whole** schema explains how a network as a whole is made up of interconnected parts; and the **up–down** schema (understood in terms of degree or scale) helps us understand the strength of a link. The study of networks is part of discrete mathematics and belongs to a larger group of theories related to complex systems. Social networks, metabolic networks, distribution networks (such as blood vessels or postal delivery routes), the World Wide Web, the Internet, and many others, although physically different, can all be studied using the formalism of graph theory [7]. Historically, the first proof in network theory is Euler's famous solution to the Königsberg bridge problem in 1735. Modern network research began in 1959 with the classical random graph theory introduced by Erdős and Rényi [8] and independently by Edgar Gilbert [9], which differed from regular lattices by allowing random links between nodes. The two models differ slightly in their main assumptions: Erdős and Rényi assumed that, on a fixed set of nodes, there would be a fixed number of links that are equally likely, while in Gilbert's model there is a fixed probability for each link to be present or absent, independently of the other links. Testing of these random-graph models showed that they may not be suitable for describing real-life networks, since they exhibit a very low degree of clustering. Particularly in social networks, clustering is an extremely pronounced phenomenon. Although important theoretical work continued after the 1959 Erdős–Rényi paper, the next major expansion of network research came about thirty years later, driven largely by the availability of computational resources capable of handling large-scale networks. This required a completely different approach and the development of statistical methods for quantifying large networks. Much of the current activity in the field is based on this approach; researchers seek statistical parameters that describe network structures, such as path lengths and degree distributions.

One of the major steps toward the description of real-world networks was the model introduced by Watts and Strogatz [10]. Best known as the small-world

network model, it enabled the rewiring of regular lattices with the aim of introducing a certain amount of disorder. The resulting system showed high clustering, as in regular networks, while at the same time exhibiting small path lengths similar to those of random graphs. In this network configuration, it is possible to connect each node in a relatively small number of steps. This model clarified the mechanism behind one of the most famous experiments in the social sciences (the so-called Milgram experiment), according to which any two individuals may be connected by an unexpectedly short chain of approximately six steps [11,12]. It was also revealed that small-world structure appears in protein interaction networks and scientific collaboration networks [7]. Watts and Strogatz tested their model on the nervous system of the *Caenorhabditis elegans* worm, which is commonly used as a model system by neuroscientists due to its simplicity. They showed that neural networks exhibit small-world structure with a short characteristic path length between neurons [10].

It should be noted that Milgram conducted his experiment in the 1960s, using an ingenious approach that involved sending postcards to randomly selected people across America and asking them to send the cards further if they did not know the target person by name. The postcard contained a part that was sent back to Milgram, which enabled him to trace the route of the postcards and systematically document the observed effect. However, the idea that any person on the planet can be linked to any other person through no more than five acquaintances was first found in the 1929 short story, *Chain-Links*, by the Hungarian writer Frigyes Karinthy [13]. This is important for the present study, which aims to show the parallels between formalized graphs (networks) and symbolic network models created in art and mythology. In this case, an artistic intuition led to an almost perfect conclusion, since the true value of the degree of separation found by Milgram was somewhere between 5 and 6. I will further present additional mythological models to illustrate that these intuitive and metaphorical understandings preceded formalized graphs, which subsequently endowed the latter with mathematical rigor. Here, it must be emphasized that the mythmakers of antiquity were not designing narratives with network structures in mind. Their myths emerged organically through oral and literary traditions, not through any deliberate attempt to organize characters or events in a network-like system.

The **link image schema** can be clearly recognized in the Greek mythological story of the Moirai, three sister goddesses - Klotho (Clotho), Lakhesis (Lachesis), and Atropos (or Aisa) - who control the fate of every mortal and deity [14, p.86]. They spin, measure, and cut the ‘thread of life’ for each individual, determining the length and fate of their existence. The thread is obviously an abstract link that connects two moments in time. It also carries a network metaphor, since the collective of all these threads forms a cosmic fabric. The fabric or tapestry symbolism appears explicitly in the Web of Wyrd (or Urðarvefr) from Norse mythology [15]. The Web of Wyrd is woven by three Norns (Urdr, Verdandi, and Skuld), and it is often depicted as nine intersecting lines embodying all runes and life’s possibilities. Each thread represents an individual life, and the tapestry symbolizes how the destinies of all beings are interwoven.

Every action ripples through time, all events are interconnected, and past, present, and future are inextricably linked. This same motif of a tapestry representing a fabric of reality appears in many other mythologies. In Navajo cosmology, a crucial deity is Spider Woman, who weaves the fabric of the universe and represents creation, protection, and balance, while the Hopi tell closely related stories about Spider Grandmother. More broadly, the spider as a cosmic weaver can be understood as a mnemonic model for visualizing cosmic webs [16]. For instance, in the folklore of the Akan peoples of Ghana and neighboring regions there is a spider-like figure of Anansi whose web represents the interconnectedness of stories, knowledge, wisdom, and culture in general [17]. The observed similarities among the above-mentioned myths are well documented, and I am not going to dwell on them. If we accept Claude Lévi-Strauss' claim that myths operate like formal systems, then meaning does not come from the individual elements of the myth but from the relations between them [18]. Myths can be transformed from one into another without changing the structure. One element can be replaced by another if it plays the same role; in that sense, Spider Woman, the Norns, and the Moirai are structurally equivalent. For the present discussion, it is more important that the networks or woven fabrics in these myths all have the simplest form of quasi-regular lattices. My intention is to show that they can also have more complex structures, of the kind observed in formal graphs.

The Norse myth of Yggdrasil reflects a small-world network architecture particularly well. Yggdrasil is the immense ash tree positioned at the center of Norse cosmology; it acts as the axis mundi and connects nine worlds [15]. Some of these worlds are well known from popular culture, such as Asgard (home of the main gods: Odin, Thor, etc.) and Midgard (the world of humans, connected to Asgard by the Bifrost bridge). The other seven are Vanaheim (realm of the Vanir gods), Jötunheim (realm of the giants), Alfheim (home of the light elves), Svartalfheim (realm of dwarves and craftsmen), Niflheim (world of ice, mist, and cold), Muspelheim (world of fire and heat), and Helheim (realm of the dead). Yggdrasil essentially symbolizes the evolution of the world until it ends at Ragnarok (the end of the world). Its branches and roots link various realms, in which different beings are locally clustered, revealing a structure that closely resembles a small-world network. As discussed above, small-world networks are characterized by locally dense clusters connected by rare but efficient shortcuts, resulting in short path lengths [10]. This structure allows information to travel rapidly across distant realms, a process mythologically embodied by the squirrel Ratatoskr, who runs through Yggdrasil delivering messages.

In the following sections, I will examine other types of formal networks and their relation to various cosmologies. First, I will focus on the scale-free network model developed by Barabási and Albert [19].

3. Scale-free networks

Typical networks, such as ordered lattices and the purely random networks of Erdős and Rényi, do have a characteristic scale. In ordered lattices, every node

is connected to the same number of other nodes, a number usually called the node's degree. In random networks, however, the node degrees vary depending on the probability of a connection between any two nodes. Still, the distribution of degrees will follow a Gaussian distribution, meaning that they will cluster around a typical value, and nodes with a huge number of links will be very rare. What Barabási and Albert found is that certain networks (for instance, genetic, social, the World Wide Web, etc.) exhibit a common scale-free organization, characterized by a power-law degree distribution [19]. In such a network, a small number of nodes will have vastly more links than the majority of nodes, and there is no characteristic scale for node connectivity. The underlying mechanisms responsible for generating this scale-free nature are network growth through the addition of new nodes and the so-called preferential attachment. The latter mechanism assumes that every new node tends to link to the well-connected nodes, particularly to the most connected ones, termed "hubs". The scale-free model describes social networks fairly well. Human interactions produce certain regularities due to specific network dynamics, which are reflected in everyday language. Common sayings and idioms reveal the basic phenomena of scale-free networks introduced by Barabási and Albert. Preferential attachment is well illustrated by sayings such as *'the rich get richer'*, *'popularity feeds on itself'*, *'nothing succeeds like success'*, to mention only few. The importance of hubs is reflected in expressions like *'it's not what you know, it's who you know'*, *'you are known by the company you keep'*, *'all roads lead to Rome'*. These examples suggest that common-sense reasoning is capable of grasping the main properties of networking. I also performed a thorough literature search to identify a cosmological model that would fit the scale-free framework. I may be mistaken, but I could not find a mythological system that exactly corresponds to a typical scale-free architecture. However, there is a specific network that may be related to Christian cosmology or certain other religious systems. This particular "network" is characterized by the emergence of a single, hyperconnected giant hub, and it statistically corresponds to one of the most intriguing phenomena in physics, namely Bose–Einstein condensation.

For those who are not familiar with Bose-Einstein statistics, I will explain its basic concept and then connect it to a similar concept in network theory. Bose-Einstein statistics arises from the quantum mechanical requirements regarding the spin of indistinguishable particles. Particles with integer spin (bosons) have symmetric many-body wavefunctions under particle exchange. Their collective behavior is therefore different from that of fermions (particles with half-integer spin). Bosons, unlike fermions, are not subject to the Pauli exclusion principle, which allows for their aggregation in the same energy state. Historically, they were introduced in the early 1920s by Satyendra Nath Bose, a professor at the University of Dhaka, who showed that Planck's formula for black-body radiation can be statistically derived from a system of indistinguishable, non-interacting massless particles, i.e., photons. Bose sent his paper to Einstein, who immediately recognized its importance, translated it into German, and argued for its publication. Later, Einstein generalized Bose's theoretical solution to atoms, which further implied the existence of a novel quantum mechanical phenomenon,

the so-called Bose-Einstein condensate. Namely, at temperatures near absolute zero, an agglomeration of atoms that obey these statistics can collapse into the same ground energy state. This is a typical example of a macroscopic quantum effect, where indistinguishable atoms occupy a single quantum state and thus exhibit collective behavior.

In order to connect network theory with Bose–Einstein condensation, Bianconi and Barabási [20] introduced node fitness as an additional constraint in the growing network model, alongside preferential attachment. In this model, each node is assigned a fitness parameter that quantifies its ability to attract new links. This turns network growth into a competition between the age of a node (older nodes have more links) and node fitness (some nodes are more attractive). They mapped the network system to a Bose gas of non-interacting particles by assuming that **each node corresponds to a single energy state, while each link corresponds to a boson occupying that state**. The attachment probability then becomes equivalent to the Bose occupation number (the average number of bosons in a specific energy state), while randomness in the attachment plays the role of "temperature". When randomness in the attachment falls below a critical threshold, the distribution of fitness values (effective energies) cannot absorb all incoming links, leading to a condensation transition. This phenomenon is known as topological condensation and assumes that one node accumulates a macroscopic fraction of all links, which are now in a single "energy" state, analogous to particles in a Bose–Einstein condensate below the transition temperature. In this way, using the framework of quantum statistical mechanics, Bianconi and Barabási [20] provided an explanation for the emergence of superhubs in heterogeneous complex networks.

The existence of a single superhub that accumulates all the links can be recognized as a centralized, radiating cosmological model, typical for all three major monotheistic religions: Judaism, Christianity, and Islam. Within this structure, all beings are directly related to a single center, God, who is the sole source of existence. The central position of God, without any mediators (at least in theory), is most apparent in Islam, where everything originates from Allah, is sustained by Allah, and returns to Allah. Here are specific verses that can support this: 'Allah is the Creator of all things, and He is, over all things, Disposer of affairs' (Qurʾān 39:62); 'Indeed, Allah holds the heavens and the earth lest they cease to exist' (Qurʾān 35:41); 'Everything will perish except His Face. His is the judgment, and to Him you will be returned' (Qurʾān 28:88). A single-hub structure can be recognized in Plotinus' cosmology and teachings about Nous (divine Mind), which deeply influenced Christian theology and Jewish mysticism. In Neoplatonism, the Nous can be viewed as the absolute center, and all existence emanates from and returns to it. The whole emanation process is mediated by the Logos, which I discussed in the previous essay [1]. It is also worth mentioning Hindu non-dualism, with Brahman as the ultimate reality, usually presented with the Vedantic phrase 'Tat Tvam Asi' (You Are That) [21]. All existing things, including gods, humans, worlds, etc., are all expressions of Brahman.

In this regard, I found interesting the concept of the 'Noosphere', introduced by the French Jesuit, paleontologist, philosopher, and mystic Pierre

Teilhard de Chardin. In its essence, the idea of the Noosphere is that human thought forms a novel, evolving layer on top of the geosphere (inanimate matter) and the biosphere (living organisms). The word is derived from the Greek nous (mind) and sphere (globe). For de Chardin, evolution does not stop with humans as biological beings; it continues in the realm of ideas through an evolutive process known as 'complexification-consciousness' [22, p. 234]. The noosphere becomes more integrated over time; it grows toward the Omega Point, which represents a final state of maximum complexity, consciousness, and unity. The Omega Point, in fact, represents Christ, who is seen as the culmination of evolution [22, p. 143]. Basically, the historical Christ, i.e., the Incarnation, is just a step toward the cosmic Christ, who unifies matter, life, and consciousness. Here, de Chardin often cites the verse Col. 1:17, 'He is before all things, and in him all things hold together', emphasizing the role of Christ in sustaining the entire universe. The whole evolutionary process can be represented by two main ideas: a convergent (centered) universe and the cosmic nature of Christ as the center of the universe [22, p. 236]. However, the process does not assume that individuals dissolve into a collective mind or that humanity becomes God. He claims that this is a conscious union, not absorption, and that personhood is preserved. Being a conscious union, the Noosphere is different from Jung's archetypes, which are typically related to unconscious processes. On the other hand, the Noosphere represents yet another example of a single-hub architecture, with Christ, who, as the Omega Point at the center of the universe, connects all individual consciousnesses. The use of the theory of Bianconi and Barabási [20] in the abovementioned context can be considered a modern interpretive approach that may pave the way for the application of other formal graph theories in the analysis of mythological models. This approach could enable researchers to examine patterns of interaction and structure within myths that might otherwise remain difficult to elucidate.

4. Indra's net

In this section, I will reverse the narrative and start first with the mythological model, since Indra's net is so rich in imagery and meanings that might be lost through a simple comparison with complex formal networks. The teachings about Indra's net come from the Hua-yen school of Buddhism, which arose in China during the T'ang dynasty (618-907) [23]. This form of Buddhism found its inspiration in the Indian Mahāyāna scripture, the *Avatamsaka Sūtra*. It tells a story about a wonderful net in the heavenly abode of the great god Indra, which has been hung by some cunning artificer in such a manner that it stretches out infinitely in all directions [23]. In each node of the net, the artificer has hung a single glittering jewel and, since the net itself is boundless, the jewels are infinite in number. A closer inspection shows that every single jewel reflects all the other jewels in an infinite reflecting process [23]. Indra's net obviously carries strong symbolism, and it is an attempt at presenting the structure of the universe in all its complexity. First, it has the form of a regular net, with a motif that repeats itself, and this is the way one can imagine something that is infinite. Most probably, this

idea comes again from the metaphor of a tapestry (Hua-yen is a direct Chinese translation of *Avatamsaka* and means 'Flower Ornament'.) Second, the introduction of jewels that reflect each other ad infinitum symbolizes a cosmos in which there is a strong interdependence among all its parts. The whole permeates the part and vice versa; the microcosm reflects the macrocosm. This has an analogy with a hologram, where each part encodes the whole, and it can be related to modern quantum mechanical theories, particularly to those of David Bohm [24, 25]. Also, the Hua-yen school uses this model to explain the notion of 'Emptiness' (Śūnyatā), an important part of Buddhist teachings [23]. If the existence of each part is inseparable from the whole, everything is empty of an independent self-nature.

On the other hand, reflective imagery can be seen as symbolically associated with processes of self-authorization and subject formation. A significant part of the teachings of Jakob Boehme (1575–1624), the German Protestant mystic, concerns Sophia, or the 'divine mirror' [26]. It is through reflection in the divine mirror that the Godhead, initially an undifferentiated Nothing (the Abyss), can reveal Himself and become something, i.e., God or the Divine Trinity. There is an obvious similarity with the jewels in Indra's net, since the Nothing contains both the mirror and the 'image' of its manifested form [26]. Here one can also mention the 'mirror stage' in child development, introduced by Jacques Lacan as a foundational concept of subject formation [27]. Lacan, relying on empirical data, argued that very young children (aged 6 to 18 months) are able to recognize their mirror reflections and identify them as their own images. This identification results in their first sense of 'I' (ego). At the same time, there is an obvious difference between the mirror image, which is whole and coherent, and the child's physical experience. According to Lacan, the ego is formed on the basis of misrecognition, since the subject replaces the true self with an external image. As a result of being founded on an external image, the subject experiences alienation from itself. Later, Lacan also recognized the role of elders and caregivers surrounding the child. He argued that the self is not formed in isolation but through interaction with others. This is where the parable of Indra's net shows, so to say, its symbolic strength. Namely, our brains are specifically wired to enable our minds to share actions and emotions. There is a class of brain cells that fire both when we perform a certain action and when we observe others performing the same action [28]. These are the so-called mirror neurons, through which we understand others—their behavior, intentions, and emotions. Mirror neurons were discovered accidentally in macaque monkeys, when researchers at the University of Parma, led by Giacomo Rizzolatti, noticed that the same neurons were activated when a monkey grasped a peanut and when it watched a researcher grasp the peanut [28]. This mirroring activity strongly resembles the mutual reflection of the jewels in Indra's net. Nature was clearly capable of adopting network principles long before we were able to conceptualize them or even anticipate them through mythological imagery. As mentioned above, Watts and Strogatz found a small-world structure in neural networks, which enables fast interaction between physically distinct neurons due to the short path length between them [10]. At the same time, our ability to empathize with others is enabled via mirror neurons, with

empathy being a necessary condition for building a society. Below, I will show that these same principles are used in present-day electronic communications in a specific type of network called peer-to-peer (P2P) and mesh networks.

A peer-to-peer (P2P) network is a decentralized computing model in which each peer (node) is an equal participant and can both consume and provide resources (data, processing power, bandwidth) [29]. Basically, each peer can act as both a client and a server. Peers can directly share resources with one another without the need for a central coordinating server, which is analogous to the mutual reflections of jewels in Indra's net. This kind of architecture is behind file-sharing apps such as BitTorrent and blockchain technologies (Bitcoin and other cryptocurrencies). P2P networks are self-organized and global; the nodes can spontaneously join or leave the network. They are an application model and use the already existing infrastructure, i.e., the internet. However, there are also physical networks that are based on similar decentralization principles. These are mesh networks, which provide a resilient alternative to traditional network infrastructures [30]. In mesh networks, nodes may act as routers and relays, and data can travel through multiple paths. This significantly improves reliability; in the case when one connection fails, data can automatically be rerouted through other nodes. Mesh networks are often modeled as random geometric graphs, where edges are formed if nodes lie within a certain distance, *r*. A mesh network is *k*-connected if at least *k* independent paths exist between any two nodes. This property determines its fault tolerance. Due to their resilience and fault tolerance, mesh networks are commonly used in wireless systems such as community WiFi, smart homes, and IoT deployments. Being a web-like physical network, one can run a P2P architecture on a mesh network but not *vice versa*. Nevertheless, they both, on a lower scale, resemble the structure of Indra's net and operate on similar basic principles.

5. Multiplex networks

Most real networks are not formed as isolated systems; typically, they are networks of networks, such as transportation networks (roads, railways, flight corridors), energy-supply networks (gas, electric power), etc. [31]. Furthermore, some entities can interact in several different ways, i.e., they can participate in different networks at the same time. They form a multiplex network, in which the same set of nodes belongs to several layers, each representing a different type of connection. For instance, individuals can be connected by friendship, work, and e-mail communication, while proteins can interact through regulation, physical binding, or metabolic pathways. The multiplex network is characterized by intra-layer edges (links) within a particular layer and inter-layer edges between the copies of the same node existing in different layers (called overlap) [31]. The key difference between multiplex and single-layer networks is that a node can be well connected in one layer while isolated in another. Also, the degree of a node is not a number, as in a single-layer network, but a vector. Ginestra Bianconi [31] was able to apply statistical mechanics tools to multiplex networks as well, just as she earlier did in the case of Bose–Einstein condensation in scale-free networks [20].

It was shown that it is possible to define microcanonical and canonical ensembles in these systems and to quantify their entropy (the amount of structural randomness in the multiplex). Special attention is paid to overlap, which carries information about structural correlations between the layers. The degree of layer interdependence is reflected in the overall properties of the system, since processes that occur in one layer can trigger or suppress activity in another.

Mythological models often appear to have a hierarchical, i.e., layered structure. The most typical is the Chinese celestial (immortal) bureaucracy in Daoism, which, basically, follows the same governing pattern established on Earth, with the highest god of Heaven, the Jade Emperor, at its apex [32]. The Dao remains the transcendent, unstructured source of the entire system. This model, however, does not fit the multiplex network architecture, since each bureaucratic layer comprised different constituents, with very few horizontal links between them. A multiplex network organization can be recognized, I believe, in the Kabbalistic Tree of Life (Etz Chaim in Hebrew). As in other cosmological models, its primary purpose is to explain the problem of creation [33, 34]. It is a dynamic myth, unifying theogony, cosmogony, and cosmology into one model [34]. According to Gershom Scholem, a leading authority in this field, the early Kabbalists of Provence and Spain, in their attempts to express the unknowable aspect of the Divine, coined the term Ein Sof (‘Infinite’). Ein Sof is viewed as absolute perfection, in which there are no distinctions or differentiations, and it is not accessible even to the innermost contemplative thought [33]. The existence of Ein Sof, as the first infinite cause, can only be deduced through the actual existence of creation and the finite nature of created things. The process of contraction through which the divine light descends from Ein Sof is called emanation. This activity, occurring within God Himself, produces ten hypostases, or ten divine powers, which were known in later kabbalistic writings as the ten Sefirot [34]. Most writings concerning Jewish mysticism are specifically focused on the emergence of the ten Sefirot from the hidden divine realm and the emanation of the divine system that creates and governs the world [34]. The Sefirot are usually presented in the following order [33]: 1) Keter (‘supreme crown’), 2) Hokhmah (‘wisdom’), 3) Binah (‘intelligence’), 4) Gedullah (‘greatness’) or Hesed (‘love’), 5) Gevurah (‘power’ / ‘judgment’), 6) Tiferet (‘beauty’ / ‘harmony’), 7) Nezah (‘lasting endurance’), 8) Hod (‘majesty’), 9) Zaddik (‘righteous one’) or Yesod Olam (‘foundation of the world’), and 10) Malkhut (‘kingdom’) or Atarah (‘diadem’). The Sefirot are emanated from first to last, from Keter to Malkhut, in successive steps, and the Tree of Life is a diagrammatic presentation of this divine process. In the Tree of Life, the upper nine Sefirot are organized in triangles, layered one above another, with Malkhut below them as a separate Sefirah [33]. They are also arranged in pillars: the central pillar (Keter–Tiferet–Yesod–Malkhut) represents balance and harmony; the right pillar (Hokhmah, Gedullah, and Nezah) represents active, creative, masculine energy; and the left pillar represents receptive and restrictive feminine energy. The Sefirot in the Tree of Life are nodes (schematically presented as circles) connected by 22 paths, which correspond to the 22 letters of the Hebrew alphabet. Presenting all possible aspects of the Sefirot that appear in interpretations of Kabbalah is

beyond the scope of this paper; I will focus now on those parts of the model that can be related to multiplex networks. As the Divine light descends after the primal act, it creates four distinct ontological realms [33]: Atzilut (the World of Emanation), Beriah (the World of Creation—the Throne and the Chariot), Yetzirah (the World of Formation—the World of the Angels), and Assiah (the World of Making—the Terrestrial World). The ten Sefirot are present and active in all four worlds, but not to the same extent, as they become fragmented upon descending into the lower worlds [33, p. 119]. Atzilut contains all ten Sefirot; Beriah primarily contains the lower seven, and so on. The four-layer structure with networked Sefirot, which overlap across certain worlds, clearly has the form of a multiplex network. The principal difference between this and a formal multiplex network lies in the fact that the Sefirot in these worlds are not absolutely identical; nevertheless, certain aspects of each Sefirah are present in all four worlds.

In addition to the emanation, there are also other processes through which the Sefirot can affect each other. Here, we find again the motifs of reflection and mirroring akin to those found in Indra's net. The term Sefirah is closely related to the Hebrew sappir (sapphire), while one of the names used to describe the Sefirot is also marot (mirrors) [33, pp. 99-100]. Scholem contends that the idea that each Sefirah comprises all others in an infinite mutual reflection appears in Kabbalistic texts from the 13th century onward [33, p. 113]. The Sefirot are seen as both a medium for the transference of light from above to below and as mirrors serving to reflect the light back to its source [33, p. 115]. In this way, reflection and mirroring provide powerful symbolism that enables contemplation of the relationship between the whole and its parts, and an understanding of the role of the Sefirot as mediating principles between the infinite and the finite.

6. Epilogue

The present study seeks to show that the human mind, in its attempt to understand and model the cosmos, consistently uses the same cognitive patterns. I began with the **link cognitive scheme** through which we grasp the network paradigm and then followed the profound parallels between the abstract language of formal graph (network) theories and the organizational structures of ancient cosmological systems. This methodology does not reduce myth to mathematics but suggests that they share inherent, often unconscious, design principles, which may explain why mythological narratives contain complex relational structures that mirror formal network theory. Network patterns were likely appealing to ancient peoples because they enabled the representation of concepts that are intuitively difficult to imagine, such as infinity and the relationship between the microcosm and the macrocosm. They experienced the world as hyperconnected and used network motifs they were familiar with (spider webs, tapestries, trees, nets, etc.) to create cosmological models. These models were implicitly built on the link cognitive scheme, and the various network organizations were later simply formalized. On the other hand, formal studies revealed additional phenomena in complex networks, such as Bose–Einstein-like condensation, which provide an additional set of tools for uncovering hidden rules and patterns

within mythological and cosmological systems. It is interesting to note that even concepts of eternal Nothingness, such as the Ungrund (Abyss) of Jakob Boehme or Ein Sof of Kabbalah, have their network-model counterparts. These can be viewed as total networks in which all nodes are maximally connected. Such configurations are associated with states of infinite or zero entropy (these two states are physically indistinguishable), in which nothing happens. In order to observe movement, one has to break at least one link between nodes, and this process is the network analogue of the Big Bang. We must not forget that cultural background may also play a role in the, probably unconscious, selection of a particular type of network structure incorporated into myth. Indra's net was chosen by Buddhists because it reflects their pantheistic experience of the world, while the Jesuit de Chardin imagined the Noosphere as a central hub with Christ at its center. In that sense, examining various cosmological models using the tools of formal network theory offers a neutral framework for cross-cultural study of the mechanisms through which societies construct their symbolic universes. Ultimately, this confluence invites us to consider whether we are discovering universal patterns in narratives, or unconsciously retelling the same ancient network story in every model we construct.

Acknowledgement

I would like to express my gratitude to my colleague and friend Nebojša Škrbić for introducing me to network concepts and formal graph theory more than two decades ago, an early influence that ultimately inspired this work. The study was funded in part by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

References

[1] V. Djoković, *Logos as a Universal Thought Form: Bridging Mythological and Scientific Worldviews*, European Journal of Science and Theology, **21(3)** (2025) 1-14, ISSN 1841-0464

[2] E. Cassirer, *The philosophy of symbolic forms, Volume 3: The phenomenology of knowledge*, Yale University press, New Haven, 1957, 521, ISBN 978-0300000399

[3] G. Lakoff and M. Johnson, *Metaphors we live by*, The University of Chicago Press, 2003, 256, ISBN 978-0226468013

[4] G. Lakoff and R.E. Núñez, *Where mathematics comes from: How the embodied mind brings mathematics into being*, Basic Books, New York, 2000, 512, ISBN 978-0465037711

[5] G. Lakoff and M. Johnson, *Philosophy in the Flesh: The embodied mind and its challenge to western thought*, Basic Books, New York, 1999, 640, ISBN 978-0465056743

[6] M. Johnson, *The body in the mind: The bodily basis of meaning, imagination, and reason*, The University of Chicago Press, 2013, 272, ISBN 978-0226177847

[7] M.E.J. Newman, *The Structure and Function of Complex Networks*, SIAM Review **45** (2003) 167-256, doi: 10.1137/S003614450342480

[8] P. Erdős and A. Rényi, *On random graphs. I.*, Publicationes Mathematicae Debrecen, **6(3-4)** (1959) 290-297, doi: 10.5486/pmd.1959.6.3-4.12

[9] E.N. Gilbert, *Random Graphs*, Annals of Mathematical Statistics, **30(4)** (1959) 1141-1144, doi: 10.1214/aoms/1177706098

[10] D.J. Watts and S.H. Strogatz, *Collective dynamics of 'small-world' networks*, Nature, **393** (1998) 440-442, doi: /10.1038/30918

[11] S. Milgram, *The Small World Problem*, Psychology Today, **1(1)** (1967) 61-67, doi: 10.1037/e400002009-005

[12] J. Travers and S. Milgram, *An experimental study of the small world problem*, Sociometry, **32(4)** (1969) 425-443, doi: 10.2307/2786545

[13] F. Karinthy, *Chain-Links*, in *Everything is Different,* 1929, accessed online in 2026 at https://djjr-courses.wdfiles.com/local--files/soc180%3Akarinthy-chain-links/Karinthy-Chain-Links_1929.pdf

[14] R.G.A. Buxton, *The Complete World of Greek Mythology*, Thames & Hudson, London, 2004, 240, ISBN 978-0500251218

[15] J. Lindow, *Norse mythology: A guide to gods, heroes, rituals, and beliefs*, Oxford University Press, Oxford, 2002, 384, ISBN 978-0195153828

[16] M. Rappenglueck, *Cosmic spinning and weaving: Making the texture of the world*, 161-171, in *Archaeoastronomy in archaeology and ethnography*, E. Pasztor (ed.), British Archeological Report, Oxford, 2007, 179, ISBN 978-1407300818

[17] R.D. Pelton, *The Trickster in West Africa: A study of mythic irony and sacred delight*, University of California Press, Oakland, 1989, 324, ISBN 978-0520067912

[18] C. Lévi-Strauss, *The Structural Study of Myth*, The Journal of American Folklore, **68(270)** (1955) 428–444, doi: 10.2307/536768

[19] A.-L. Barabási and R. Albert, *Emergence of Scaling in Random Networks*, Science, **286(5439)** (1999) 509–512, doi: 10.1126/science.286.5439.50

[20] G. Bianconi and A.-L. Barabási, *Bose-Einstein Condensation in Complex Networks*, Physical Review Letters, **86** (2001) 5632 doi: 10.1103/PhysRevLett.86.5632

[21] B. Gupta and W. C. Wilcox, *"Tat tvam asi": An Important Identity Statement or a Mere Tautology*, Philosophy East and West, **34(1)** (1984) 85-94, doi: 10.2307/1398491

[22] P.T. de Chardin, *Christianity and Evolution*, Harcourt Brace Jovanovich, Orlando, 2002, 264, ISBN 978-0156028189

[23] F.H. Cook, *Hua-yen Buddhism*: *The Jewel Net of Indra*, Pennsylvania State University Press, University Park, 1977, 164, ISBN 978-0271021904

[24] D. Bohm, *Wholeness and the implicate order*, Ark Paperbacks, London, 1983, 240, ISBN 978-0744800005

[25] D. Bohm and B.J. Hiley, *The Undivided Universe, An ontological interpretation of quantum theory*, Routledge London, 1995, 397, ISBN 978-0415121859

[26] H. Grunsky, *Jacob Boehme*, Frommanns Verlag, Stuttgart, 1956, 348, ISBN 978-3772806544

[27] A. Johnston, *Jacques Lacan*, in *The Stanford Encyclopedia of Philosophy*, E.N. Zalta and U. Nodelman (eds.), accessed online in 2026 at https://plato.stanford.edu/archives/sum2024/entries/lacan/

[28] G. Rizzolatti and C. Sinigaglia, *Mirrors in the Brain - How Our Minds Share Actions and Emotions*, Oxford University Press, Oxford, 2008, 256, ISBN 978-1782326229

[29] S. Androutsellis-Theotokis and D. Spinellis, *A survey of peer-to-peer content distribution technologies*, ACM Computing Surveys (CSUR), **36(4)** (2004) 335-371, doi: 10.1145/1041680.1041681

[30] I.F. Akyildiz, X. Wang and W. Wang, *Wireless mesh networks: a survey*, Computer Networks, **47(4)** (2005) 445-487, doi: 10.1016/j.comnet.2004.12.001
[31] G. Bianconi, *Statistical mechanics of multiplex networks: Entropy and overlap*, Physical Review E, **87** (2013) 062806, doi: 10.1103/PhysRevE.87.062806
[32] S.F. Teiser, *The Spirits of Chinese Religion*, 3-37, in *Religions of China in Practice*, D.S. Lopez Jr. (ed.), Princeton University Press, Princeton, 1996, 472, ISBN 978-0691021430
[33] G. Scholem, *Kabbalah*, Keter Publishing House, Jerusalem, 1977, 492, ISBN 978-0706513585
[34] J. Dan, *Kabbalah - A Very Short Introduction*, Oxford University Press, Oxford, 2007, 144, ISBN 978-0195327052