

Between the Discrete and the Infinite: Attention and Latent Space Metaphors in Borges and Calvino



Metaphors surrounding artificial intelligence increasingly inform contemporary discussions on the topic, shaping both technical conceptualizations and cultural narratives. This paper explores literary metaphors by Jorge Luis Borges and Italo Calvino, arguing that their narratives offer critical conceptual frameworks for understanding deep learning's representational structures. Drawing on five emblematic metaphors from Borges and Calvino—the Aleph (dimensional compression), the Library of Babel (combinatorial archive), the Chessboard (rule-based combination), the Atlas (emergent potential), and the Garden of Forking Paths (branching potentiality), this paper suggests that these literary metaphors reflect key phenomena within latent spaces and attention modules, such as the reduction of knowledge in one abstract point, dimensionality, and the combinatorial or potential logic. By aligning literary analysis with computational architectures, this paper highlights the significance of literary imagination in articulating deep learning's capabilities and limitations, challenging simplified or anthropomorphic interpretations.*

1. Introduction

“The catalogue of forms is endless: until every shape has found its city, new cities will continue to be born.” Calvino, Italo. *Le città invisibili*, 1978

“The Library is total and its shelves record all possible combinations of the twenty-odd orthographic symbols” Jorge Luis Borges, *La Biblioteca de Babel*, 1954

The rapid proliferation of AI technologies has brought concepts like latent space and attention mechanisms to the forefront of technical and theoretical discussions. Melanie Mitchell observes that “metaphors are all we have for the moment to circle the black box” (Mitchell 2024). Indeed, from “neural networks” to “machine learning”, metaphors are indispensable tools for grasping AI concepts. These metaphors, from stochastic parrots to agentic terms, reveal the scientific,

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political and cultural landscape of how we are trying to conceive artificial intelligence. Anthropomorphic and epistemic attributes sneak into AI discourse with human-like attributes, directing their interpretation, operationalization, design and deployment.¹ Yet, common metaphors can also oversimplify or anthropomorphize, potentially obscuring the underlying mechanisms and their societal implications.

This paper argues that a selection of literary metaphors from 20th-century authors Jorge Luis Borges and Italo Calvino (the Aleph, the Library, the Chessboard, the Garden and the Atlas) offer valuable tools for understanding and critically engaging with these computational concepts. Following Lakoff and Johnson's (1980) premise that metaphors structure our understanding, we use literary examples not merely as illustrations, but as conceptual lenses. Borges and Calvino, writing amidst the nascent ideas of cybernetics, explored themes of infinity, combinatorics, and the nature of reality in ways that resonate strikingly with current AI paradigms. Their works, often moving beyond realism, be it scientific à la Zola or even promethean à la Shaw (Greiner 1979, 45), use the material world as a catapult to immerse the reader into the fantastic. The fantastic here is not a mere escape from the material world but a vehicle to uncover the structure of possibility (possible aspects of reality in fiction). As readers, we are encouraged to explore multiple interpretations of an observed reality evolving through the fantastic. From a universe contained in a single point in *The Aleph* to the combinatorial notion of the universe seen as a library, this metaphorical fascination to understand an expanding world and reality is not merely Borgesian, we see it also in Calvino's *Invisible Cities*, where cities are merely possible combinations.

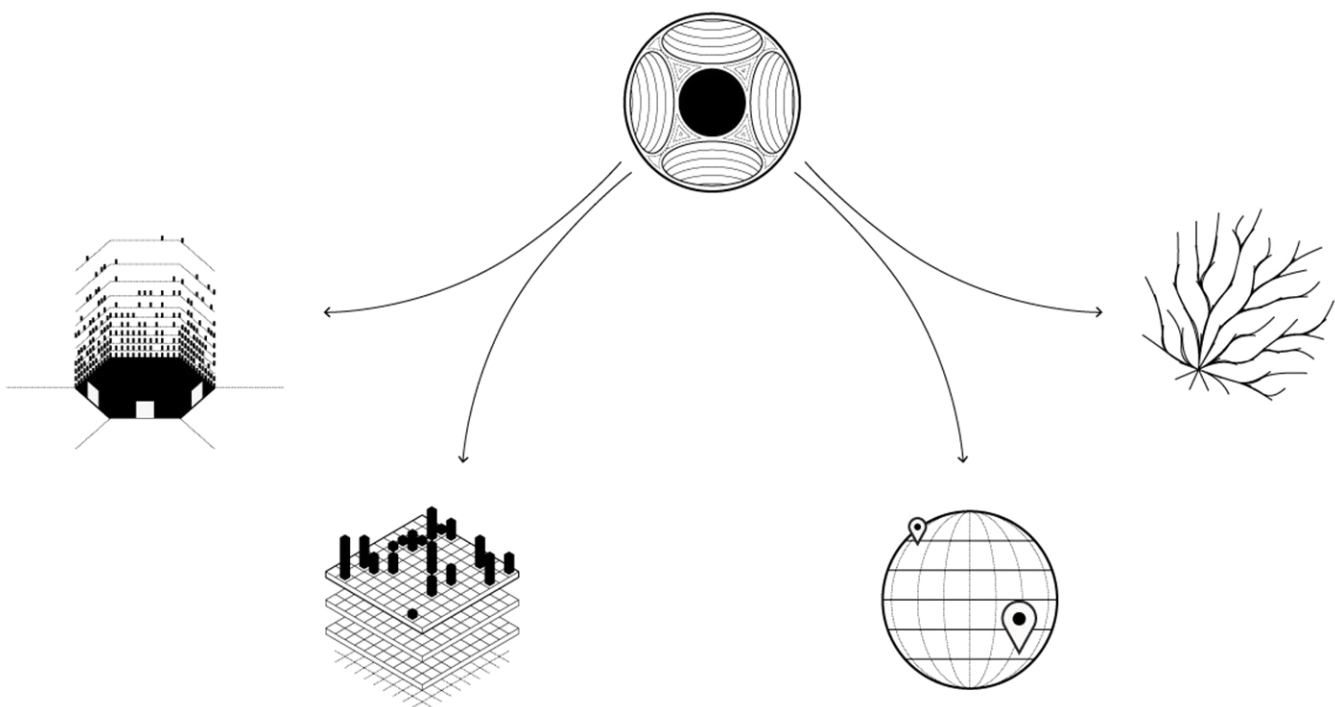
While previous work has noted connections between Borges and AI (Bottou and Schölkopf 2023), this paper focuses specifically on how a selection of their metaphors illuminates the tension and interplay between *discrete, combinatorial* systems (attention mechanisms) and *continuous, generative* spaces (latent representations). We analyze five key metaphors selected for their distinct embodiment of this tension: Aleph (total compression) Garden of Forking Paths (concurrent potentiality), Library of Babel (combinatorial archive), Chessboard (rule-based combination), and Atlas (emergent forms from a potential field). The first literary metaphors in the essay concern world-building. The following metaphors explore a bifurcation of this world: the first presents a discrete universe of combinations of existing elements, and the second conveys a continuous world of potentialities.

By examining these literary metaphors and mapping them onto the concepts of latent space and attention, we aim to develop a richer

understanding of how AI models structure information and generate novelty. This comparative approach allows us to appreciate the capabilities of these systems while critically interrogating the limits, illusions, and biases inherent in their models of possibility. The paper proceeds by detailing each literary metaphor, then connecting these concepts to their AI counterparts, culminating in a discussion of the insights and critical perspectives offered by this juxtaposition.

2. Metaphors

We propose a selection of five metaphors from Borges and Calvino which help illustrate five substantial and distinct modes of grappling with the structure of reality and the universe of possibilities, oscillating between combinatorial logic and continuous potential.



2.1. The Aleph: Compressing Totality in a point of maximum density – or Dimensional Compression

Borges’ concept of the Aleph as a point in space that contains all other points, has been studied also in literary terms (González Echevarría 1990, Manguel 1996), in mathematics and physics (Rucker 1984, Bohm 1980) and in computational perspectives (Deutsch 1997).

“El Aleph” (1949) is concerned with a radical perception of the compression of possibility: a single point containing all points. The story’s central narrative suggests a world where totality exists in simultaneity, where the infinite is made finite without losing information. This concept aligns with Borges’ broader narrative interests in infinity, labyrinthine structures, and the limitations of human perception and language. From a technical perspective, the Aleph works as metaphor

Fig. 1. Metaphors of the latent space. Starting from the top where the Aleph demonstrates the compression of reality to a point, on the left, the combinatorial discrete metaphors of library and chessboard appear. On the right, we present the continuous metaphors of the atlas and the forking paths.

for dimensionality reduction and embedding spaces in modern machine learning. As, for instance, Mikolov et al. (2013) demonstrated with Word2Vec, complex semantic relationships can be compressed into dense vector representations where proximity stands or corresponds for meaning.

The Aleph starts with a narrator, who we later find out is the same Borges, visiting the family house of the late Beatriz Viterbo, a woman whom he loved deeply. We learn about this love through his several descriptions of his visits: in 1933 it rained profusely, in 1934 he presented himself with traditional Argentinian alfajores, and so on. It is in one of these visits that he meets Carlos Argentino Daneri, Viterbo's first cousin, described by the narrator as a mediocre poet, but the one who introduces the narrator to the Aleph residing in his parents' house, scheduled to be demolished: "In one corner of the cellar there was an Aleph. He explained that an Aleph is one of the points in space that contains all points". (Borges 1954, 635) The narrator, still believing Daneri to be insane, promptly proposes to see it immediately. Once the narrator is situated at the right spot in the basement in the darkness, he is able to see it: "I closed my eyes, then opened them. It was then that I saw the Aleph" (Borges 1954, 639).

The reader is then presented with a description that reveals a world where "(I) saw the Aleph from everywhere at once, saw the earth in the Aleph, and the Aleph once more in the earth and the earth in the Aleph," (Borges 1954, 643). This recursive vision suggests the reader not merely a vessel for all things, but a place where each part contains the whole. We could say that it presents a reality where locality and universality share the same space and become almost the same. The narrator's struggle to communicate what he sees in The Aleph shows a tension between reality, language and memory, and the way this last two can only convey so much: "I come now to the ineffable center of my tale; it is here that a writer's hopelessness begins. Every language is an alphabet of symbols the employment of which assumes a past shared by its interlocutors. How can one transmit to others the infinite Aleph, which my timorous memory can scarcely contain?" (Borges 1954, 640).

Nonetheless, the narrator tries to recreate with words what he sees: "The Aleph was probably two or three centimeters in diameter, but universal space was contained inside it, with no diminution in size. Each thing (the glass surface of a mirror, let us say) was infinite things, because I could clearly see it from every point in the cosmos" (Borges 1954, 641). He sees everything: "(I) saw all the mirrors on the planet (and none of them reflecting me)" (Borges 1954, 641). It rep-

resents an ultimate compression of the infinite into the finite, a recursive structure where each part contains the whole, challenging the limits of perception and language. The narrator struggles to describe this “ineffable center,” highlighting the gap between holistic experience and linear language. This metaphor embodies the fantasy of total knowledge contained within a single, finite point, and echoes or resembles dimensionality reduction and vector embedding spaces in modern ML. Just as the Aleph contains “all the mirrors on the planet” while occupying merely “two or three centimeters in diameter,” the bottleneck layer in variational autoencoders compress high-dimensional image data into compact latent representations without losing essential information (Kingma and Welling 2013). This information compression is particularly evident in multimodal embedding models like CLIP (Radford et al. 2021), which unifies visual and textual modalities in a shared latent space, allowing the model to “see” connections across different forms of data.

2.2. The Library (of Babel)

Borges’ “La Biblioteca de Babel” (1944) has inspired extensive scholarly analysis across disciplines, from literary theory (Rodríguez Monegal 1978, Blanchot 1993, Eco 1995, Foucault 1966, among others) to mathematics (Bloch 2008, Rucker 1982, Dennet 1995) and computer science (Chaitin 2002, Lasswitz 2013, Dennet 2013). This metaphor of a universe composed of hexagonal galleries containing all possible books has proven particularly generative for computational thought.

“La Biblioteca de Babel” (1944) seems to present two worlds in one story. First, the idea of an infinite variation (the library) that starts with a limited set of elements (the books) and the idea of being lost in the whole world. The reader is presented with a description of this library as a universe and being lost in a book, in a combination of books, in the library, and in a way in the universe. The Library’s architecture, opening the text, is presented as the main framework in the story. The narrator opens up the text by defining the Library as “The universe (which others call the Library) is composed of an indefinite, perhaps infinite number of hexagonal galleries” (Borges 1954, 252). Borges further elaborates on the contents of these galleries, creating an evocative impression of this metaphorical world:

Twenty bookshelves, five to each side, line four of the hexagon's six sides; the height of the bookshelves, floor to ceiling, is hardly greater than the height of a normal librarian. One of the hexagon's free sides opens onto a narrow sort of vestibule, which in turn opens onto another gallery, identical to the first— identical in fact to all. To the left and right of the vestibule are two tiny compartments. One is for sleeping, upright; the other, for satisfying one's physical necessities. Through this space, too, there passes a spiral staircase, which winds upward and downward into the remotest distance. In the vestibule there is a mirror, which faithfully duplicates appearances. (Borges 1954, 252)

In an interview with Georges Charbonnier in 1965, Borges acknowledged the two central ideas in the story: the “possibility of almost infinite variation beginning with a limited number of elements” and “the idea of being lost in the universe, of not understanding it” (Greiner 1979, 45). The author makes sure to emphasize the Library's completeness and its infinity nature: “The Library is “total” – perfect, complete and whole – and that its bookshelves contain all possible combinations of the twenty-odd orthographic symbols (a number which though unimaginably vast, is not infinite) – that is, all that is able to be expressed in every language” (Borges 1954, 259). The story concludes when the narrator establishes that the Library is unlimited and periodic, creating in the reader not only a sense of infinitude but of repetition and order:

I have just written the word “infinite.” I have not included that adjective out of mere rhetorical habit; I hereby state that it is not illogical to think that the world is infinite. Those who believe it to have limits hypothesize that in some remote place or places the corridors and staircases and hexagons may, inconceivably, end—which is absurd. And yet those who picture the world as unlimited forget that the number of possible books is not. I will be bold enough to suggest this solution to the ancient problem: The Library is unlimited but periodic. If an eternal traveler should journey in any direction, he would find after untold centuries that the same volumes are repeated in the same disorder—which, repeated, becomes order: the Order. My solitude is cheered by that elegant hope. (Borges 1954, 268)

2.3. The Chessboard

Calvino's chessboard metaphor from “Invisible Cities” is a foundational metaphor where the board becomes a “model of combina-

torial reasoning”, a discrete space where meaning arises from the rule-bound arrangement of symbolic pieces. It has been analyzed primarily in terms of its combinatorial and rule-based aspects, the “the tension between the visual and the verbal” (Ricci 2001), as a precursor to hypertextual and procedural literature (Aarseth 1997). The author’s broader engagement with scientific concepts, particularly cybernetics and information theory (Pilz 2003) and how its system of “constrained combinations” resembles attention mechanism in machine learning (Mitchell 2024).

Calvino’s “Invisible Cities” (1978) narrates an imagined dialogue between the Mongol emperor Kublai Khan and Marco Polo, a Venetian merchant. Every evening, in the gardens of the imperial palace Xanadu, Marco Polo describes to the Great Khan the cities of his empire. The narration progresses as an inward journey into understanding the patterns and underlying logic of the cities of the empire. At the heart of the book lies a tension between two opposing forces. Kublai Khan embodies a modernist desire for order and system – a cartographic impulse to grasp the empire in its totality. Polo, in contrast, represents an errant counterforce: his stories refuse stable meaning, instead emphasizing fragmentation, exception, and plurality. This dialectic – between structure and singularity, system and deviation – has been widely explored in Calvino criticism (Cannon 1991, Pilz 2003, Panigrahi 2018). Pilz (2003, 229-242) describes Calvino’s attitude as simultaneously a force seeking a global structure in the labyrinth and one fascinated by the same labyrinth. Following Umberto Eco’s (1984, 7-12) distinction of the three types of labyrinths into the linear, the maze, and the net, Calvino’s attitude stands in between the multicursal, tree-like maze of modernity and the Deleuze and Guattari’s rhizome (1987). The visual metaphor of a chessboard, introduced in the penultimate chapter of the book, shows this hybrid process:

Marco Polo, mute informant, spread out on [the majolica floor] the samples of the wares he had brought back from his journeys to the ends of the empire: a helmet, a seashell, a coconut, a fan. Arranging the objects in a certain order on the black and white tiles, and occasionally shifting them with studied moves, the ambassador tried to depict for the monarch’s eyes the vicissitudes of his travels, the conditions of the empire, the prerogatives of the distant provincial seats. (Calvino 1978, 121)

Here, the chessboard becomes more than a stage for storytelling, it is a model of combinatorial reasoning. Wilson (1992, 91) defines the

chessboard as the “emblem of cities that emphasizes patterns and space”. The chessboard formalizes the cities into black-and-white discrete combinations of entities. The space of a city deconstructs into a mental space, – akin to Baudrillard’s oneiric space (1988) – in which the mind can create by decomposing the elements and recombining them. Using metaphoric wares found during his travels and arranging them in a particular combination, the merchant can describe the cities in the empire. In this passage, Calvino, similarly to “Castello dei Destini Incrociati” (1973), uses visual props – in the former case, tarot cards, in this case, wares from the travels – as visual concepts for combination. In “Cibernetica e Fantasmì” (1995, 8), Calvino advocates for the possibility of understanding language through dismantling and reassembling words. In this passage, the entity is more complex; instead of combining words, meaning is created through a combination of visual symbols.

After contemplating the chessboard, Khan realizes that not every arrangement is possible but that, playing by the rules, one could create countless combinations. The discrete space of combinations of the chessboard, albeit unsatisfactory, is revealed to be a creative structure. Its limits serve as the constraints that stimulate creativity, reminiscent of the theoretical investigations by the experimental literary group Oulipo, of which Calvino was a part for some time. Using constraints to stimulate creativity – in this case, the rules of chess – elements of reality can be recombined to create the inexistent, whereby even a few combinations – as in the chess pieces – can be recombined in near-infinite realities. In the same spirit, Raymond Queneau, one of the founders of Oulipo, in the book “Cent Mille Millions de Poèmes” (1961), features 10 poems of 14 lines cut at every line. The reader can choose a combination of the 10 poems and 14 lines to read; these combinations total 10^{14} possible poems.

2.4. The Atlas

The metaphor of the Atlas has attracted research from multiple disciplines. Authors like Vrbančić (2012) have identified it as a comment on the unattainable “dream of the perfect map” and the limits of representation, contrasting cartographic reason with postmodern disorientation. Others like Rita Wilson (1992) used it in urban theory to explore how cities are perceived and experienced, shaped by memory and narrative beyond physical structure.

It is in the last chapter of “Città invisibili,” Calvino presents the book’s final metaphor: Kublai Khan’s atlas.

The Great Khan owns an atlas where all the cities of the empire and the neighboring realms are drawn, building by building and street by street, with walls, rivers, bridges, harbors, cliffs [...] The atlas depicts cities which neither Marco nor the geographers know exist or where they are, though they cannot be missing among the forms of possible cities [...] The atlas has these qualities: it reveals the form of cities that do not yet have a form or a name. (Calvino 1978, 135-138)

At first glance, the atlas seems to fulfil the emperor's modernist dream: to contain the empire within a single, exhaustive object. Ryan (2016, 222–237) interprets the atlas as a hegemonic metaphor for Kublai Khan's desire for control. As the Mongol emperor, Khan is comforted by the possibility of reducing his whole reign to one object. This almost magical object is reminiscent of an encyclopaedia of spatial knowledge, in accordance with Calvino's appreciation of the Enlightenment (Pilz 2003). At first a hegemonic, non-expandable cartographic terrain, the metaphor suddenly opens possibilities for transgression (Ryan 2016). It contains not only all the cities that have existed and exist, but all the possible cities, as every form can reveal a city. Wilson (1992, 91) defines it as the metaphor "emblem of other patterns and worlds". As Calvino attempts to offer a memory structure, the fluidity of the cities escapes any possible hegemony overthought.

Unlike the previous metaphors, no stable entities exist for the forms composing the cities. The combinatorial reality is not comprised of parts but instead of a state of flow. Calvino abandons structural closure in favor of infinite generativity. The city is no longer an object but a process, a constellation of flows, temporalities, and potential arrangements. The shift from chessboard to atlas marks a critical movement in the book: from the finite to the infinite, from constraint-based recombination to endless potentiality ("The catalog of forms is endless: until every shape has found its city, new cities will continue to be born," Calvino 1978, 138).

2.5. The Garden (of Forking Paths) or the Labyrinth

In "El jardín de senderos que se bifurcan" (1941) ("The Garden of Forking Paths"), Borges introduces a spatialized structure that represents the complex nature of time, choices, and potentiality. This metaphor captures the fundamental idea of branching trajectories that are divergent yet co-existing narratives and outcomes, and which are central to literary as well as to computational explorations of complexity.

Recent labyrinth theory (Kern 2000, Hennig 2015) offers insights into how the figure of the labyrinth functions not just as a narrative device, but as a semantic structure that actively organizes experience, disorients and reorients, and compresses and expands temporal and spatial dimensions. Hennig emphasizes labyrinths as semantic spatialities that work as topologies of meaning where the navigation becomes an interpretative act. In this light, Borges' garden as a metaphor for multiplicity can be seen as a semantic topology which echoes latent space. Each decision, each sampling operation whether in a diffusion model (Ho et al. 2020, Song et al. 2021) or reinforcement learning (Silver et al. 2018) unfolds a new branch of potentials or possible states. In diffusion models, each generated image is a trajectory through a noise saturated space towards a possible that is instantiated, and where all the possible trajectories starting from the initial noise are contained in that initial point.

Moreover, labyrinths in literature act often as epistemological devices reflecting tensions between: 1) totality and disorientation, as in Danielewski's "House of Leaves" (2000), where the house is a constantly shifting physical impossibility that functions as an unmappable and generative spatial latent manifold), 2) structure and opacity, as in Dürrenmatt's "Minotaurus" (1985), where the minotaur is trapped in a mirror maze that reflects many images of itself where it cannot recognize itself; and 3) knowledge and its limits, as in Lovecraft's "The Festival" (1925) where architecture of the unknown becomes a pathway to knowledge, but at the cost of madness.

In Borges' work, the labyrinth garden is framed by the encounter of Yu Tsun and Stephen Albert, which is also framed by a spy story, forming a story-within-a-story-within-a-story. Borges tells to Charbonnier: "I think that the two ideas are behind its origin: the idea of the labyrinth, which has always haunted me, and of the world as a labyrinth, and also the idea of a man who kills a stranger to attract someone else's attention to himself ... I believe that what is more important than the detective story is the idea, the presence, of the labyrinth, and after that of a lost labyrinth. I amuse myself with the idea, not of losing oneself in a labyrinth, but in a labyrinth which also loses itself" (Greiner 1979, 45). The garden then serves as a structure for understanding the universe, as the narrator writes, "The garden of forking paths is an incomplete, but not false, image of the universe" (Borges 1954, 290). This concept of branching paths can be seen as an exploration of the difficulty of decision-making and the multiple directions that stem from each choice we make, of finding a path and, at the same time, being lost in another.

The narrator continues to elaborate this idea by contrasting it with a traditional, linear understanding of time: “Unlike Newton and Schopenhauer, your ancestor did not believe in a uniform, absolute time; he believed in infinite series of times, a growing, dizzying web of divergent, convergent, and parallel times” (Borges 1954, 290). Borges gives us a complex understanding of time, where multiple paths and possibilities can coexist and intersect, creating layers of potential trajectories and outcomes.

Throughout the story, the narrator emphasizes the concept of multiple trajectories and the simultaneous existence of various potentialities. He writes, “in all fictions, each time a man meets diverse alternatives, he chooses one and eliminates the others; in the work of Ts’ui Pên, the character chooses – simultaneously – all of them” (Borges 1954, 286). This idea challenges the notion of singular, linear narratives and instead presents the reader with a world where all possibilities are happening at the same time. Borges further explores the implications of this multifaceted understanding of time and existence: “we do not exist (in the same time); in some, you exist but I do not; in others, I do and you do not; in others still, we both do” (Borges 1954, 290).

Despite the labyrinthine nature of the garden and the endless possibilities it seems to represent, Borges suggests that there are moments of convergence: “Once in a while, the paths of that labyrinth converge” (Borges 1954, 286). Thus, the reader is presented with the idea that there are points where different trajectories intersect and align, creating spaces of multiple moments of unity and coherence.

3. Attention Module and Latent Space

Stimulated by a fascination for the possibilities surrounding reality, all the metaphors introduced begin from the key assumption that the world of possibilities can be stored and structured in a finite object: Aleph’s point, a library, a chessboard, an atlas, a garden. The structure can be achieved in two ways: it can stem from the near-infinite combination of discrete entities, i.e., books in a library, parts of a book, chess plays, or it can be continuous, a space of potentiality, where every form can become a city, and every trajectory can be traversed. In this section, we suggest that these modalities are relevant to date as they mirror the most widespread structures to represent information in deep learning models. We claim that they loosely reflect on the one hand, the combinatorics of attention modules and, on the other, the continuity of the latent space. In this section, we walk through the latent space and attention module and discuss how these metaphors contribute to their understanding and mental images.

Due to the visual nature of the metaphors and the richness of their symbolic registers, we focus on generative vision models and their internal representations. In computer vision, the latent space refers to the part of the model where information is most compressed and semantically organized. In discriminative models, such as convolutional neural networks like ResNet (He et al. 2016) or EfficientNet (Tan and Le 2019), it is typically the space formed by the activations at the final layers before classification, those layers where the model distills complex perceptual data into minimal semantic representations. In generative architectures, the latent space takes on a more explicit role: in variational autoencoders (VAEs) (Kingma and Welling 2013), it is the bottleneck through which the input is encoded before being reconstructed; in StyleGANs (Karras et al. 2019), it becomes the starting point from which high-resolution and controllable images are synthesized.

Generative Adversarial Networks (GANs), autoencoders, and related models all share this principle: a compressed, abstract space from which images are uniquely derived. The position within this space (almost) fully determines the generated output. A point in this space can be manipulated and interpolated, and small changes in its coordinates can produce smooth and semantically meaningful transformations in the generated image. This space is often understood as continuous, multidimensional, and semantically rich, a geometry of meaning that reflects not the world as it is but the world the model has seen. Schaerf (2024) describes them as spaces that fill the gap between what exists and what could exist in between: the potential. Concurrently, Meyer (2023) equates them to an archive: a structure that organizes knowledge univocally and efficiently.

While this continuity is an illusion – since a model is a discrete entity on a discrete computing machine – the created representations can be continuously explored following infinite trajectories. Because of its complexities and affordances, this entity is often misunderstood and overhyped. The metaphors introduced above can help understand and situate the nature and expectations of this space.

Borges' Aleph conceptualized the possibility of infinite knowledge condensed into a single geometric point. In latent spaces, the visual, linguistic, and semantic information from billions of training data is compressed into a point that lacks physical extension but holds an extraordinary representational capacity. The Library of Babel offers a parallel: an archive of all possible books, where the real and the inexistent books are organized in the same formal structure. Likewise, the latent space encodes not only what is real, but what could be real.

Like a game of chess, its formation follows discrete steps across layers – through each layer’s weights – a sequence of contingent moves that ultimately determines where the input will be placed within the latent topology.

The Atlas metaphor serves as a poetic analogy for this structure. Kublai Khan’s atlas maps not only what exists but what might exist – forms awaiting instantiation, cities without names. Similarly, in the latent space, every point can be decoded into a visual form, even if that form has never been seen before. The space becomes a cartography of potential, where each direction signifies a journey that might be taken but has not yet occurred. The Garden of Forking Paths captures the final illusion of the latent space: that all these paths can coexist, that all these realities might simultaneously unfold. Nevertheless, as Borges reminds us, “The garden of forking paths is an incomplete, but not false, image of the universe” (Borges 1954, 290). The latent space, too, is always a partial view, a simulation of possibility constrained by what was seen, selected, and counted.

No latent space, however seamless, can represent the world’s fullness. As models are trained on selective, biased, or censored datasets, so too are their spaces of representation partial, skewed, and incomplete. The latent space acts as a lens, reflecting not of an objective truth, but a filtered reality shaped by its training data. In this way, the data echoes Venice in *Le città invisibili*: always present behind Polo’s imagined cities, constantly shaping what can be told, even if never mentioned directly. Just as the reader in Babel’s library is also its author, the latent space reflects the gaze of its creator, even as it pretends to transcend it.

Contemporary generative vision models such as diffusion models – Stable Diffusion (Rombach et al. 2022), DALL·E 2 (Ramesh et al. 2022), and Imagen (Saharia et al. 2022) –, or visual autoregressive models – DALL·E 1 (Ramesh et al. 2021), VQ-VAE-2 (Razavi et al. 2019), and ImageGPT (Chen et al. 2020), – move away from a single high-level latent vector representation. Diffusion models are built around iterative, non-compressed, non-continuous generation pipelines, such as diffusion processes, which begin with pure noise and progressively denoise toward a coherent image. Similarly, visual autoregressive models construct images iteratively, token by token, predicting each patch based on the preceding ones in a causal sequence. The generative process emerges over time shaped by a schedule in diffusion models or a causal chain in autoregressive ones. Each step in the sequence represents a decision, a branching, a subtle turn. The process is not unlike Borges’ Garden of Forking Paths: at every stage, a fork, a

narrowing, a divergence that might eventually lead, perhaps paradoxically, to the same image or to one entirely different.

Most of these models adopt a visual transformer architecture (Dosovitskiy et al. 2020), where the image is broken into patches and processed through layers of multi-head attention (Vaswani et al. 2017). This attention mechanism, first introduced by Bahdanau et al. (2014), is combinatorial in nature: it learns how each part of the input interacts with every other part. Attention is not merely a tool for computation; it is a structural metaphor. Like the chessboard or the library, it defines a grid of possible interactions. Technically, this is done by projecting each token into three distinct vectors, query (Q), key (K), and value (V), and calculating the attention weights based on the similarity between queries and keys. These weights are then used to blend the values across the entire input sequence. In this way, each token dynamically reshapes its meaning by selectively attending to others, creating an intricate mesh of mutual influence. Like Calvino's chessboard, it defines a finite, rule-based space within which tokens interact according to abstract patterns. On the chessboard, each piece has a form and a function, and its role emerges not in isolation but through its possible movements and relationships to others. Similarly, in a vision transformer, each token (often representing a patch of an image) can be understood as a conceptual unit, not unlike a piece in a game. Its significance is not determined in advance but arises from its combinatorial alignment: how it positions itself in relation to others through the attention mechanism.

The visual concepts become especially apparent in personalization methods such as DreamBooth (Ruiz et al. 2022). DreamBooth fine-tunes a generative model to bind a specific identity – a visual concept – to a synthetic token (often a rare word like “sks” or “zxxperson”), which the model learns to associate with the visual concept of the new subject. This token, embedded within the language and image spaces, functions like a chess piece that has been introduced to the board: its role is undefined at first, but it quickly acquires meaning through its interactions with other tokens—through the K/Q/V matrices that allow it to “understand” and be understood within the architecture. Each token participates in an economy of meaning: it attends, it is attended to, and it reshapes the meaning of the whole in the process. Attention, like Calvino's wares arranged on the tiles, is a mechanism for visual storytelling through relational structure.

Like Calvino's work oscillates between the modernist desire for structure – the tree-like, branching labyrinth that seeks to contain meaning within a coherent system – and the postmodern realization

that such structures are always provisional, always partial, so do the architectures of contemporary generative models. On the one hand, they are built upon hierarchical, layered structures, with each layer processing the data more abstractly. On the other hand, their networked nature, especially in attention-based architectures, reflects a rhizomatic logic, a system of mutual influence with no clear origin or center, where meaning is not inherited top-down but assembled laterally and contextually. Despite its complexity, it remains a structure bounded by its own assumptions, trained on partial realities, encoded in discretized weights. The rhizome, as Deleuze and Guattari propose, allows for multiplicity, rupture, and growth in every direction. But even the most rhizomatic models struggle to represent evolving, dynamic realities; they remain anchored to the training set, unable to untangle from what they have seen. They offer a partial view of the world, one framed by human curation and algorithmic filtering. They are architectures of imagination but also of limitation, where their illusions of infinite recombination often obscure the finitude and contingency of their source.

4. Discussion

The long-lasting fascination in 20th century literature, particularly in Borges and Calvino, with the idea of structuring infinite possibility through metaphors of either combination of discrete elements (the Library, the Chessboard) or continuous potential (The Aleph, the Atlas and the Garden) finds parallels in the architectures and conceptualizations of contemporary AI models. Attention mechanisms, with their focus on relational interactions between tokens, echo combinatorial systems, and latent spaces in generative models evoke notions of a continuous and explorable continuity.

However, employing these literary metaphors is not about finding direct equivalences, but about using them as critical lenses to understand the potentials, limitations and tensions in deep learning and the way it represents and generates realities. Some crucial distinctions must be made. The literary metaphors of the Library, Chessboard and arguably also the Atlas function as diagrammatic tools, that is to say, as spatial arrangements or conceptual compositions that are understandable and navigable by humans, and which facilitate reasoning through or via visual organizations (Krajewski and Krapp 2011). In contrast, latent spaces exist in hundreds or thousands of dimensions and are fundamentally inaccessible to direct human perception or navigation. It is, rather, a statistical construct, only graspable through projections and approximations. Recognizing this difference is vital: these literary metaphors can illuminate the struc-

ture of possibility encoded in deep learning, but they simultaneously warn against mistaking the map (our conceptual grasp) for the territory (the inaccessible computational reality). Therefore, we use these metaphors not as a direct equivalence but as a valuable framework for a critical and reflexive engagement.

Within this fascination with the idea of structuring infinite possibility resides an unsolved and pervasive tension between the conception of novelty as either arising from a recombination of smaller components (as a resampling of pieces) or from a continuous space (exploration). This tension can arguably be traced back to the scientific revolutions happening around the turn of the century such as quantum physics, the theory of relativity and the emergent computational paradigms (Turing's universal machine, Shannon's information theory, and the birth of cybernetics), which, translated into the world of culture, seemed to suggest that reality might be better grasped as a vast interconnected network, a labyrinth of branching pathways and combinatorial permutations. Borges, Calvino and the later members of the Oulipo group acted as literary seismographs, presenting imagination as an experimental, even an algorithmic engine, capable of generating alternative realities. A crucial distinction emerges in how these infinite spaces are conceived: Are we dealing with a combinatorial explosion of possibilities, or with a continuous field of potential?

Many literary metaphors from these authors elaborate on discrete and combinatorial constructs: the Library is enacted through the exhaustive rearrangement of finite alphabets; the chessboard encodes an infinity of intricate urban configurations made up of a limited catalogue of elements; and also by Calvino, the Atlas, promised as cartography of continuous potential while being instantiated in discrete examples, while Borges' Forking Garden of time goes back to a fluid, continuous and perhaps elusive notion of possibility.

This oscillation between, on the one hand, the combinatorial and discrete, and the continuous and endless on the other also echoes how modernist and postmodern sensibilities fed with uncertainty, subjectivity, and the rejection of linear narratives, gradually shifted from the enumerative and combinatorial, towards the more ambiguous, open-ended infinite geographies of possibility that characterize later periods. In a seemingly parallel manner, in AI, systems of combinations alternate and coexist with representation spaces. "The excitement of working with artificial neural nets...comes in part from the fact that their 'knowledge' is distributed and emergent, a pattern of responses that often cannot be predicted beforehand" (Hayles 1999, 175).

Somaini, in his contribution to “Questionnaire of Art and Machine Learning”, says that latent spaces are not unbounded fields, similarly, Borges characterizes the forking garden as “incomplete but not false” resonating with the fact that deep learning models capture a coherent logic, a kind of self-consistent system derived from the data they have ingested. But also, they omit, distort, or are blind to data and phenomena they have not seen or witnessed. As latent spaces and attention modules cannot be represented in reality due to their high dimensionality, they are statistical abstractions derived from data that we can only grasp through their projections into human-interpretable dimensions (Rodríguez-Ortega 2022). Latent spaces and attention mechanisms reflect filtered, biased realities shaped by training data and architectural choices, much like Polo’s descriptions are inevitably shadowed by Venice. These literary metaphors, steeped in paradox and the limits of representation, thus provide a powerful vocabulary for articulating the inherent partiality and situatedness of AI knowledge, moving beyond simplistic notions of objective representation.

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Notes

+ indicates equal contributions.

* This paper is complemented by a visual narration of the metaphors, that can be found on <https://dvstudies.github.io/metaphors-of-latent-space/>.

1. University of California, San Diego professor Sean Trott has discussed and sketched out the structure of the most used metaphors to describe LLMs. See: <https://seantrott.substack.com/p/what-we-talk-about-when-we-talk-about>.

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