World of Geniuses

THE NATURE OF GENIUS

An interdisciplinary analysis of the neurobiological and evolutionary mechanisms behind the development of exceptional cognitive abilities.

World of Geniuses

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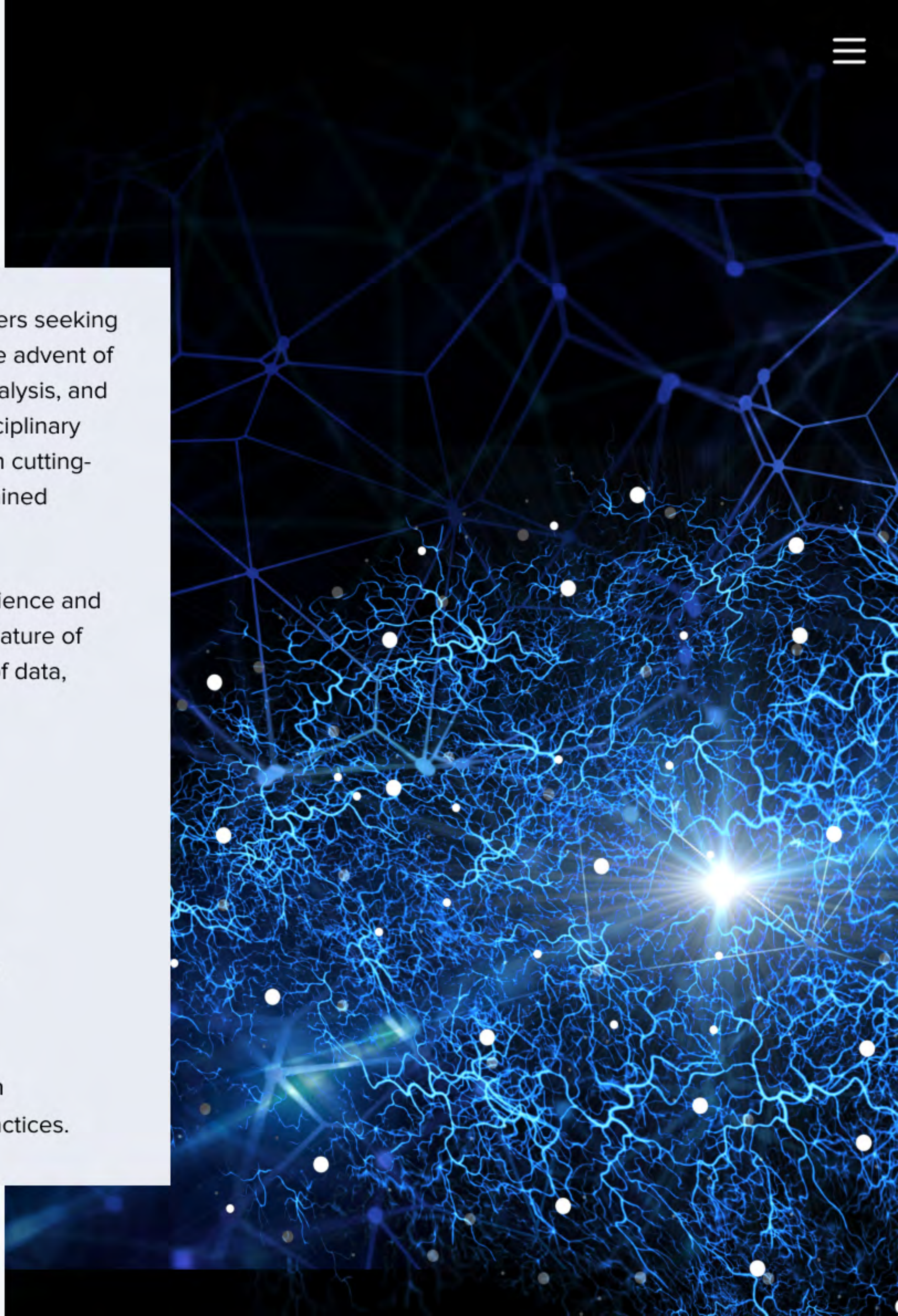
THE NATURE OF **GENIUS**



For decades, the phenomenon of genius remained an enigma to researchers seeking universal patterns behind it. A breakthrough became possible only with the advent of modern technologies—advanced neuroimaging, precision brain activity analysis, and artificial intelligence. These tools have enabled a comprehensive, multidisciplinary approach that integrates the accumulated wisdom of past generations with cutting-edge research on neural networks and insights into the genetically determined potential of the human mind.

Experts from the International Association for Strategic Development of Science and Convergent Research, Dark Matter, conducted a large-scale study on the nature of genius. This interdisciplinary analysis brought together a broad spectrum of data, including:

- Breakthroughs in modern neurobiology, neuropsychology, and neurocognitive science;
- Research findings in genetics, experimental psychology, cognitive science, physics, chemistry, and artificial intelligence development.
- Historical records and biographical accounts of the lives of renowned geniuses.

In addition, the study analyzed data from long-term longitudinal studies on cognitive development, along with empirical findings from educational practices.

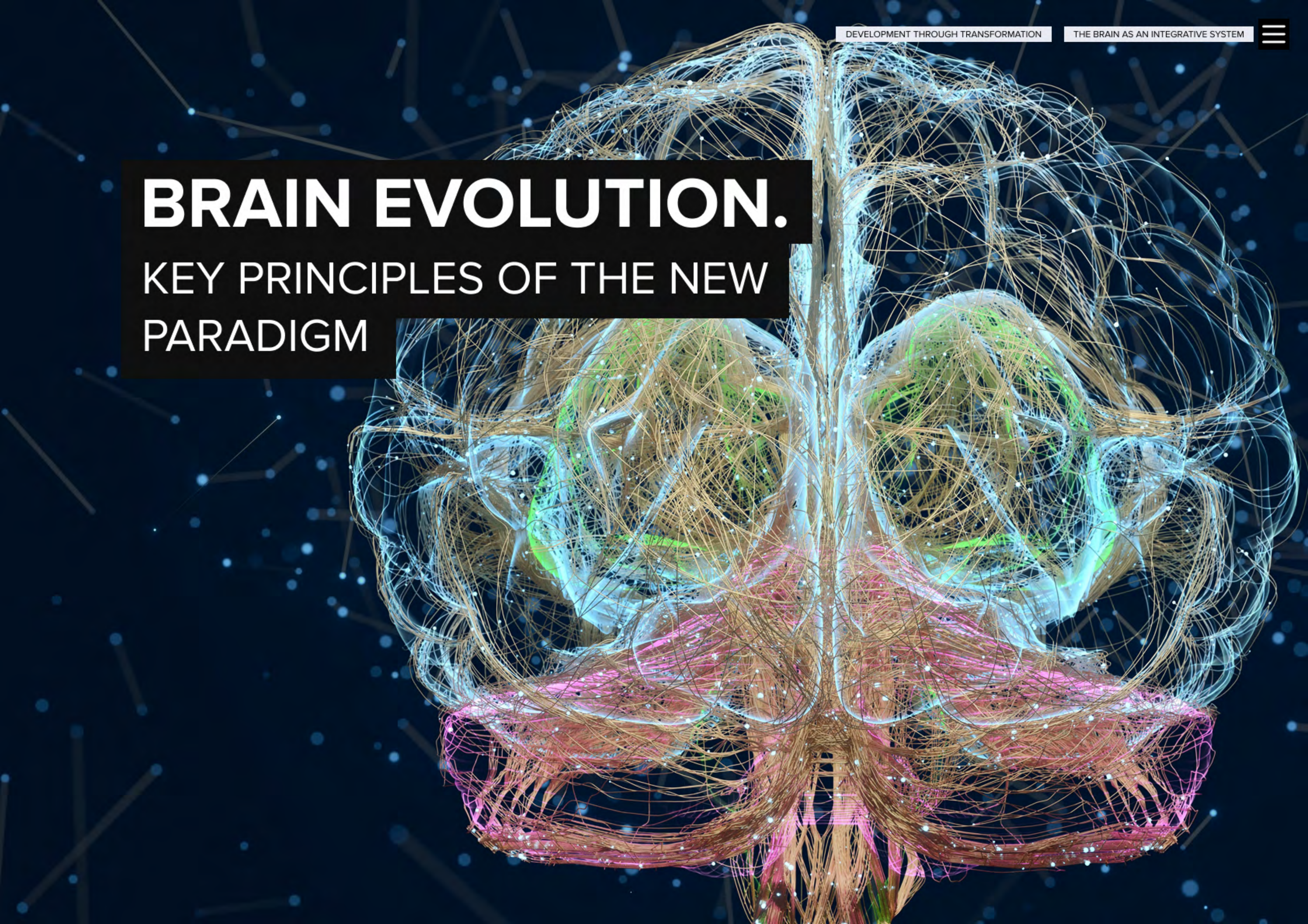
This comprehensive, multi-layered analysis of a vast body of data led to the development of a scientifically grounded concept of genius.

The results of the study enabled specialists at the Dark Matter Association to:

- Identify the neurobiological markers of genius and the unconscious cognitive patterns associated with it;
- Develop a system for the early detection of talent and genius;
- Pinpoint key environmental factors that catalyze the expression of genius and support the full realization of a person's genius potential;
- Initiate the creation of an integrated educational methodology aimed at purposefully unlocking the genius in children.

BRAIN EVOLUTION.

KEY PRINCIPLES OF THE NEW PARADIGM



Brain Evolution as Continuous Development

Modern discoveries in biology and neuroscience have radically transformed our understanding of human brain evolution. For a long time, it was believed that its development occurred in leaps—by layering new structures on top of old ones. However, new evidence suggests that brain evolution was not abrupt but gradual, representing a subtle and continuous adaptation of existing structures.

For many years, the “triune brain” model, first proposed in the 1960s, dominated both scientific and popular literature. According to this concept, the mammalian brain—including the human brain—consists of three evolutionarily layered parts:

- the “ancient” **reptilian brain** (responsible for basic instincts),
- followed by the **limbic system** (the center of emotions),
- and finally, the cerebral cortex—or **neocortex**—associated with rational thinking, logic, and abstract reasoning.

This theory gave rise to the idea of a strict hierarchy, in which the ancient structures were considered more primitive, and higher cognitive functions were thought to be entirely dependent on the latest evolutionary "additions." However, by the 1990s, accumulated data showed that this model did not reflect the true picture.

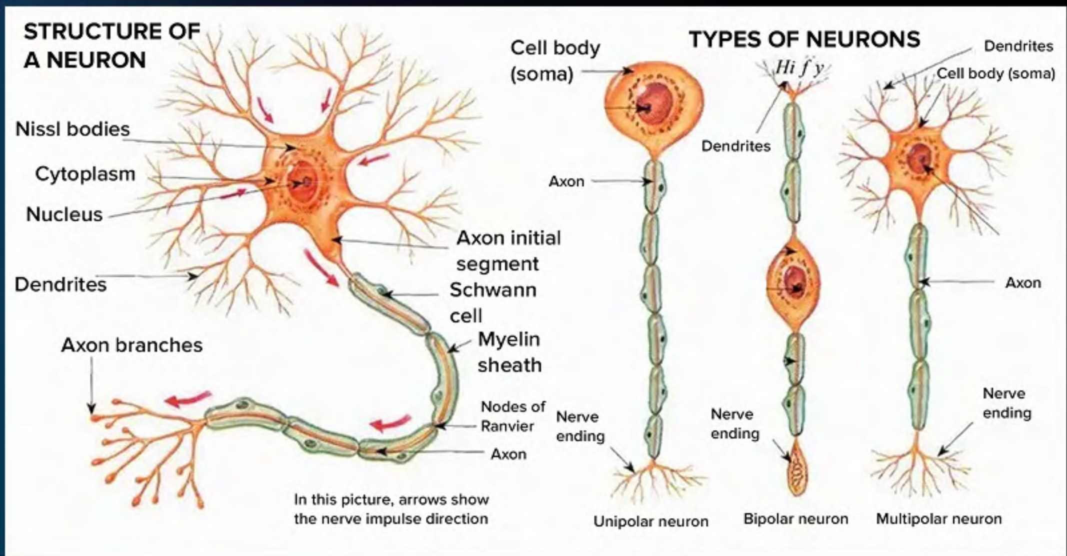
Neurons in a fragment of brain cortex. Daniel Berger, Lichtman Lab, Harvard University

DEVELOPMENT THROUGH **TRANSFORMATION**

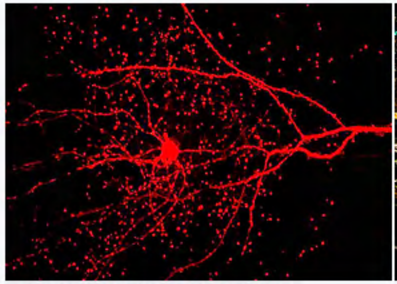
Modern brain research proves that evolution did not build the brain by adding new "floors." On the contrary, all the main regions of the brain—the forebrain, midbrain, and hindbrain—existed in all vertebrates, including reptiles, birds, mammals, and even fish, from the moment of their emergence. The functions of these regions changed and became more complex, but they did not disappear or get completely replaced.

"ANCIENT" NEURONS IN THE MODERN BRAIN

The modern brain of humans and animals retains elements in its architecture inherited from evolutionarily ancient nervous systems. For example, recent studies in comparative neurobiology have revealed a striking similarity between neurons in lizards and mammals (David Hain, 2022). **Despite 320 million years of separate evolution,** the common set of neuron types has maintained a high degree of molecular similarity. These neurons are found both in subcortical and cortical areas, confirming that the division of the brain into "ancient" and "new" parts is artificial and does not reflect reality. The entire brain is a complex integration of ancient elements and later evolutionary additions.



Figuratively speaking, our brain is like a city that has been continuously rebuilt while preserving elements from all eras — "ancient" and modern neurons are interwoven, forming a single functional system, much like historical buildings carefully integrated into a city's modern infrastructure.



Neural structure of the brain

Night city photo

It stands to reason that evolutionary changes affecting one part of the brain would trigger changes in others. For example, the growing complexity of the cortex likely required adaptations in subcortical structures to maintain the system's overall balance. It's much like upgrading a complex machine—enhancing one component demands a precise recalibration of the rest.

Thus,

> **Brain evolution wasn't about suddenly adding new parts, but rather about the gradual transformation and refinement of connections and functions within existing structures. Every region of the brain is the result of millions of years of adaptation—not a relic of the past.**

This new perspective on brain evolution opens fundamentally new avenues for researching the nature of intelligence and, most importantly, provides deeper insight into the **mechanisms underlying the formation of genius.**

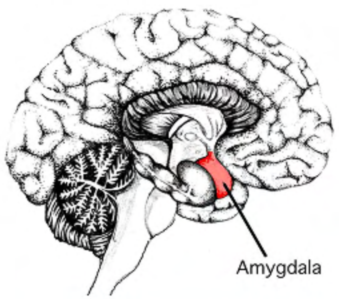
THE BRAIN AS AN INTEGRATIVE SYSTEM

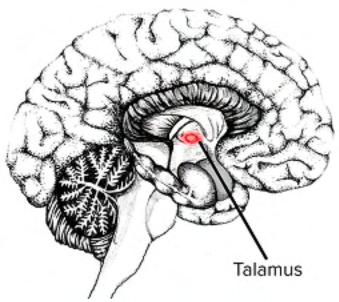
Evolution does not operate like a builder stacking new floors atop old ones. Rather, it works like a master weaver—continually enriching the tapestry of the brain by threading in new fibers of varying texture and color into the existing fabric, creating ever more intricate patterns. The ancient patterns don't vanish; they become the foundation for more complex designs, forming a multidimensional canvas where each interwoven strand of neurons gives rise to new facets of cognitive ability. **Every thread matters to the overall pattern.**

Thus, the human brain resembles not a hierarchical machine with "primitive" and "advanced" components, but rather an intricately woven neural tapestry where deep subcortical and specialized cortical brain structures function as a unified whole. Even the deep subcortical structures of the brain previously considered as "primitive" **remain critically important for higher cognitive functions,** such as memory, attention, and decision-making.

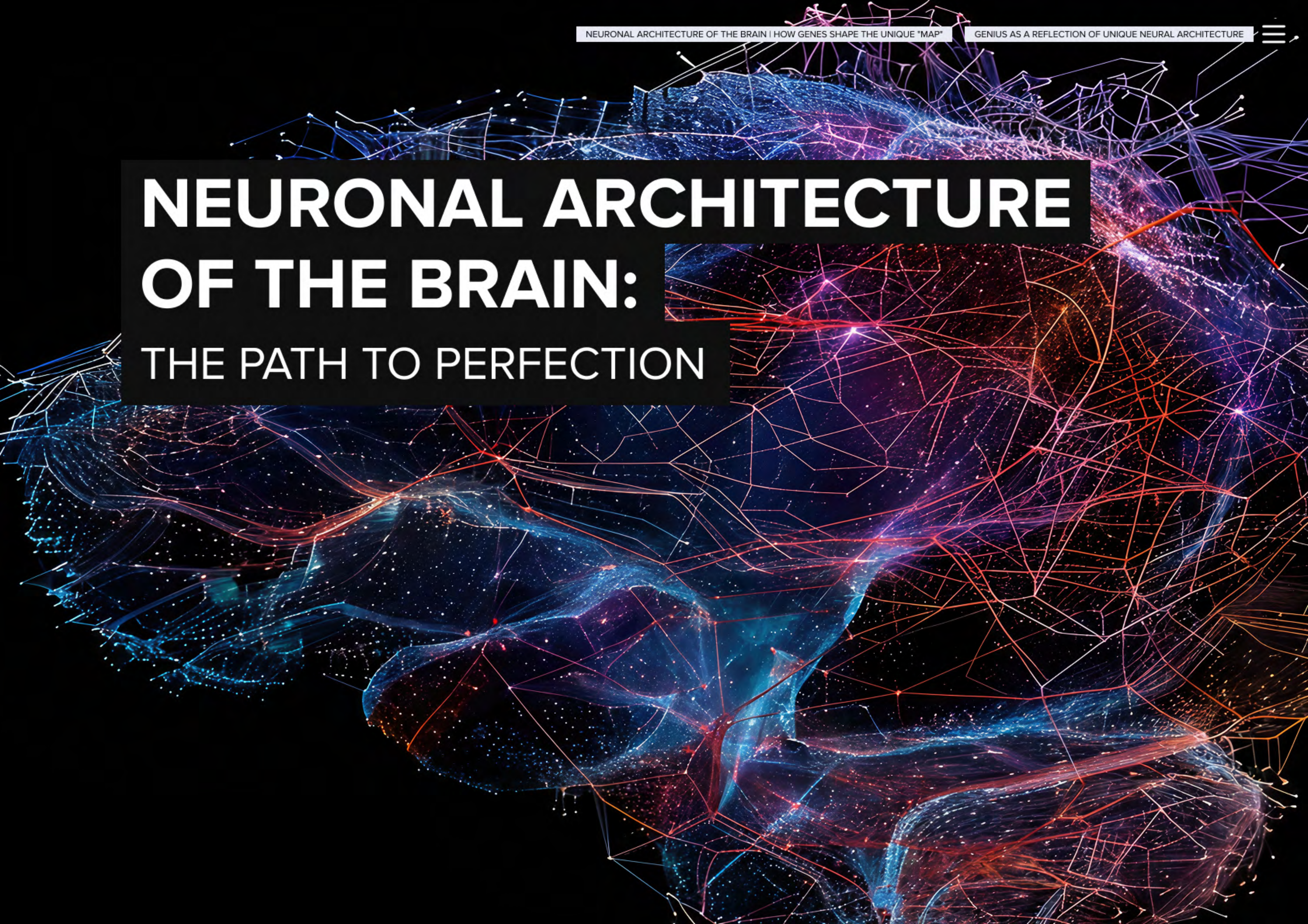
FOR EXAMPLE:

- The "ancient" amygdala actively interacts with the cerebral cortex during **decision-making processes.**
- The thalamus, once classified as a "primitive" structure, is essential for **information processing**, alongside the cortex.





This understanding reflects the modern view of the brain as a **heterarchical system,** where **flexible interactions among networks** play a key role.



NEURONAL ARCHITECTURE OF THE BRAIN:

THE PATH TO PERFECTION

NETWORK MODEL AND GLOBAL CONNECTIVITY OF THE BRAIN

Contemporary neurobiology emphasizes **the network model of brain function**. Current scientific understanding posits that creativity, logic, and analysis are not confined to specific areas of the brain; rather, they emerge as **global functions resulting from the interactions among multiple regions and networks** (Bassett et al., 2017). Each brain function, from solving mathematical equations to writing poetry, is the result of the coordinated efforts of the entire neural network.

The brain does not function as a mere sum of separate, independent parts. It operates as a unified, integrative, and dynamic system—where the autonomy of individual modules is balanced by their global coordination, and each structure plays a distinct role in creating a harmonious whole. It is this finely tuned interplay that determines the overall efficiency of the brain's functioning.

Research **indicates that individual differences in intelligence are not localized to a few restricted brain areas but rather reside in the communication mechanisms that encompass the entire brain.** Communication between brain regions, or functional brain connectivity, plays a crucial role in shaping intelligence.

Thus, intelligence and cognitive functions arise from the **global interaction of neural networks** rather than the isolated activity of individual regions. **Just as a symphony cannot exist without tuning its instruments, the brain cannot function without the coordination of all its parts.**

> **The brain is a remarkable, synchronously operating network shaped by millions of years of evolution and interaction with the world. Today, we understand that its true power lies in its connections—not in isolated "regions."**

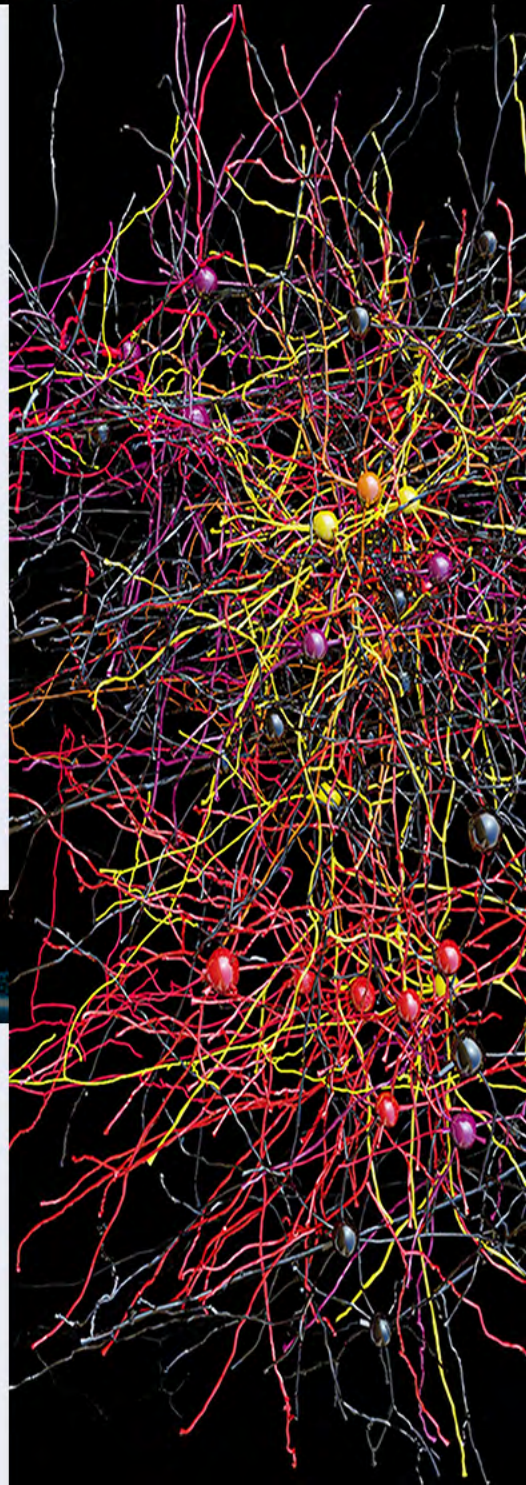
It is precisely the unique pattern of neuronal connections — a kind of **"individual neural signature"** for each person's brain—that serves as the key to understanding the phenomenon of genius. **Exceptional abilities arise from the distinctive architecture of connections throughout the entire neural network.**

NEURONAL ARCHITECTURE OF THE BRAIN

How Genes Shape the Unique "Map"

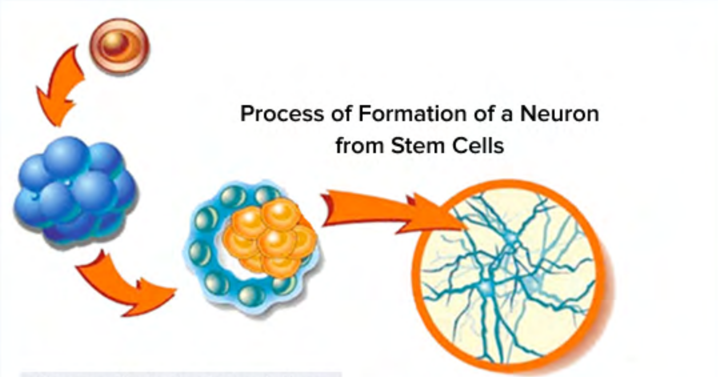
The neuronal architecture of the brain is a complex system of structural and functional connections between billions of neurons, which form networks for processing information and serve as the foundation for all cognitive processes.

Each individual's uniqueness lies in the fact that their neuronal architecture is as distinctive as the patterns on tree leaves. The question remains: How is it formed, and what determines its complexity?



GENETIC FOUNDATION

The formation of the foundations of future neural networks begins at the early stages of intrauterine development: embryonic stem cells differentiate into neural stem cells, which give rise to the first neurons. These neurons, following a genetic program and environmental cues, migrate, mature, and gradually form connections.



Source: Pluripotent circulations

However, there is a paradox: the complete map of neural connections (the connectome) is too vast to fit within DNA. For instance, storing the connectome of a mouse requires 10 terabytes of data, while its genome contains only about one gigabyte of information.

Scientists have spent decades attempting to understand how a brain composed of billions of neurons establishes trillions of precise connections when the genetic code is too small to store such a map.

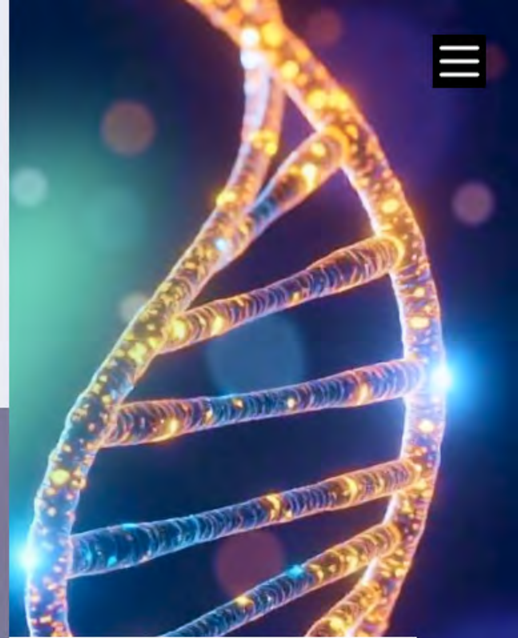
AN ELEGANT SOLUTION FROM NATURE

Modern research has shown that **DNA does not encode the map** of neural connections itself, but rather the algorithm for its formation—**a simple set of rules that axon**s (neuronal processes) use to find their "target," the destination they need to reach (Kerstjens et al., 2022).

> **Genes do not store the map of neural architecture; they provide the algorithm.**

HOW IT WORKS

- **Neurons form families.** When brain cells divide, they create “familial branches,” similar to a family tree. Neurons from the same branch share common origin and are located in specific areas of the brain.
- **Axons seek their “relatives.”** Neurons extend their axons not toward random cells but toward neurons that originate from similar division lineages. Each axon “reads” molecular markers along its path to determine the direction of growth. **Their task is to find neurons from neighboring “branches” of the same “generation.”**
- **A precise route without a map.** An axon traverses molecular markers, adjusting its path at each stage. When it encounters a marker that closely resembles its own, it “understands” that it has reached the target neuron and forms a synaptic connection.



Chapter 11 | Introduction to the Nervous System and Nervous Tissue

Just as you would navigate a city by following directions—“turn left at the blue house, then right at the fountain”—an axon reaches its target neuron by adhering to the algorithm at work.

FUNCTIONAL SIGNIFICANCE

The result of this process is the development of a complex neuronal architecture that encompasses the anatomical organization of distinct brain regions and the functional systems that facilitate the brain’s operations. These systems range from basic sensorimotor networks to higher-order global networks such as the default mode network (DMN), the salience network (SN), and the central executive network (CEN), among others. These networks play pivotal roles in sustaining cognitive and behavioral functions.

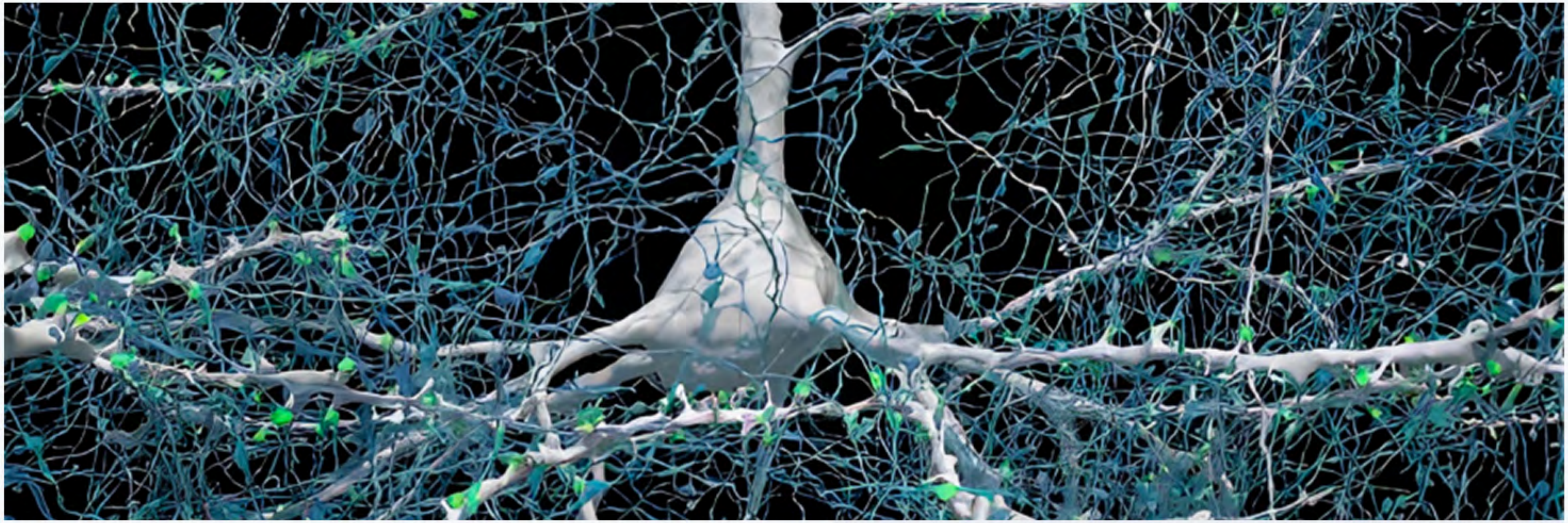
Thus, neuronal architecture is not constructed randomly; rather, it is determined by a **genetically encoded algorithm** that governs axonal growth.

NEURONAL CODE AND THE LIMITS OF NEUROPLASTICITY

While the genetic program establishes the foundational organization of neural architecture, each individual's unique pattern of connections is also shaped by the external environment, experiences, and learning. This process occurs through **neuroplasticity**—the brain's ability to create new neural connections, modify the strength of existing ones, and adjust the efficiency of signal transmission (for example, by changing the degree of myelination of the **axons**).

However, it’s crucial to understand that **neuroplasticity operates within genetically predetermined boundaries.** Neurons can extend axon terminals (axon endings that form synapses), establish new connections, and modify existing pathways. But **they cannot radically reconstruct the brain’s original architecture.** All of these changes occur within the limits set by evolution.

Figuratively speaking, if we imagine the brain as a city, genes define its core architecture—the layout of neighborhoods and main highways—while experience builds the living infrastructure. It carves out new walking paths, regulates traffic flow, and creates efficient interchanges between frequently used routes.

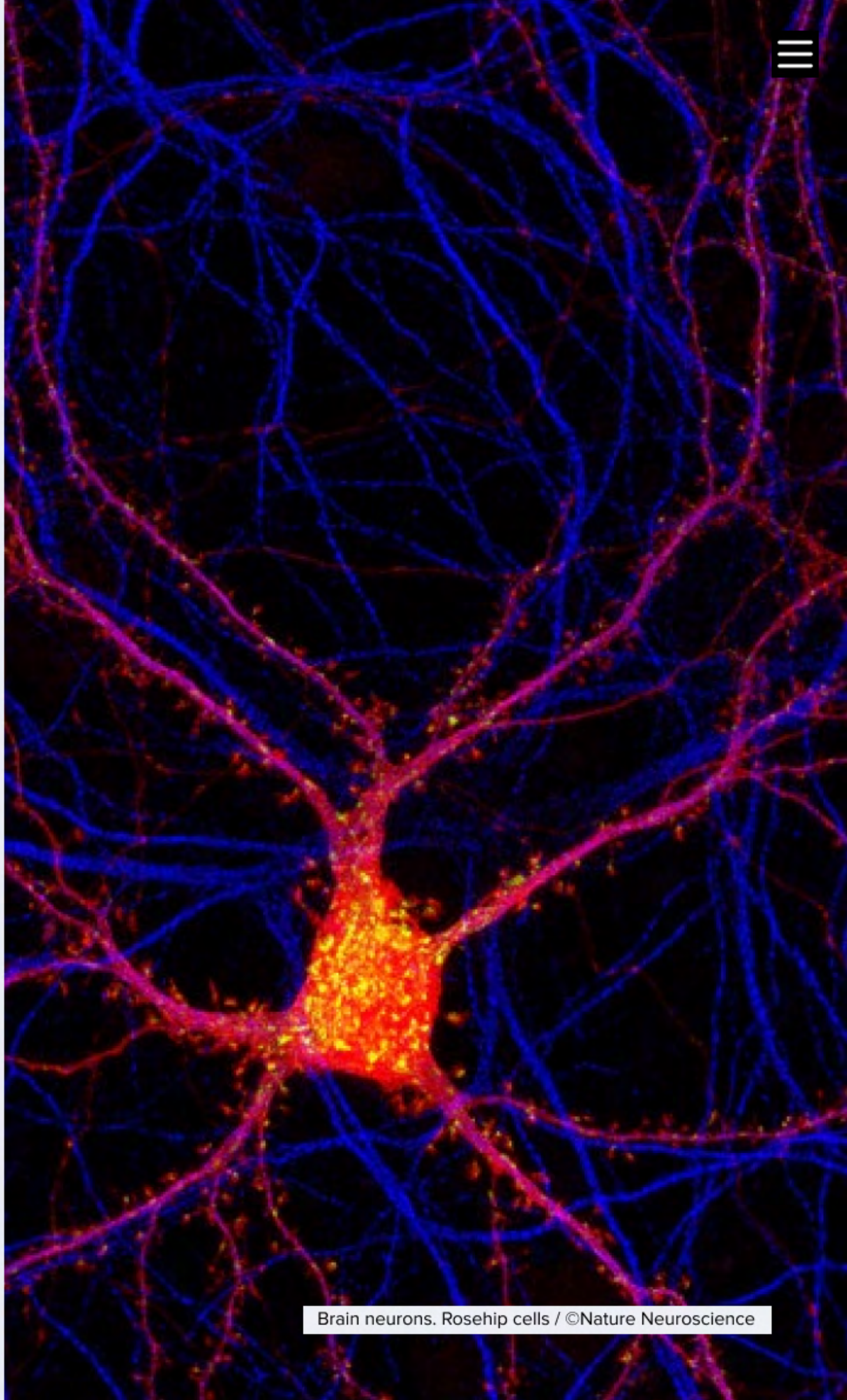


3D model of pyramidal neurons of the brain. Study by Harvard University and Google Research

GENIUS AS A REFLECTION OF UNIQUE NEURAL ARCHITECTURE

Years of research into the nature of genius conducted by the research team at the Dark Matter Association have led to a key conclusion: the roots of genius can be traced to the unique neural architecture of the brain, which is formed according to a genetically encoded algorithm. The research findings indicate that the **neural patterns associated with genius potential** are primarily determined by hereditary factors.

Where exactly does genius "hide"? Why does it emerge in so few individuals, and so rarely—often spontaneously and unpredictably? What mechanisms suppress or block its expression? And most importantly: where can we find the keys to unlocking it?



Brain neurons. Rosehip cells / ©Nature Neuroscience

WHERE IS **GENIUS HIDDEN**

Using a whole-brain fluorescence imaging technique developed at Janelia, scientists captured axons of pyramidal tract neurons leaving the motor cortex. Credit: MouseLight Project, Janelia Research Campus

THE EVOLUTION OF THE BRAIN CONTINUES TODAY

The human brain is a dynamic system that not only adapts to its environment but also actively engages in its own development. It possesses a unique ability to optimize its functions purposefully and **independently set its developmental priorities.**

From an evolutionary perspective, the brain has evolved over generations, constantly seeking new potential through complex processes of harmonization and self-organization. This progression reflects the **deep-rooted drive within living systems for self-improvement and evolutionary advancement**—a trait inherent in every individual and in human nature as a whole.

However, the evolutionary goals of animals and humans differ fundamentally. For animals, the success of a species is defined by its ability to survive and reproduce through physical adaptations. For example, a peacock invests resources in developing its magnificent tail to attract a mate—this is its form of "genius." Similarly, each species develops unique features: a ram has a strong forehead, a moose has powerful antlers, and a rhinoceros is protected by thick skin and a robust horn. All these traits serve a singular purpose: to ensure the reproduction and the survival of the population.

Humans, as a more advanced species, follow a different evolutionary path. Our key adaptations lie not in physical strength or defenses, but in the **development of neural networks, intelligence, and consciousness.** Thus, **human evolution is a journey toward unlocking the potential of our consciousness.**

In this process, the brain is not merely a tool for understanding the world; it is a self-sufficient system that **actively participates in its own formation, striving to unlock new possibilities and transcend the limitations of previous generations.**

> **The evolution of the human brain is an ongoing process. It** has never ceased and continues today—**within your lineage and within your own brain.**

THE EVOLUTIONARY "MANAGER" OF THE BRAIN

MECHANISM OF NEUROBIOLOGICAL ADAPTIVE META-CONTROL

In recent years, modern interdisciplinary research into the brain—integrating achievements in neurobiology, genetics, epigenetics, evolutionary biology, and anthropology—has led to several significant discoveries. The results of these studies have revealed a previously unknown **brain mechanism of phylogenetic adaptation: the ability of the brain to accumulate and transmit important "neural instructions" for evolutionary progress to subsequent generations.**

At the core of this process lies an autonomous regulatory mechanism—a kind of **"manager" of neural architecture** that analyzes the state of neural networks and optimizes the distribution of brain resources guided by evolutionary priorities. This mechanism can be termed **neurobiological adaptive meta-control**, which determines:

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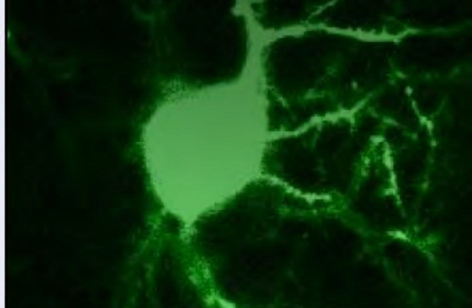
Mature Neural Patterns: Effective connections that have reached optimal levels of evolutionary development;

1

"Gray Areas": New or promising neural connections and patterns that require further evolutionary refinement.

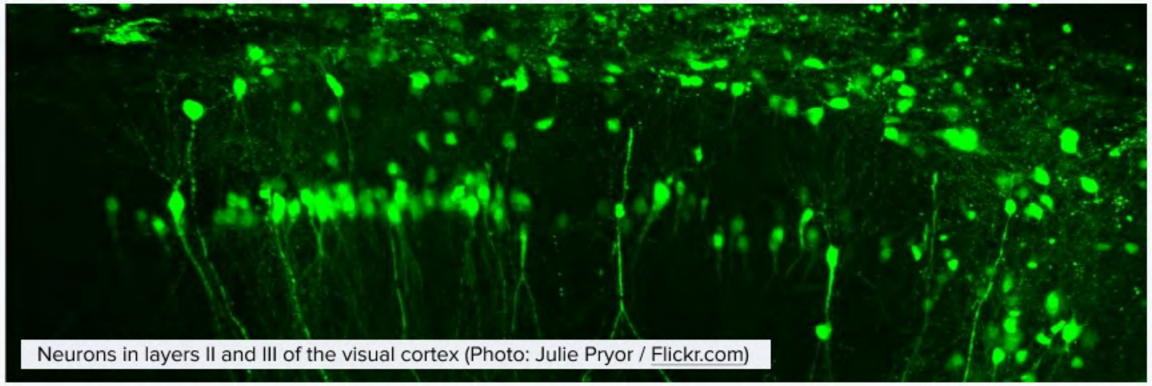


Neurons in layers II and III of the visual cortex (Photo: Julie Pryor / Flickr.com)

As a result, the brain allocates the majority of its active resources to developing young and emerging neural networks—these gray areas that evolution has not yet completed, leaving them to be refined by future generations.

Mature, stable neural patterns formed by previous generations are excluded from active modification and enter an **energy-saving background mode**: the brain ceases to use resources for their development, as they have already proven effective.

This resource redistribution allows for the formation of new connections while simultaneously maintaining a balance between the efficient functioning of the brain in the present and its potential for a qualitative leap in development in the future. Each brain inherits and upgrades the neural patterns of its ancestors, creating a foundation for new breakthroughs.



Neurons in layers II and III of the visual cortex (Photo: Julie Pryor / Flickr.com)

> **Each brain inherits and upgrades the neural patterns of its ancestors, creating a foundation for new breakthroughs.**

GENIUS AS AN EVOLUTIONARY RESERVE

The discovery of this mechanism has enabled an understanding of the fundamental nature of genius: its source lies in evolutionarily shaped yet dormant neural patterns—already refined over centuries of evolution. At the same time, **genius is locked away by a meta-control system, remaining in the brain as latent potential**—only activated under an extremely rare, coincidental convergence of specific external conditions and internal resources.

> **All known geniuses throughout human history who have accessed and unlocked their potential for genius are, in essence, the result of systemic disruptions within a finely tuned evolutionary mechanism.**

Genius can be envisioned as a complex network of "dormant" neural connections, akin to a hidden pattern on a tapestry that has long remained unseen. However, when certain conditions are met, this pattern emerges and integrates into the overall design, creating entirely new combinations of connections and interactions throughout the neural architecture. This awakening reveals the unique capabilities of the brain, allowing it to find unexpected solutions, generate innovative approaches, and achieve outstanding results. This is how genius becomes visible, weaving into the fabric of thought and transforming it.

Evolution continually strives for new breakthroughs; **it is essential for it to reach new stages** of development. Therefore, from generation to generation, evolution "guides" the brain to develop **gray areas** until they can become, so to speak, **"areas of genius."** However, once a certain level is reached, these established neural patterns seem to enter a dormant state: the brain begins to **ignore** them, stops allocating resources to them, and ceases to actively use them in everyday life.

Inherent areas of genius are evolutionarily formed neural patterns and connections that establish the individual biological foundation for the potential of genius in specific areas of knowledge.

THE TRANSMISSION OF NEURAL HERITAGE BETWEEN GENERATIONS

How is the area of genius formed in an individual? It is essential to understand that the evolution of an "area of genius" in mathematics, for example, does not require that every ancestor of a person, generation after generation, engaged in mathematical sciences. **Genius is cultivated through everyday practice and ordinary life.**

When observed closely, mathematical principles permeate many trades: a builder calculates the proportions of a structure, a carpenter measures angles, a craftsman creates symmetrical patterns—each of these activities hones mathematical, spatial, and logical thinking. In this way, evolution naturally nurtures genius based on everyday practice, where knowledge and skills are accumulated through trades, labor, and experience, developing human abilities from generation to generation.

A telling example is the **invention of the wheel**. Its inventors likely did not possess a modern mathematical vocabulary or understand theoretical equations; however, this did not prevent them from making a revolutionary discovery. **The key factors here are the practical application of knowledge, a deep understanding of the essence of phenomena, and the ability to generate new ideas—seeing what others do not and creating what has never existed before.**

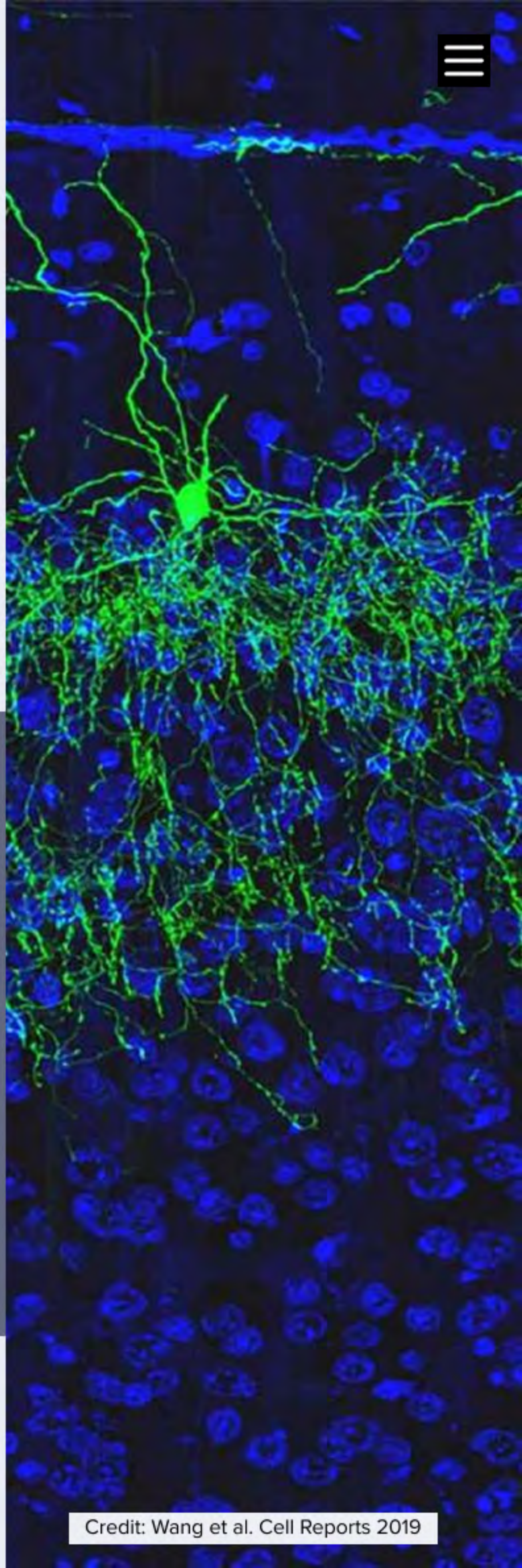

Evolution of the Wheel

Thus, when discussing the formation of genius in any field, we are referring to an evolutionary process that unfolds through applied skills and collective experience, rather than through academic study of a discipline.

Evolutionary mechanisms fixate and transmit to descendants by inheritance both the optimized neural patterns of ancestors and a map of priority gray areas for development, which each new generation progressively "refines."

This system **ensures the continuity of evolution: each new generation not only continues the development begun by its predecessors but also makes its unique contribution to enhancing the human brain.**

Notably, even when the formation of an area of genius is completed in one individual, **it does not guarantee that they will manifest as a genius.** More often than not, this potential remains hidden from them, and **the next generation** begins to develop a new area of genius from scratch, starting from a gray area. This **transitional generation** frequently lacks pronounced talents and shows a tendency to shift interests often. This is a natural stage in the evolutionary process, during which it is determined which gray area will serve as the foundation for developing a new area of genius.


Credit: Wang et al. Cell Reports 2019

It is also important to understand that the process of evolution is directly influenced by the conditions in which a particular family lineage develops: access to education, occupation, and historical events. For example, wars or epidemics can interrupt a lineage's progress, compelling evolution to start anew. Genetic mixing through inter-lineage marriages can also alter evolutionary trajectories.

Therefore, the development of an area of genius may take tens of generations in some cases, while in others, it may span hundreds of generations. Moreover, some individuals may only develop one area of genius, while others may develop several such areas simultaneously. **All of this reflects the lengthy, complex, and varied journey of evolution in the context of specific environments.**

In this way, **nature, like an unseen sculptor, has been refining the potential of the human brain for centuries.**

As a result, within the brain of each person, there is formed a distinctive "repository of genius," of which the individual is unaware.

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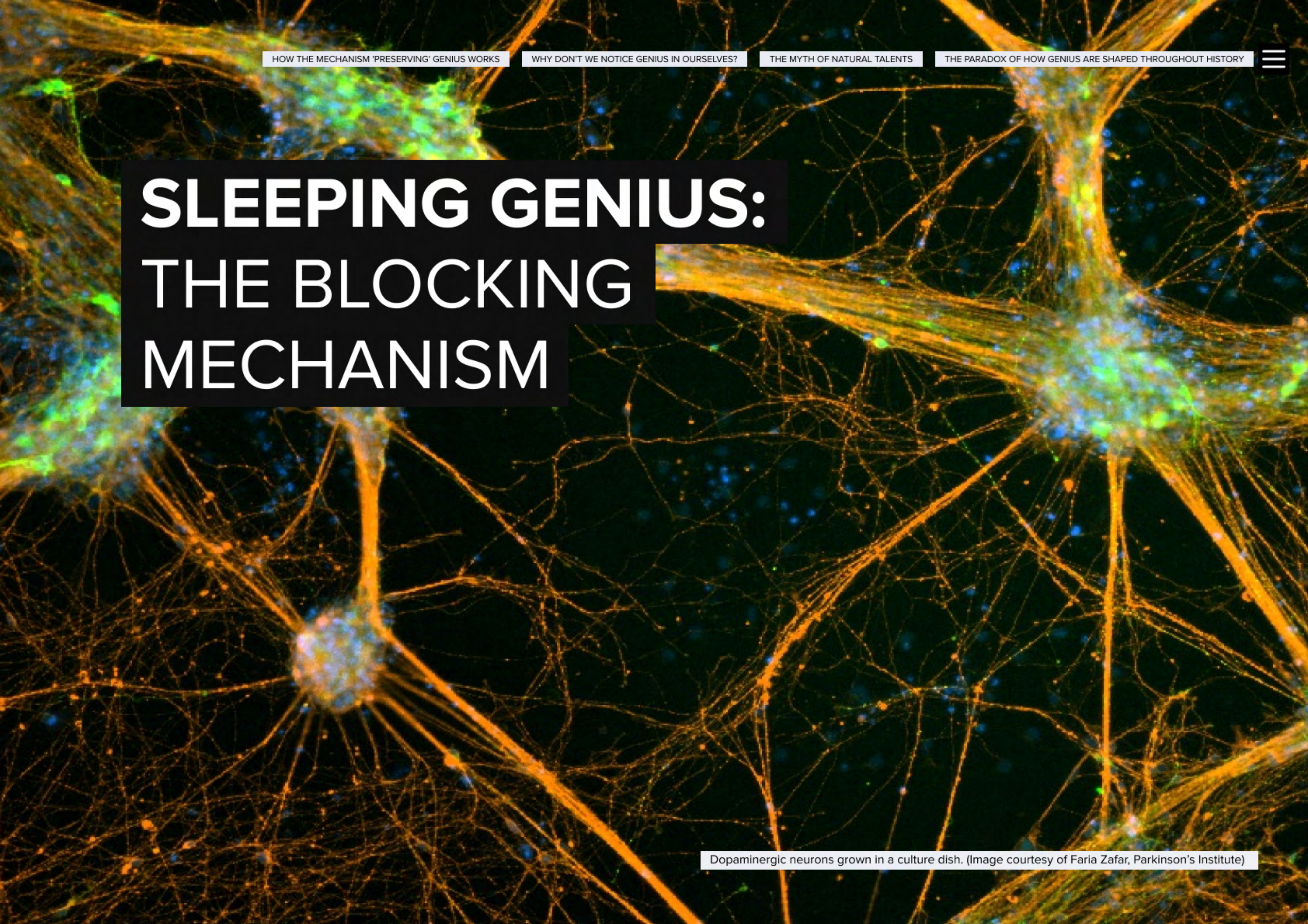
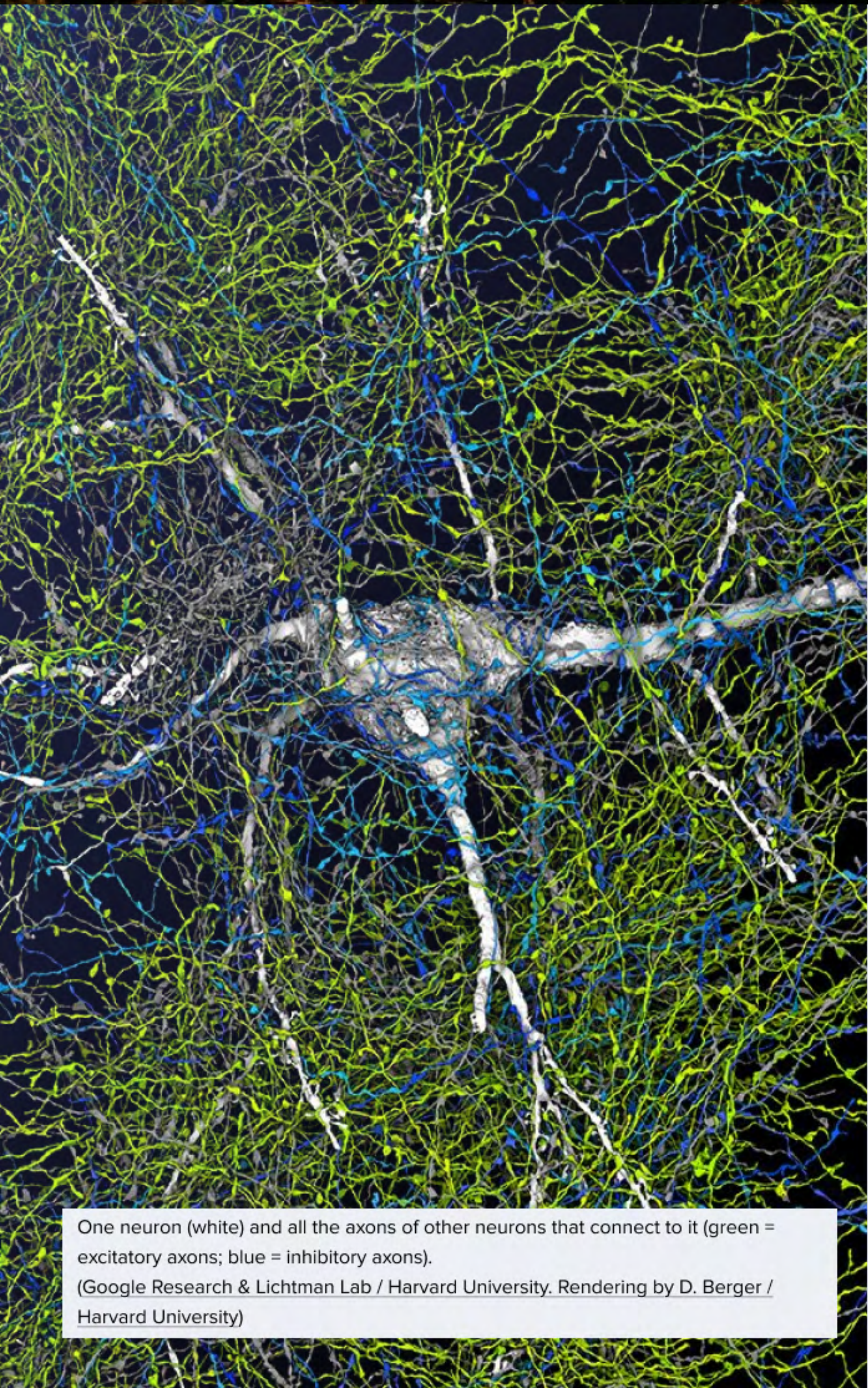
The brain is a universe that evolves according to the laws it has established for itself.

WORLD OF GENIUSES

SLEEPING GENIUS: THE BLOCKING MECHANISM



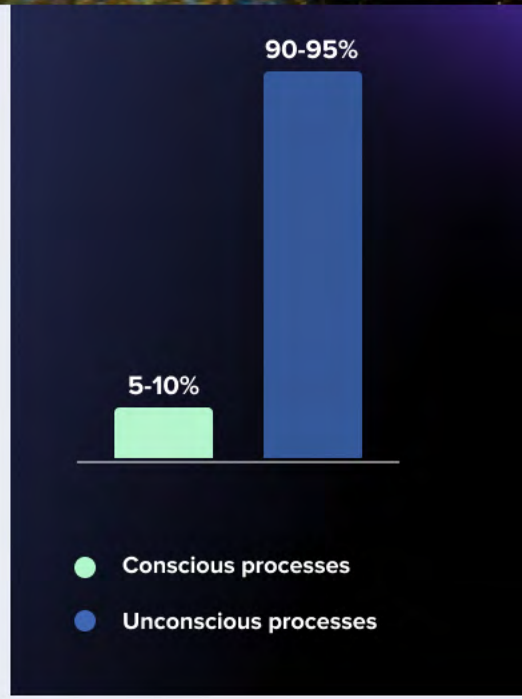
Dopaminergic neurons grown in a culture dish. (Image courtesy of Faria Zafar, Parkinson's Institute)



One neuron (white) and all the axons of other neurons that connect to it (green = excitatory axons; blue = inhibitory axons).
(Google Research & Lichtman Lab / Harvard University. Rendering by D. Berger / Harvard University)

HOW THE MECHANISM 'PRESERVING' GENIUS WORKS

Modern neurophysiological research confirms that **unconscious processes dominate** brain activity. For instance, studies show that only **5–10% of neural signals** reach conscious awareness, meaning that the majority of information is processed by the brain **without conscious involvement** (N. Dehaene, 2014).



The regulation of genius expression also occurs through unconscious neurocognitive processes, which play a crucial role in managing an individual's hidden potential.

To describe this mechanism, it is appropriate to use the dual process theory proposed by psychologists **Keith Stanovich and Richard West:**

2

System 1 (Fast Thinking)—Automatic, emotional-intuitive, operating without conscious control;

1

System 2 (Slow Thinking)—Conscious, analytical, tied to deliberate mental efforts.

THE BRAIN'S HIDDEN WORK

When we think of ourselves, we refer to **System 2**—our conscious and rational "self," which holds beliefs, makes choices and makes decisions. However, it is actually **System 1** — the automatic and unconscious system—**that generates the impressions and feelings that become the main source of beliefs and conscious choices for System 2.**

Operating in the background, "behind the scenes" of consciousness, System 1 constantly processes sensory data, forms perceptual patterns, and manages routine actions.

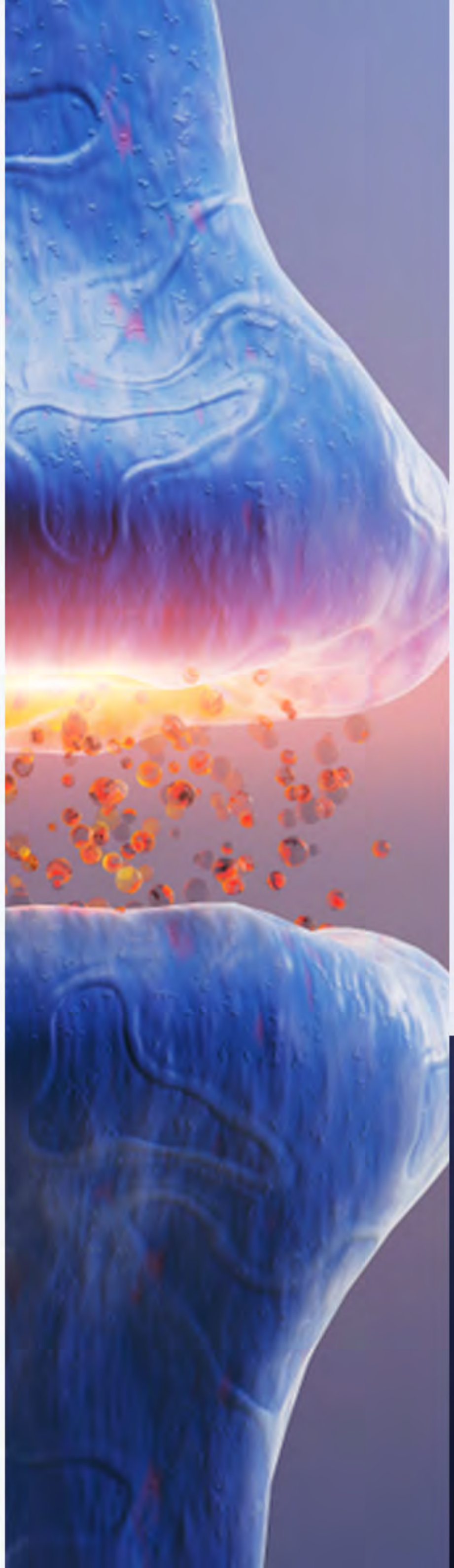
KEY FEATURES OF SYSTEM 1:

- **Constantly active and cannot be fully deactivated** (for instance, upon seeing a familiar word, we automatically read it; if we see the example "2×2," the answer "4" emerges automatically, and so on);
- Generates most thoughts and impressions outside conscious control;
- Processes emotional stimuli without conscious awareness;
- Can independently activate neural circuits.

Thus, for the majority of the time, we function under the influence of unconscious processes from System 1, which shape our perceptions and behaviors without our explicit participation. **Beyond our awareness, our brains perform a vast number of actions that we do not consciously perceive** (Daniel Kahneman, 2011).

DOMINANCE OF THE UNCONSCIOUS: THE ROLE OF SYSTEM 1 IN CHILD DEVELOPMENT

The unconscious System 1 begins to develop as early as the prenatal period, synchronously with the maturation of brain structures. This early development of the fast, automatic System 1 represents an evolutionary strategy that ensures a child's basic adaptation to the external environment. This system lays the neurobiological foundation for survival (regulation of breathing, thermoregulation), conserves energy by automating responses, and prepares for learning, allowing the brain to function efficiently from the very first moments of life.



System 2, in contrast, begins to develop only in the first weeks after birth, when the child actively receives sensory experiences through sight, sound, and other perceptual channels. This period marks the beginning of conscious learning — analyzing information, forming connections, and adapting to new conditions.

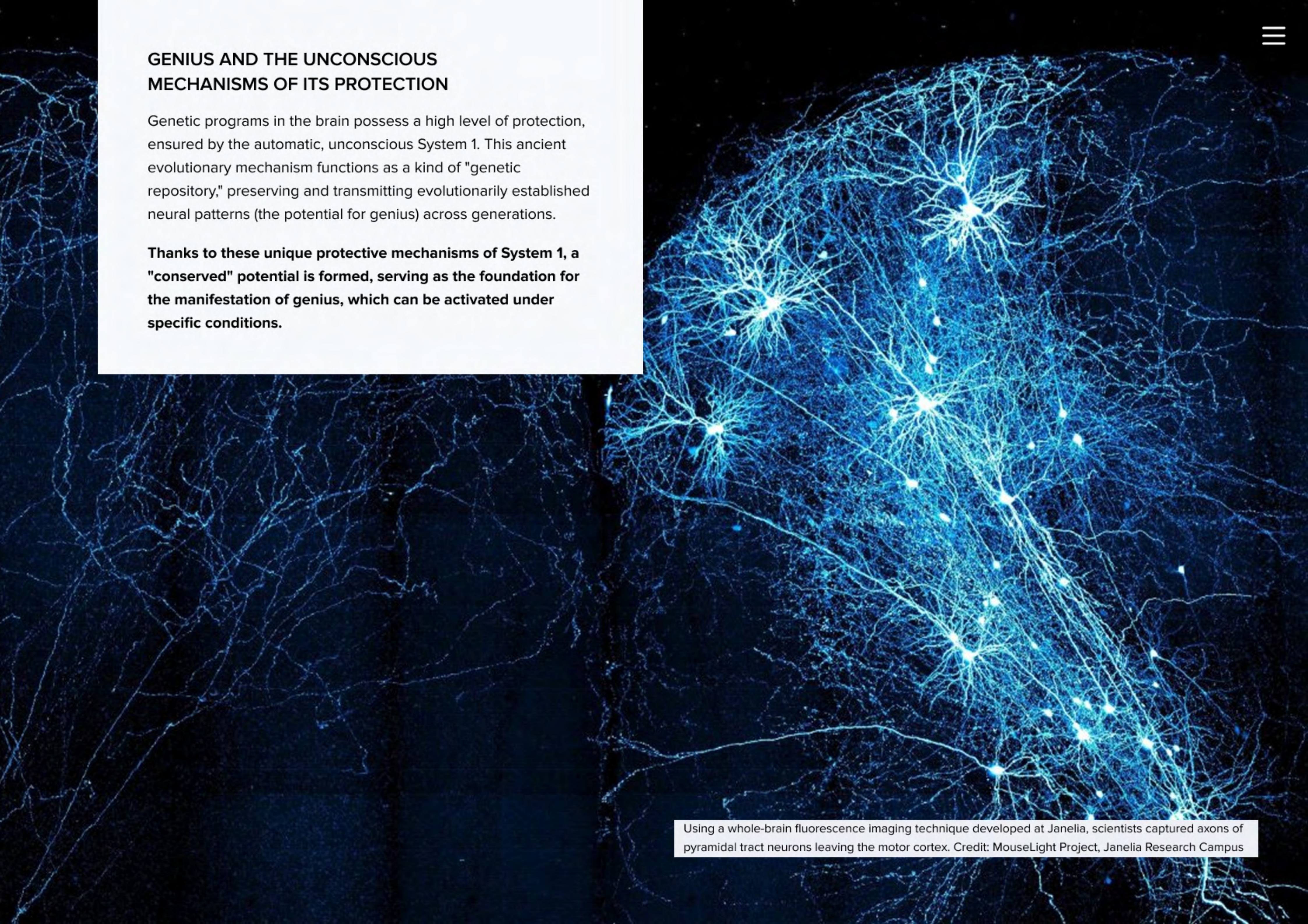
The key point here is that the unconscious System 1, being much older than the "conscious" System 2, continues to hold a dominant position. By the time a child is born, System 1 fully controls the organism and guides the development of System 2. When the child begins to see and perceive the surrounding world, and the awareness associated with System 2 manifests, this process occurs under the significant influence of System 1. Thus, unconscious mechanisms play a crucial role in the formation of conscious thinking.

> **The primary "guardian" of the potential for genius is the automatic, unconscious System 1.**
>
> **It not only preserves this potential in a "conserved" state for transmission across generations but also ensures that it does not activate prematurely or unnecessarily.**

GENIUS AND THE UNCONSCIOUS MECHANISMS OF ITS PROTECTION

Genetic programs in the brain possess a high level of protection, ensured by the automatic, unconscious System 1. This ancient evolutionary mechanism functions as a kind of "genetic repository," preserving and transmitting evolutionarily established neural patterns (the potential for genius) across generations.

Thanks to these unique protective mechanisms of System 1, a "conserved" potential is formed, serving as the foundation for the manifestation of genius, which can be activated under specific conditions.



Using a whole-brain fluorescence imaging technique developed at Janelia, scientists captured axons of pyramidal tract neurons leaving the motor cortex. Credit: MouseLight Project, Janelia Research Campus

WHY DON'T WE **NOTICE GENIUS IN OURSELVES?**

Each of us has a unique innate potential capable of leading to remarkable discoveries and breakthroughs. However, in the vast majority of cases (99%), our genius remains hidden even from ourselves. Why does this happen?

THE NEUROBIOLOGICAL MECHANISM REGULATING THE MANIFESTATION OF HIDDEN GENIUS POTENTIAL

The automatic, unconscious System 1 (intuitive thinking) regulates the expression of genius potential, using emotional modulation as a key mechanism for behavioral regulation.

This involves a **sophisticated neurobiological mechanism of emotional-cognitive regulation**, where the limbic system and the cerebral cortex orchestrate specific patterns of emotional states. As a result, certain activities become subjectively more appealing to the individual, while others provoke internal resistance.

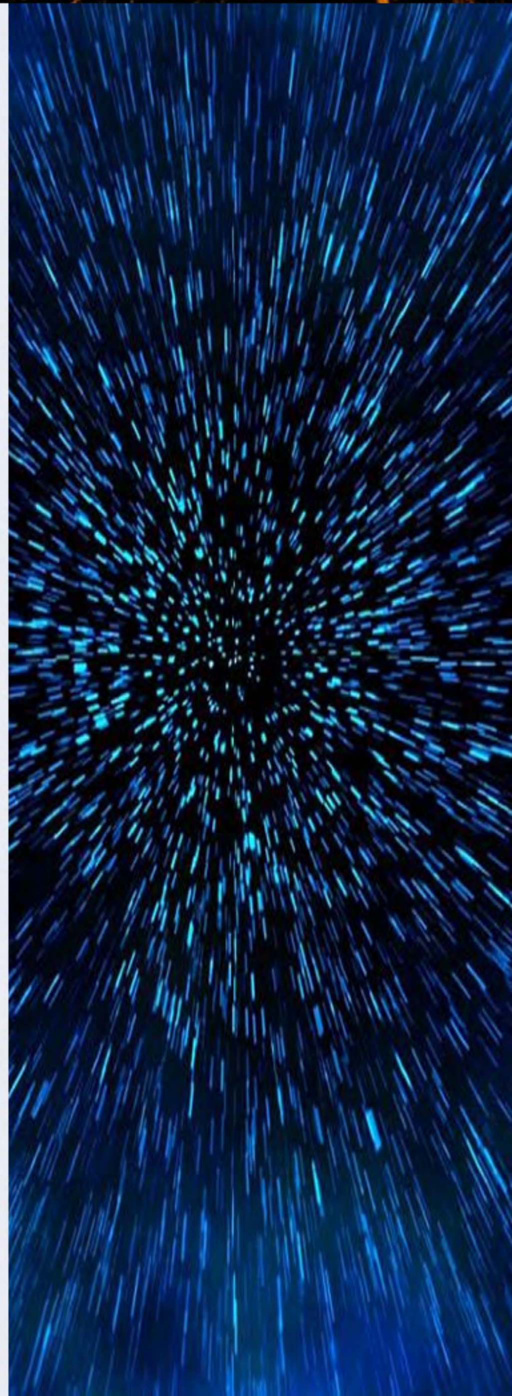
For example, some people feel inspired when engaging in music, while others experience this when solving mathematical problems. This is not a mere coincidence but rather the result of System 1's influence, guiding us toward activities that foster the development of gray areas—neural patterns that remain insufficiently shaped by evolution.

This process is realized through the following mechanisms:

- **Reward System:** Activation of dopamine, serotonin, and endogenous opioids, which generate feelings of satisfaction and motivation.
- **Cognitive Resource Management:** Selective activation of attentional systems and prioritization of specific cognitive processes.
- **Emotional Tagging of Experience:** Formation of stable emotional associations, establishment of long-term patterns of motivational preference, and regulation of emotional background during various activities.

As a result, individuals experience heightened interest and motivation toward activities that contribute to the development of these gray areas.

Thus, fully evolved neural patterns, which, metaphorically speaking, contain the potential for genius, remain inaccessible to the conscious awareness of their bearer. They are preserved as a foundational neurobiological background for further system enhancement. For this reason, individuals generally remain unaware of their own potential: their brains, through unconscious mechanisms, render these possibilities invisible and practically inaccessible for direct use by their bearer.



Emotional modulation acts as a tool of System 1, serving as a limiter on the expression of genius. Suppose automatic, unconscious processes of System 1 did not exert such significant influence over our psyche. In that case, the likelihood of genius emerging would be considerably higher, and nearly every second person would have the opportunity to realize their exceptional potential fully. However, due to the strong dominance of this system, deeply rooted in subconscious mechanisms, many innate abilities remain unrealized, and most people remain unrealized geniuses.

"

GENIUS IS TYPICALLY HIDDEN OR IMPLICIT, REQUIRING IN-DEPTH ANALYSIS TO UNCOVER IT

THE NEUROSCIENCE OF CHOICE: WHY MATHEMATICAL GENIUSES TRANSITION TO ART

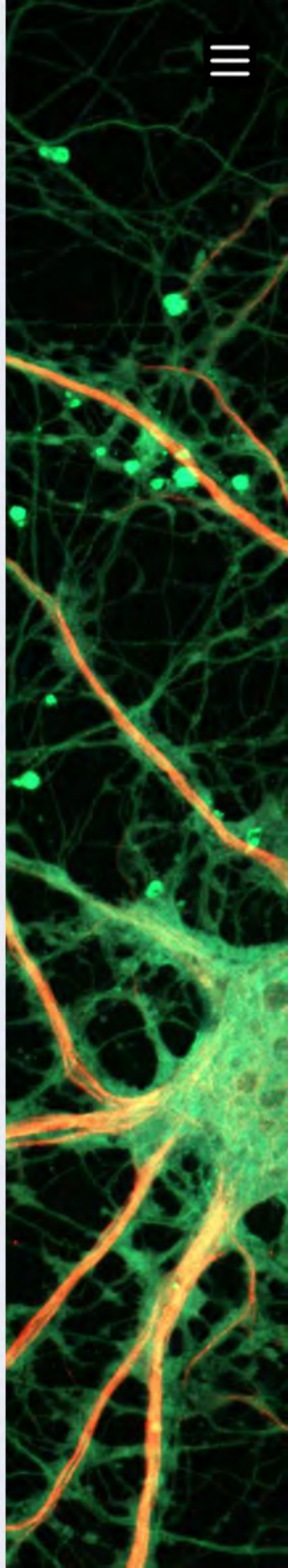
Imagine a child with genetically embedded potential for genius in mathematics. System 1 activates limiting mechanisms in the child's brain, which manifest as subconscious resistance to engaging in this area. Consequently, the child experiences a **lack of motivation, boredom, drowsiness, diminished interest, and irritability when solving mathematical problems.** They develop a sense of internal rejection toward these activities despite their innate abilities—**similar to rereading a book for the tenth time: what was once exciting in the first reading becomes interesting in the second, and by the tenth feels like a punishment.**

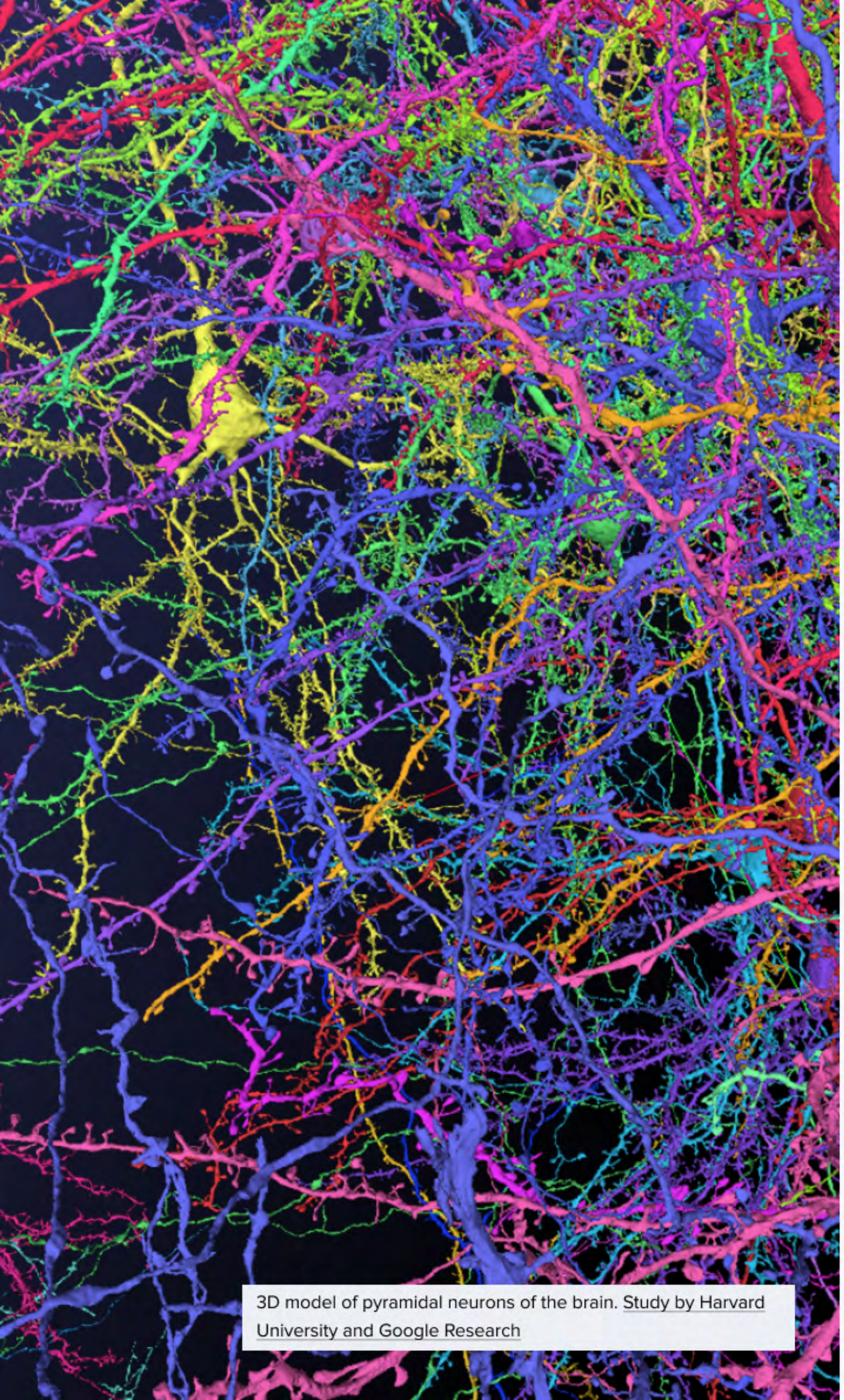
Gradually, the child develops a persistent aversion, subjectively perceiving mathematics as uninteresting, sometimes confusing, and, in their opinion, unnecessary. Mathematics becomes their least favorite subject.

Simultaneously, the unconscious System 1 activates a compensatory mechanism that redirects cognitive and energetic resources to alternative areas of development. For example, it may stimulate the child's deep interest in creativity by forming positive emotional associations, enhancing internal motivation, and facilitating the process of creating vivid imagery.

As a result of these mechanisms, a child with innate neurocognitive predispositions for genius in mathematics is more likely to choose drawing as their primary passion. In this process, System 1 activates emotional reinforcement mechanisms: creating positive states during creative activities, enhancing the pleasure derived from the process, and fostering a strong internal motivation for artistic self-expression. **Subjectively, the individual will feel they have chosen this direction; however, their choice is largely determined by the operations of unconscious mechanisms.** Their brain interprets mathematics as an **accessible resource,** requiring little effort, while viewing creative abilities as **an area of growth.**

From the outside, it may appear that the child demonstrates early talents in drawing, even though these abilities are not yet fully developed evolutionarily. In reality, System 1 is stimulating System 2, encouraging the development of gray areas and laying the foundation for future talents and genius in subsequent generations. Meanwhile, the already formed potential remains hidden. Parents might envision their child as a future great artist, while **in reality, this child harbors the potential of a brilliant mathematician who could unlock the mysteries of dark matter, or a geneticist who could develop new methods for analyzing genomic data, which could help to decode the mechanisms of aging and extend youth for all humanity.**





3D model of pyramidal neurons of the brain. Study by Harvard University and Google Research

THE MYTH OF NATURAL TALENTS

There is a widespread but mistaken belief that a child's spontaneous interests in certain activities directly indicate their innate abilities or hidden potential in those areas. Many educational methods are based on the idea of identifying talents in children by observing their natural inclinations from an early age. However, **this approach fails to recognize the presence of genius as a qualitatively different level of potential. The reality presents a different picture.**

- **A child's spontaneous curiosity** is directed toward **gray areas**—domains that require evolutionary development and skill-building, not toward evolutionarily established domains of genius.
- **Potential areas of genius** remain outside the child's interests because their unconscious system (System 1) perceives them as already mastered.
- **Natural interest** often focuses on **talents**—areas that evolution has been shaping for several generations.

In the development of abilities, a certain gradation can be observed. The gray area consists of immature neural connections and patterns that are at an early stage of development. As these areas undergo evolutionary "refinement," they manifest as **talents** in subsequent generations. Thus, **talent is an intermediate stage between the gray area and the area of genius.**

In this context, it becomes clear why talent often aligns with a child's passions and even becomes apparent to those around them. However, it is essential to understand that even strongly expressed **talents still do not equate to the area of genius.**

Moreover, **the development of talents will distract individuals from cultivating and awakening their true genius.** A person can refine their talents throughout their life, **yet their genius will remain hidden or "dormant."**

> **Talent is an evolving area of genius for future generations.**

THE ILLUSION OF GENIUS

Let's examine an example of how the illusion of obvious innate genius in a child can be created. For instance, in a family where mathematics has become a tradition—first the grandfather was passionate about mathematics, then one of the parents, and now the child continues this lineage, achieving certain results through diligent effort.

This creates a mistaken impression that unique mathematical abilities are passed down from generation to generation. The question arises: is this an expression of genius? The answer is no. In reality, this represents a former gray area that the unconscious System 1 develops in the interest of evolution, which in the younger generation manifests as talent—a transitional result of this work.

The situation is paradoxical: a child, for example, may be potentially a brilliant physicist—similar to Einstein—but may end up focusing on mathematics, where they show good results. However, these successes will not lead to any significant discoveries. Moreover, even dedicating their entire life to mathematics, they may not achieve notable heights.

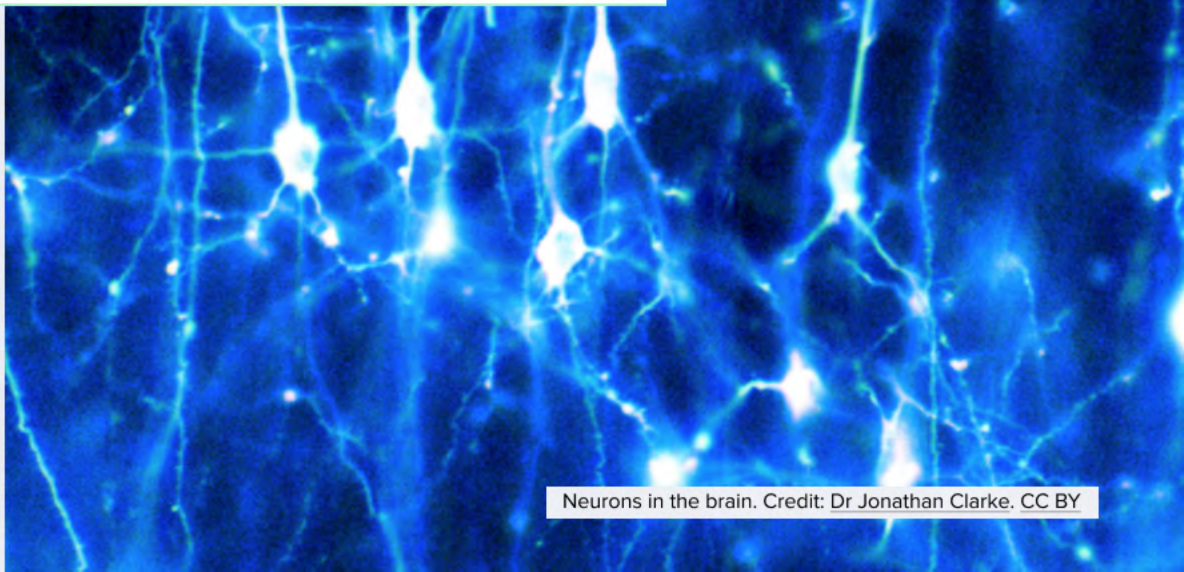
At the same time, such a child will completely ignore their true calling—physics—and experience a profound aversion to it, akin to the deep resistance that many geniuses and most Nobel laureates felt toward sciences and studies in general during their childhood. Yet it is precisely in physics that this child could unlock their potential, make great discoveries, and significantly benefit humanity.

Thus, the hypothesis that natural early interests and preferences of children directly reflect hidden genius is scientifically unfounded. Child behavior is determined by a *multifactorial system* that includes cognitive, social, and evolutionary mechanisms, rather than a linear connection between interests and potential.

Today, when parents are increasingly moving away from imposing education in favor of the principle of "developing only what the child enjoys," and access to educational resources has become unprecedented, one might expect an explosive increase in the number of geniuses. However, this is not happening.

Empirical data indicate that spontaneous childhood preferences and actual potential for outstanding achievements in specific areas **often demonstrate an inverse correlation.**

Moreover, relying solely on stimulating "natural" interests **is unsupported by practice: this approach lacks documented cases of forming outstanding abilities or nurturing genius in the history of pedagogy.**



Neurons in the brain. Credit: Dr Jonathan Clarke. CC BY

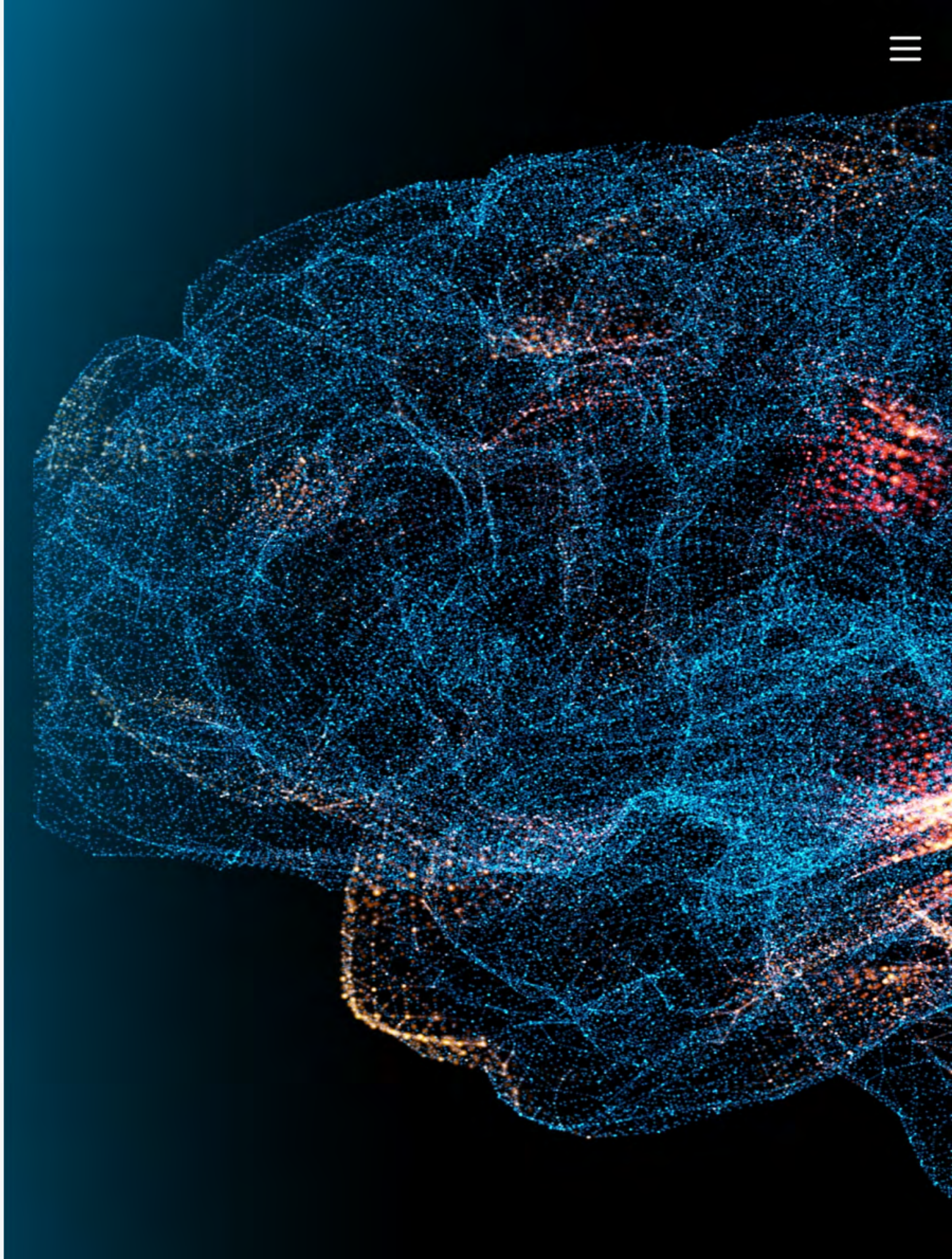
THE PARADOX OF HOW GENIUS ARE SHAPED THROUGHOUT HISTORY

In the biographies of outstanding minds, one can often observe a paradox: even future great geniuses must initially overcome resistance from their own brains. Frequently, future geniuses in childhood:

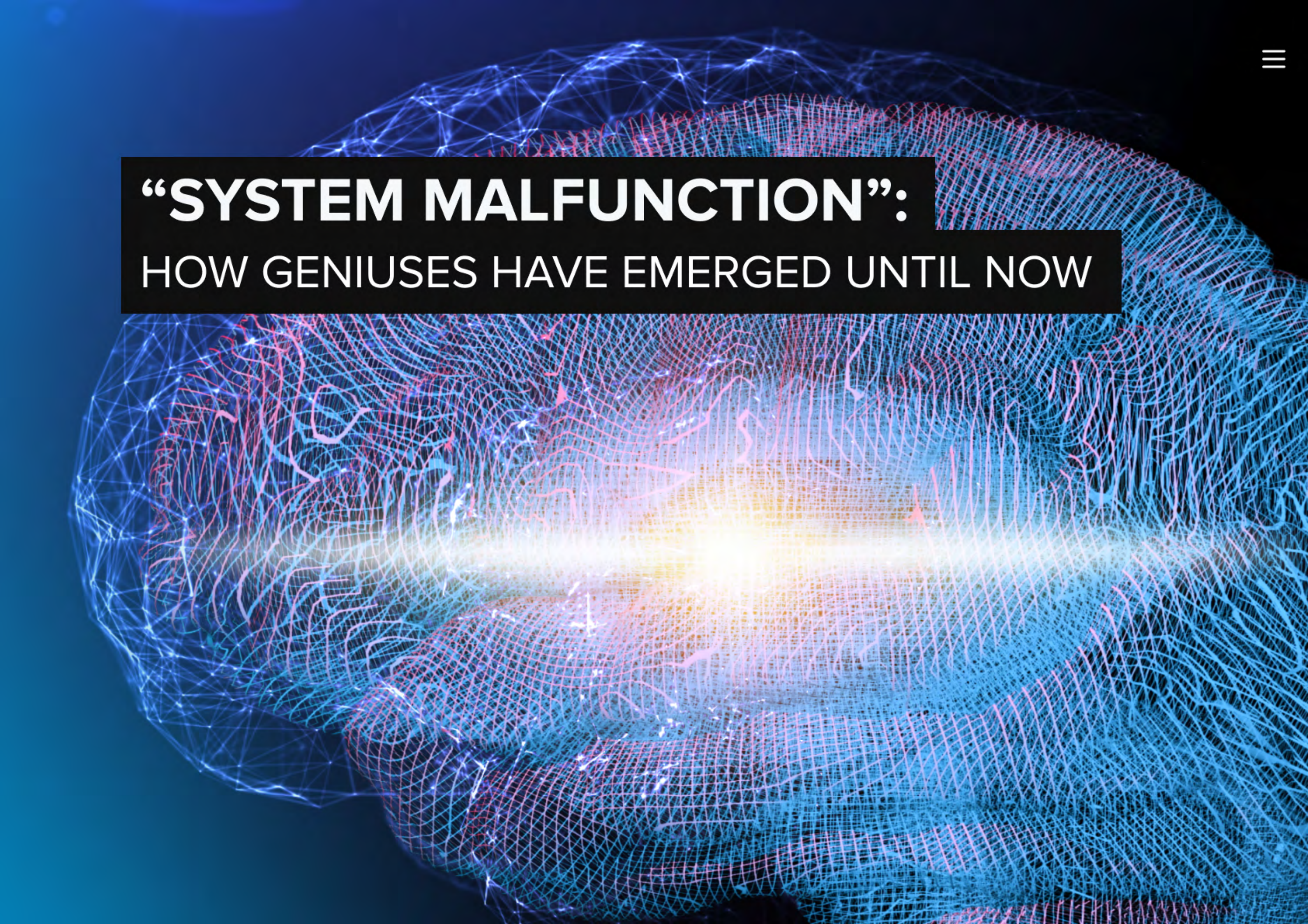
- Experience internal rejection of the very field in which they will make their future discoveries.
- Demonstrate apathy toward standard education, viewing it as routine and pointless.
- Often exhibit low academic performance, which obscures their unconventional thinking.

Many of them either, due to circumstances, did not receive a traditional school education or intuitively rejected it. Instead, they chose **the path of self-directed learning** through deep immersion in practice, which significantly contributed to the unlocking of their unique potential.

Often, overcoming the internal barriers set by the unconscious System 1 involved random circumstances that allowed individuals to bypass mechanisms of internal resistance and gain access to their hidden potential.



“SYSTEM MALFUNCTION”:
HOW GENIUSES HAVE EMERGED UNTIL NOW



At its core, genius is a pattern of neural connections — inherited from ancestors and refined over generations. These patterns are passed down through DNA, accumulating and intertwining within the brain's architecture. Often, a person may inherit several forms of latent genius that have remained dormant in their lineage for centuries, never once surfacing.

Then, at some point, in one particular descendant, that potential breaks through—like a river bursting through a dam. This is how the great minds of history have emerged.

But what sets this process in motion?

Throughout human history, the appearance of genius has been more of an **anomaly** than a pattern. The rare individuals who managed to unlock their potential did so due to a combination of internal factors and a unique set of circumstances—entirely beyond their control. It was an extraordinary coincidence, not the result of deliberate development.

Under normal conditions, genius remains hidden, seamlessly integrated into the brain's everyday activity. Its activation becomes possible only when **specific conditions arise**—such as access to specialized education or an unusual convergence of internal and external factors that **trigger a systemic disruption in the evolutionary regulatory mechanism designed to suppress the expression of genius.**

THE SUDDEN BREAKTHROUGH: WHY GENIUS CAN EMERGE UNEXPECTEDLY

Several factors may lead to the sudden emergence of hidden potential:

1

INTERNAL FACTORS

- **Congenital anomalies** (e.g., genetic mutations or structural brain abnormalities).
- **Acquired injuries** (such as neuroinfections or traumatic brain injuries).
- **Neuroplasticity:** When certain brain regions are damaged, neighboring areas—or the opposite hemisphere—can sometimes compensate by taking over lost functions. In rare cases, this compensatory rewiring may lead to the partial emergence of hidden potential. For example, savant syndrome in autism—where children demonstrate extraordinary abilities in specific areas, such as memory or mathematical calculation.

2

EXTERNAL CONDITIONS

- **Compensatory Adaptability of the Psyche:** The brain stores the potential for exceptional abilities as a hidden reserve, which may be activated under critical conditions—such as when facing existential challenges or prolonged stress. Traumatic experiences may **recalibrate the emotional filters of System 1 and partially disable the "lock" that suppresses latent potential.**
- **Early and well-tailored education:** As a child matures, the influence of the unconscious System 1 intensifies, making it increasingly difficult to overcome internal resistance to uncovering true talents. Effective, specialized learning during childhood—especially when it nurtures curiosity in areas of latent ability—can become the key to unlocking genius.

In the past, the emergence of genius became possible due to a systemic disruption in neural processes—one that weakened or completely disabled the unconscious regulatory mechanism.

As a result of internal or external factors—or a combination of both—the emotional barrier of the unconscious System 1, which typically restricts access to hidden potential, can fail. When this happens, a person begins to naturally gravitate toward areas in which their innate, dormant potential manifests with extraordinary force.

However, all known geniuses of the past were outliers—rare exceptions. Their emergence was the result of a fortunate convergence of circumstances, a glitch in the evolutionary mechanism. **Had the trajectory of their lives or the conditions they faced shifted even slightly, their genius might never have surfaced.**

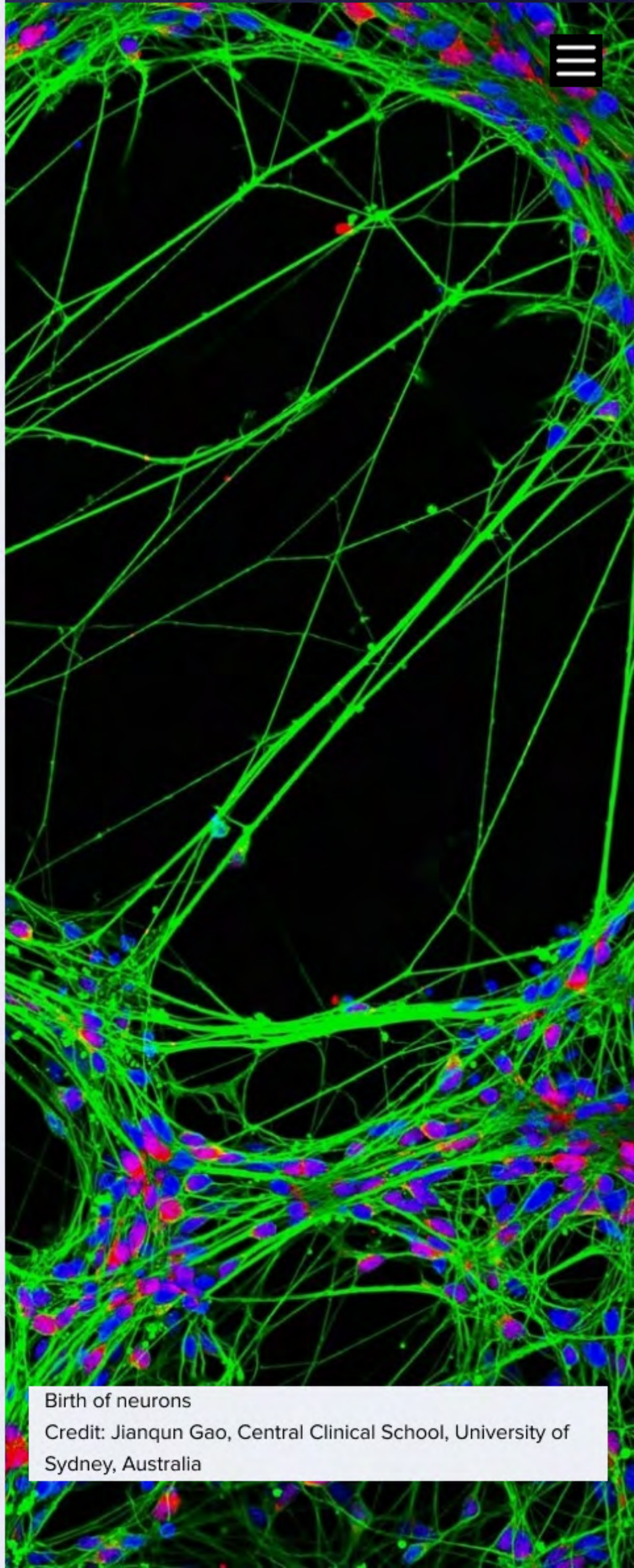
It was the alignment of these rare factors that allowed humanity to acquire the technologies that changed the world. After all, it was geniuses who brought us the bow, revolutionizing hunting; the printing press, which launched the mass spread of knowledge; internal combustion engines, modern devices, and artificial intelligence. **Everything—from the first wheel to spaceflight—has been the result of genius emerging by chance in a few extraordinary individuals.**

However, most people go through life without ever discovering their hidden potential—because their brains continue to operate according to their evolutionary programming.

But what if we could transform the discovery and development of genius into a conscious, guided process? What kind of breakthrough would humanity achieve then?

This is the driving purpose behind the World of Geniuses project: to ensure that the emergence of genius is no longer a rare accident but a consistent and predictable phenomenon.

> **Genius lives within everyone—and our mission is to help it emerge.**
>
> WORLD OF GENIUSES



Birth of neurons
Credit: Jianqun Gao, Central Clinical School, University of Sydney, Australia

CHILDREN AS UNIQUE RESEARCHERS

Modern research in cognitive development, including the work of Alison Gopnik, a professor of psychology at the University of California, Berkeley, offers a new perspective on the nature of children's cognition. Instead of the outdated view that children as “underdeveloped adults,” **they are seen as completely unique members of humanity with a special way of thinking that is evolutionarily attuned to exploration and learning.**

BABIES ARE BORN EXPERTS, NOT BLANK SLATES

In addition to a latent potential for genius, every infant is born with an innate foundation that makes it possible to view children as natural-born explorers of the world.

John Locke’s idea of the child’s mind as a *tabula rasa*—a blank slate shaped solely by external influences—has been overturned by modern research. Despite their immaturity, **newborns' brains are already structured and contain a multitude of specialized neural networks shaped by evolution.** These networks provide inborn intuitions about physical laws, numbers, probability, and even social interaction.

Innate Understanding of Physics

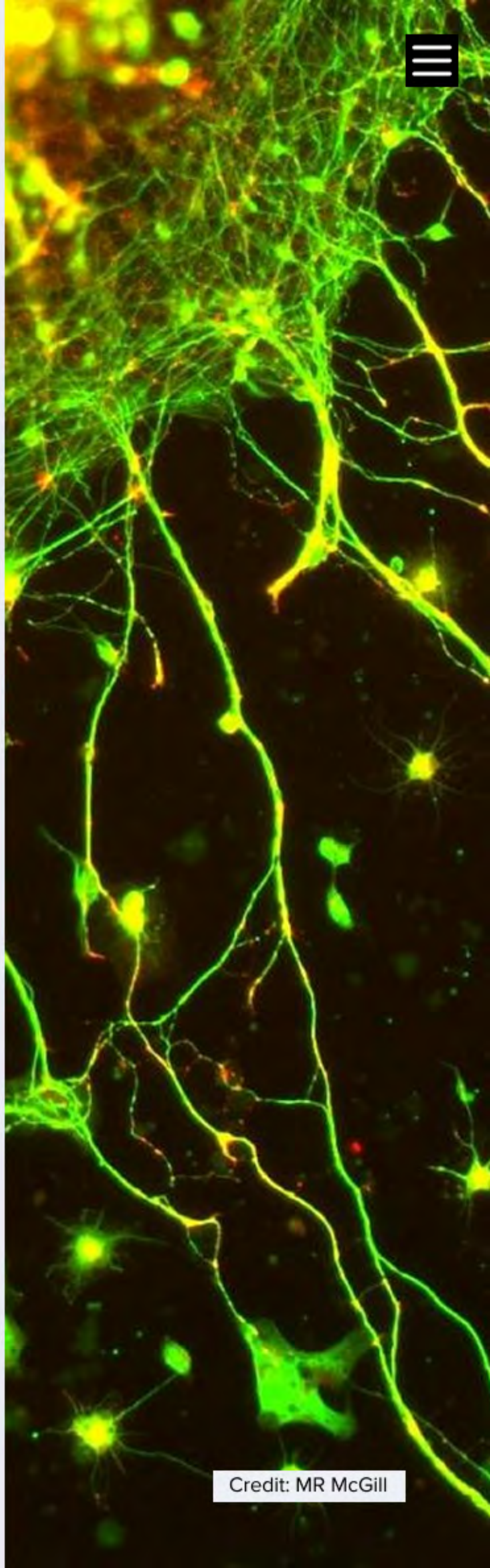
Research shows that infants are born with a basic understanding of physical laws. They expect objects not to pass through one another, not to disappear without cause, and not to exist in two places at once. When these rules are broken—such as when a toy “teleports” (vanishes in one spot and reappears in another without visible movement)—infants react with surprise. This phenomenon, known as the *violation-of-expectation* effect (Spelke, 1994), confirms that babies possess an internal model of the physical world. This evolutionarily embedded mechanism helps them perceive reality as an ordered system.

A Sense of Number

Infants **recognize quantity without being taught.** Studies show that babies as young as 2 to 3 days old react to changes in the number of objects—for instance, distinguishing between 4 and 12 dots. This indicates that the brain is already “pre-wired” for quantity assessment—a capability formed before birth. (Izard et al., 2009).

If a 4- to 5-month-old infant is shown a sequence like “1 object + 1 object = 3 objects,” they tend to stare at the outcome longer—demonstrating an intuitive expectation of the correct result (Karen Wynn, 1992).

These abilities are present before the child has any experience with counting or learning number words.



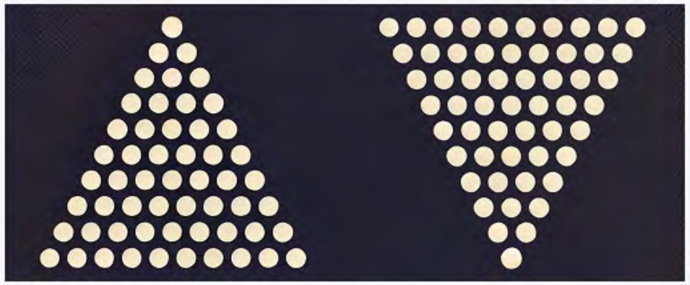
Credit: MR McGill

Experiments confirm that the innate ability to distinguish quantities is an evolutionarily ancient mechanism—not unique to humans but also found in other species such as monkeys, crows, chicks, and even fish.

Beyond physics and arithmetic, infants also possess basic intuitions about psychology and social interaction. From the **earliest months of life**, they demonstrate remarkable abilities to analyze the world around them—including an intuitive distinction between living and non-living objects and a foundational understanding of social dynamics.

Face Recognition

Studies show that even a fetus in the womb displays a preference for face-like images. In experiments, three dots arranged in the shape of a human face drew more attention from the fetus than the same three dots arranged in a pyramid shape. This suggests that the brain is innately tuned to detect socially significant stimuli (Reid, V. M. et al.. 2017).



An Inborn Sense of Pedagogy

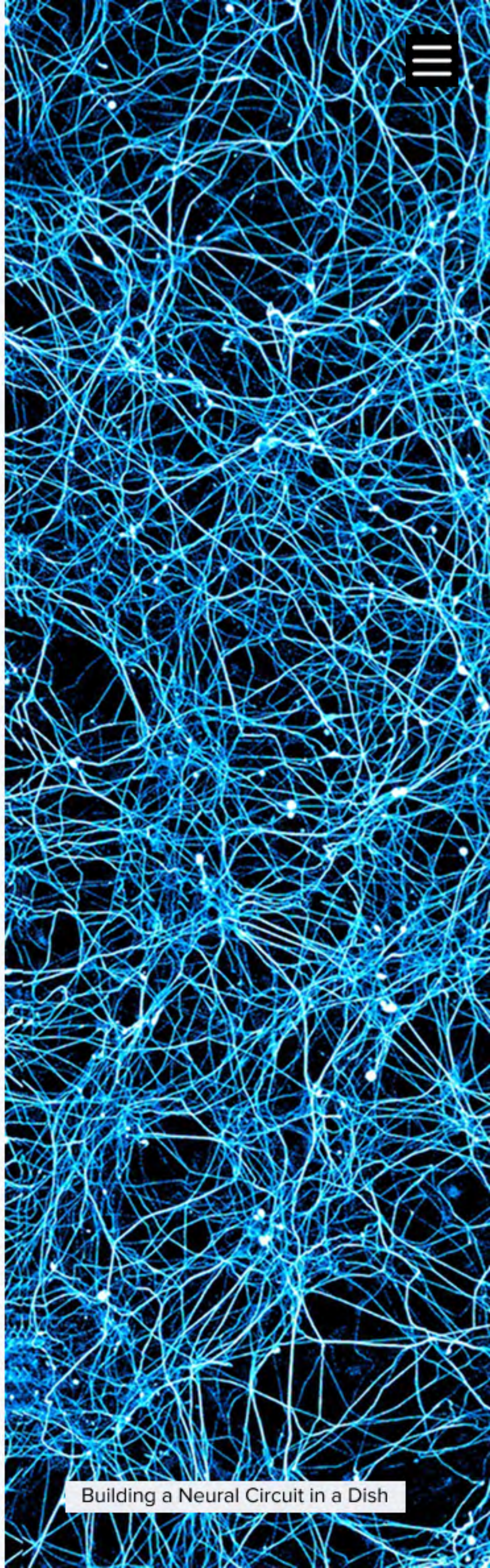
By the age of one, children can already recognize when someone is trying to teach them—distinguishing between an ordinary action and one intended as instruction. This skill plays a crucial role in the learning process (Csibra, G., & Gergely, G., 2009).

The Language Instinct — A Built-In Program of the Brain

The human brain is equipped with an innate language instinct. This universal mechanism allows children to acquire any language in the world. Infants are born with a unique ability to distinguish all the sounds of all human languages.

Unlike adults, who typically perceive only the sounds of their native language, infants under one year old retain a universal sensitivity to phonemes. For example, Japanese infants under six months old can distinguish between [r] and [l]—even though in their native language, these sounds are treated as one. By the end of the first year, however, this perceptual openness narrows under the influence of their linguistic environment, and they begin to specialize in the sounds of their native language (Kuhl, P. K., 2004).

Japanese hieroglyph



Building a Neural Circuit in a Dish

In the first months of life, infants actively gather the statistical patterns of language: they analyze the speech around them, identifying regularities in sounds, syllables, and intonation. By listening to adult speech, they use their innate computational abilities to analyze and “crack” the linguistic code. Even when exposed to mistakes in adult speech, children learn language flawlessly—demonstrating their remarkable capacity for analysis and generalization.

A child doesn’t simply copy what they hear. They decode an extraordinarily complex system of rules, internalize them in the brain, and begin using those rules to communicate.

Within just a few months, infants exhibit astonishing capabilities: they distinguish phonemes, prosody, vocabulary, and even basic grammatical structures. By their first birthday, they’ve already laid the foundation for understanding the structure of their native language.

An Evolutionary Foundation

Modern research shows that the newborn brain is an evolutionarily tuned system—already embedded with core rules about the world. This foundation makes the child a natural explorer, equipped with all the essential tools for learning and adaptation.

> **The newborn brain is an evolutionarily tuned instrument—optimized for rapid development.**

HOW INFANTS USE SCIENTIFIC METHODS: PLAY, OBSERVATION, EXPERIMENTATION

Infants engage in learning using mechanisms that are strikingly **similar to the scientific method**. They **generate hypotheses** about the world, test them through **experiments**—such as playing with objects—**gather evidence, analyze outcomes**, and revise their initial assumptions.

Early childhood learning happens not through deliberate instruction but through **free exploration of the world—at a pace and with a level of creativity that exceeds that of trained scientists.**

THE PARADOX OF CHILDHOOD LEARNING

Despite the brain's immaturity, children master exceptionally complex skills—from language and social norms to the fundamentals of physics and mathematics—with **a level of efficiency that adults simply cannot match.**

The uniqueness of childhood cognition has a neurobiological basis:

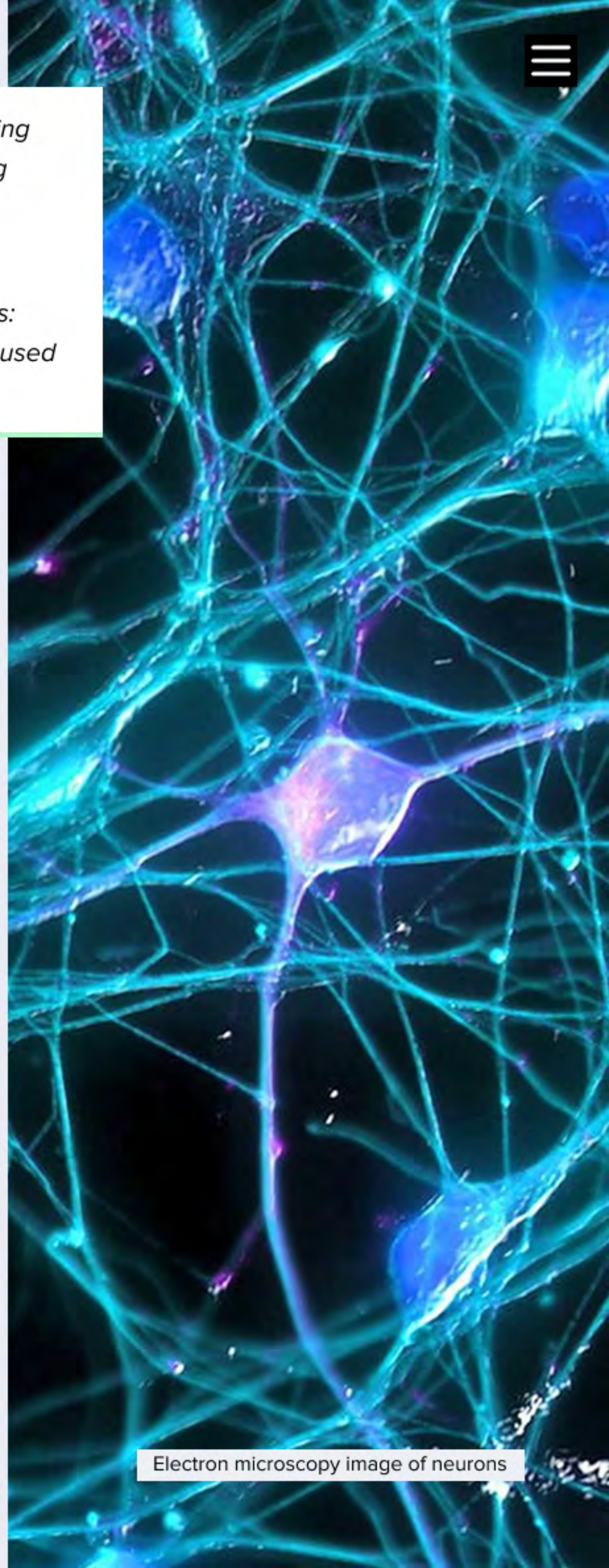
- **Redundancy of neural connections. A child's brain initially contains far more neural connections than an adult's.** This surplus allows them to process vast amounts of information and explore a wide range of learning strategies. However, as they grow, unused connections are gradually eliminated through a process known as synaptic pruning. As a result, the brain becomes more specialized and efficient at performing tasks required for daily life. Over time, **adults lose the ability to explore a broad range of new scenarios** as their brains become optimized for solving specific, familiar problems.

The infant brain resembles a network of narrow, winding streets: neurons form millions of connections, enabling flexibility and the ability to solve problems in unconventional ways.

The adult brain is like a system of optimized highways: frequently used pathways are reinforced, while those used rarely disappear.

- In early childhood, the brain is marked by **high plasticity, cognitive flexibility, and a natural openness to experimentation.** However, information processing in children is slower due to incomplete axonal myelination and the immaturity of the prefrontal cortex.

  The adult brain, on the other hand, operates more quickly but sacrifices flexibility. It relies on a limited set of pre-established, automated patterns that accelerate the resolution of routine tasks and conserve time and energy. Yet this efficiency comes at a cost: a reduced ability to undergo radical change or adapt to unfamiliar circumstances.



Electron microscopy image of neurons

DIFFERENCES BETWEEN CHILD AND ADULT THINKING:

- Children specialize in **exploration and the generation of new ideas,** while adults focus on the practical application of existing knowledge.
- A child's brain **isn't locked onto a single task;** it remains open and highly flexible, allowing infants to entertain multiple hypotheses at once—unconstrained by predefined categories or cognitive templates.
- An infant's brain gathers information **three times faster** than an adult's. For example, children can intuitively grasp grammatical rules simply by listening to speech. However, this rapid learning doesn't happen through focused study—it occurs **through free play and observation.**
- Children **explore all potential pathways for development.** Adults, by contrast, rely on the most efficient solutions already discovered.

Research shows that **childhood is not merely a preparatory stage for adulthood but a unique period in which the brain reaches its peak capacity for creativity and experimentation—laying the foundation for limitless exploration and discovery.**

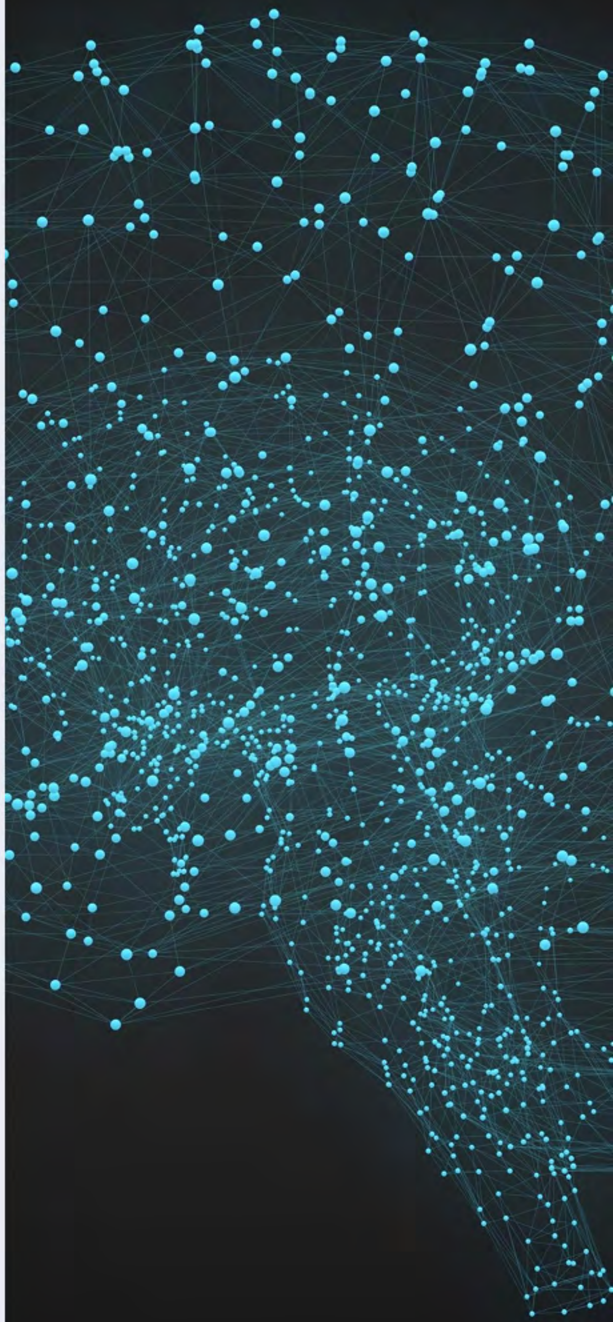
Children as a Distinct "Species" Within the Human Species

Children are **active explorers of the world, equipped with innate abilities and learning mechanisms.** Studying how they think reveals the very processes by which the human mind takes shape. Their brains—flexible, open, and **still forming into the adult version**—remind us that adults are, in essence, **just a highly specialized version of what children once were.**

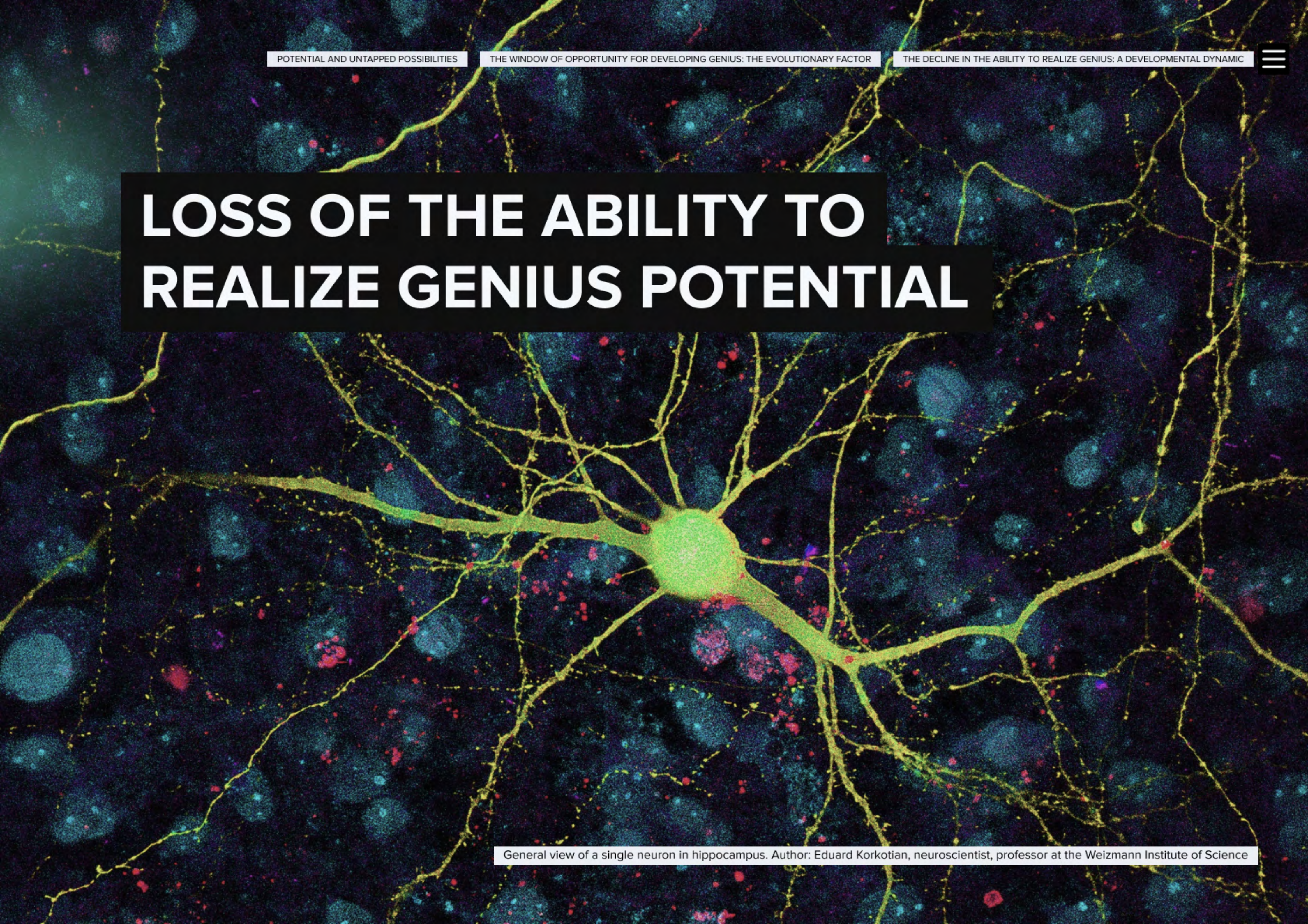
In a sense, children can be viewed as a distinct "species" within our own—so unique and effective are their ways of learning and knowing.

> **Children are not simply miniature adults; they are a special kind of being, designed for discovery.**

(Gopnik, 2016, The Gardener and the Carpenter)



LOSS OF THE ABILITY TO REALIZE GENIUS POTENTIAL



General view of a single neuron in hippocampus. Author: Eduard Korkotian, neuroscientist, professor at the Weizmann Institute of Science

POTENTIAL AND UNTAPPED POSSIBILITIES

Modern neurobiological research reveals a remarkable phenomenon: every newborn possesses a unique set of neurophysiological traits—**prerequisites for exceptional cognitive development.**

1

First, the infant brain exhibits unprecedented **neuroplasticity**, driven by an overabundance of synaptic connections. During this period—peaking around ages 2 to 3—the density of synapses **exceeds that of the adult brain by a factor of 1.5 to 2**. This forms a multitude of "draft" neural circuits, which serve as the foundation for the formation of complex neural networks.

2

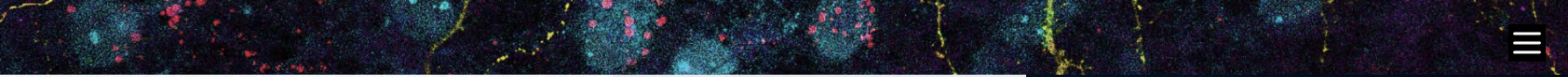
Second, studies of cognitive development show that children naturally apply a **methodology akin to scientific inquiry.** This innate investigative approach mirrors the thinking patterns of leading scientists and inventors, making it possible to draw parallels between early **childhood cognition and “genius-level” thought processes.**

3

Third, from birth, the human brain carries an **evolutionarily developed potential for genius.**

This unique combination of neurophysiological and cognitive factors creates the foundation for achieving what can be called the **anthropological maximum in adulthood—the optimal realization of human potential.**

And yet, we observe a paradox: despite these extraordinary early capabilities, most individuals reach adulthood with a standardized level of cognitive ability that **falls significantly short of what is neurologically possible.**



Neurobiological data show that the structural and functional differences between the infant and adult brain are so pronounced that they may be regarded as two distinct neurophenotypes within the same biological species.

This phenomenon raises a profound question: **why would evolution shape a system in which the original state (the child), endowed with exceptional adaptive advantages—hyperlearning capacity, creativity, and neuroplasticity—transforms into a final state (the adult) that loses these key traits?**

Some researchers in the field of neuroontogeny describe this transformation not as progressive development but as a form of devolution (from the Latin devolutio, meaning "reverse development").

Metaphorically, this process can be likened to a reverse metamorphosis of a butterfly: whereas a caterpillar transforms into a more advanced form, humans appear to do the opposite—an organism with immense developmental potential transitions into a more constrained state.

It is as if the butterfly enters the cocoon... and never emerges again.

Evidently, significant changes occur during the maturation process that limit the potential initially present in childhood. The key factors involved are:

1

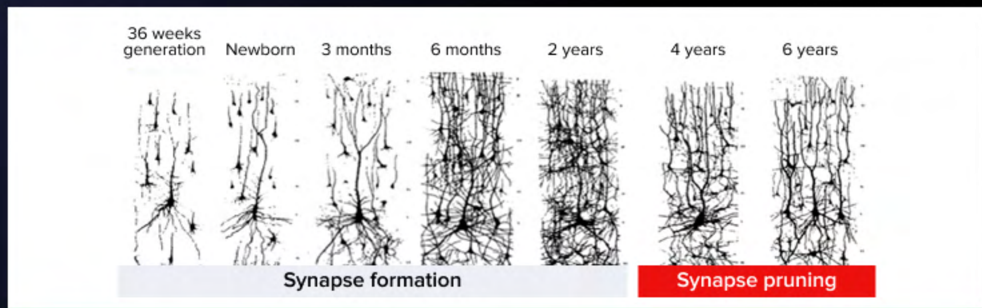
Synaptic Pruning (Neural Connection Trimming):

Research shows that **the peak density of neural connections occurs around ages 2 to 3. After this peak, a gradual reduction begins.** This process—known as synaptic pruning—is an evolutionarily programmed mechanism of optimization that eliminates excessive or rarely used neural connections, preserving only the frequently utilized and functionally essential ones.

While this enhances the brain's operational efficiency, it also reduces its plasticity.

Synaptic pruning unfolds gradually and affects different regions of the brain at different times. The timing and intensity of pruning can vary between individuals and are influenced by numerous factors, including experience and environment:

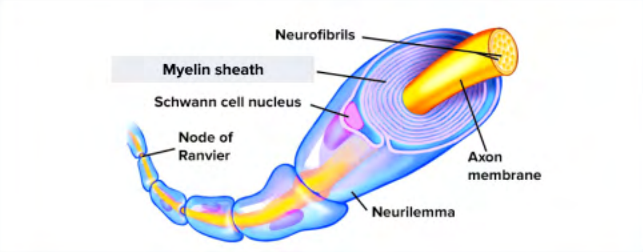
- **Early synaptic pruning** (before ~age 7) primarily impacts sensory and motor regions, as well as basic cognitive functions essential for adaptation to formal education.
- **During adolescence,** pruning shifts toward the prefrontal cortex, where selective elimination of weak synapses reorganizes executive functions such as planning, emotional regulation, and decision-making. The prefrontal cortex continues to develop and refine itself through the mid-20s.
- **Full "adulthood"**—that is, the maturation of the brain, including the optimization of neural networks and the complete development of the prefrontal cortex—occurs between **the ages of 25 and 30.** This process is accompanied by continued myelination, particularly in the prefrontal cortex.



2

Myelination:

The process of coating axons with a myelin sheath concludes by the end of **the second decade of life.** This significantly increases the speed of neural signal transmission, but at the cost of reduced plasticity.

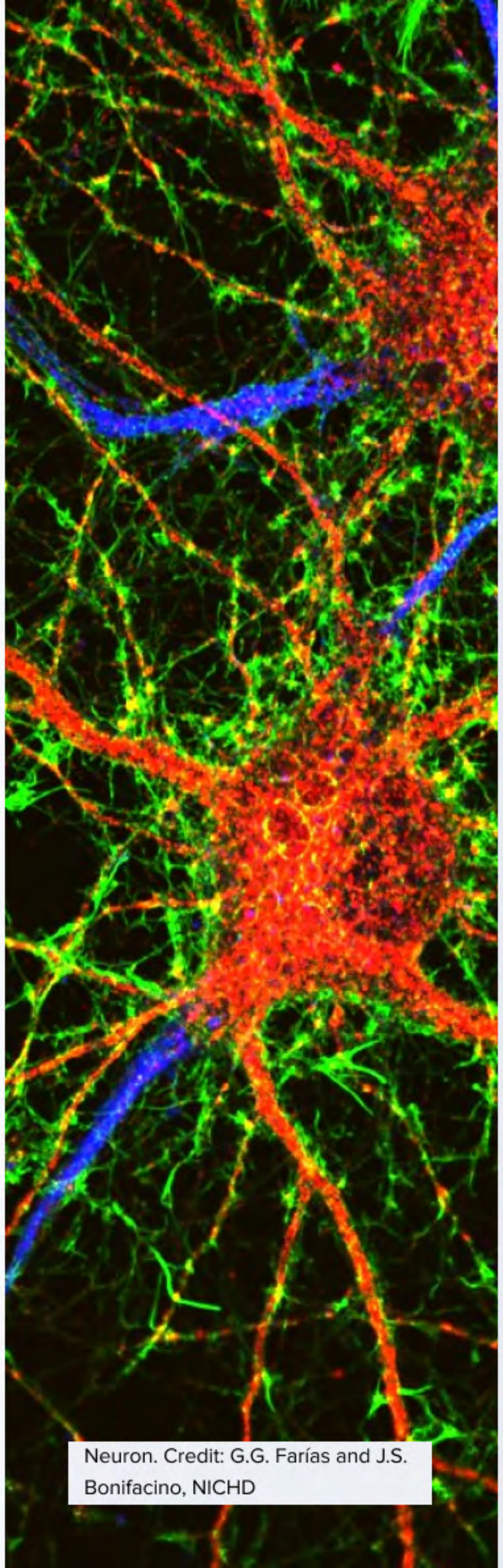


3

Restriction of Sensitive Periods:

Once sensitive periods have ended, the brain becomes less plastic and less responsive to new stimuli. For instance, learning languages at an older age requires more effort and time. As a result, if learning begins too late, the development of certain abilities may be hindered or never fully realized.

All of these processes contribute to the stabilization of neural networks in adulthood. However, they also **lead to the loss of the capacity to unlock the innate potential for genius,** as the high level of neuroplasticity essential for realizing that potential gradually declines.



Neuron. Credit: G.G. Farías and J.S. Bonifacino, NICHD

“Social Pruning”: How Education and Culture “Optimize” the Brain

In addition to natural neurobiological processes such as synaptic pruning and neural network optimization, **sociocultural factors** also play a significant role in reducing cognitive plasticity.

The standardization of educational systems and adherence to cultural norms often accelerate the loss of innate creativity by limiting intellectual freedom and suppressing imagination and exploratory curiosity.

For example, modern education systems tend to emphasize formulaic solutions and correct answers, which discourages experimentation and creativity while fostering a fear of making mistakes.

Instead of cultivating divergent thinking—the ability to generate multiple ideas—these systems largely reward convergent thinking, which focuses on finding the single correct answer.

This leads to functional reorganization in the brain: the neural networks responsible for creative thinking are activated less frequently and, over time, begin to fade from use.

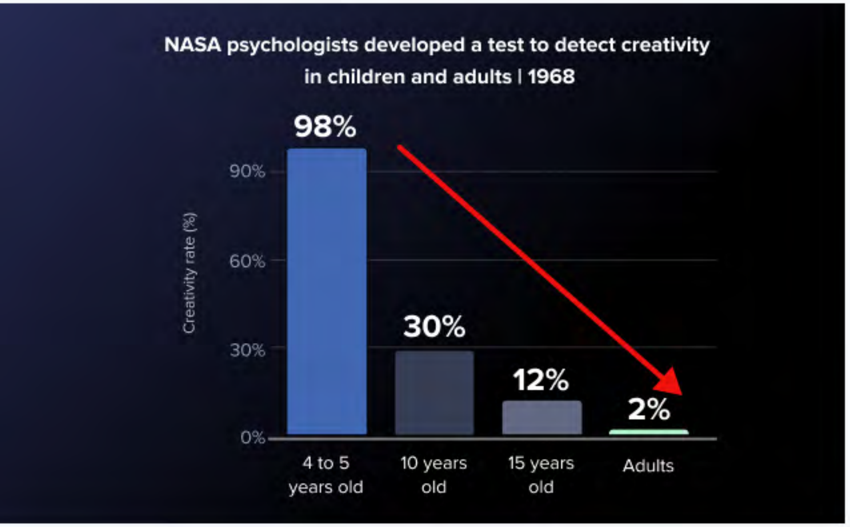
Cultural Norms Worsen the Process

In societies that prioritize predictability and obedience, children adapt more quickly to standardized behaviors. Studies show that in such environments, even **biologically intact plasticity remains untapped—the brain becomes optimized to meet narrow social demands.**

THE NASA TEST: 98% OF CHILDREN ARE GENIUSES—WHY DO ONLY 2% OF ADULTS REMAIN SO?

In 1968, NASA psychologists developed a test to measure creativity in children aged 4 to 5. When 1,600 children were tested, **98% demonstrated a level of creativity consistent with genius.**

However, when the same children were tested again at ages 10 and 15, their creative scores dropped to 30% and 12%, respectively. When the test was later administered to 280,000 adults, **only 2% scored at the genius level in creativity.**



This study demonstrates that nearly all children are born with unique gifts and the potential for genius. But over time, these qualities fade—not because they disappear, but because they are overlooked and left undeveloped.

THE BRAIN BEFORE AGE 25: EVOLUTION'S CONSTRUCTION SITE

Synaptic pruning (the selective elimination of neural connections), age-related declines in neuroplasticity, and the gradual fading of innate exploratory behavior—all of these factors directly influence the ability to realize the brain's inborn potential for genius.

The temporal aspect of this process is particularly significant, defined by the convergence of two key factors. On the one hand, **evolutionary mechanisms** responsible for generating and refining new and promising neural connections—the future potential for genius in subsequent generations—**are most active** during the period of maximal neuroplasticity, which lasts **until approximately age 25.**

On the other hand, this same age range represents the most favorable biological and neurobiological window for unlocking the genius potential **already** embedded within an individual.

This convergence gives rise to a compelling paradox: the **window of opportunity** for actualizing innate genius overlaps with the very phase during which evolution is actively "at work," transforming the brain's "gray areas" into new areas of genius.

Let's take a closer look at these processes.

THE WINDOW OF OPPORTUNITY FOR DEVELOPING GENIUS: THE EVOLUTIONARY FACTOR

Many researchers have asked a fundamental question: **why did evolution "gift" humans such an unusually long period of childhood and learning?** While most animals reach functional maturity relatively quickly, humans maintain high brain plasticity until around the ages of 20 to 25. Why, then, did nature allocate the entire first quarter of life to learning and development?

This unique phenomenon—known in scientific literature as the **"extended neuroplastic period"** or **"extended childhood"**—is not merely a lengthened timeframe for acquiring knowledge. Rather, it is a complex biological mechanism meticulously refined by **evolution**.

During this prolonged phase, the **brain engages in intensive work on its "gray areas,"** laying down a foundation of neural potential that can be passed on to future generations.

What accounts for the duration of this period?

As previously noted, every child is born with a unique potential for genius. However, **System 1 is evolutionarily "programmed"** not to unlock existing potential, but **to generate new possibilities across successive generations.**

For this reason, the brain tends to make dormant already-formed neural patterns—where genius may be encoded—to free up resources for creating new connections and developing promising patterns in the brain's grey areas.

However, there is one crucial detail: **human life is too short.** Evolutionarily "programmed" System 1 has only a limited window of time to form promising neural connections that can be passed on to offspring. **On average, the human reproductive age—the period during which individuals typically have children—is around 25 years.**

It is precisely during this timeframe that System 1 "aims" to complete the formation of those neural patterns that will be transmitted to the next generation.

The first quarter of life becomes a critically important period during which evolution has the opportunity to implement its upgrades—so that a person can pass along an enhanced genetic and cognitive potential to their descendants.

At approximately the same age—around 25 years—the **maturation of the prefrontal cortex** is completed, accompanied by the stabilization and consolidation of neural networks.

After this point, evolution ceases its active work on developing promising neural patterns in the human brain and shifts its focus elsewhere:

- Programs geared toward survival and caregiving are activated;
- Resources are redirected toward sustaining parental instincts and the socio-cultural transmission of already established and validated skills.

With the onset of the reproductive peak (approximately ages 25–35), evolution "concludes" its work on the individual and ceases active development—even within the brain's grey areas. From that point on, the individual continues along a path of cognitive development shaped by unconscious mechanisms. However, the primary task now becomes the nurturing and development of the next generation, where evolution's "work" on grey areas begins all over again.

Thus, evolution operates under strict time constraints, concentrating its efforts on creating new talents and forms of genius for future generations rather than enhancing those that already exist. This helps explain why innate genius so often remains unrealized: **the brain sacrifices individual genius in favor of creating the possibility for a more advanced configuration of the mind in its descendants.**

"Genius is born from other geniuses—tragically, unrealized ones."

Before the completion of synaptic pruning (around age 25) and full maturation of the prefrontal cortex, there remains a critical **"window of opportunity" in which the genius already shaped by evolution can still be revealed.**

This window offers a chance to realize one's innate potential—yet the extent to which it is fulfilled depends greatly on the developmental stage at which this process occurs.

THE DECLINE IN THE ABILITY TO REALIZE GENIUS: A DEVELOPMENTAL DYNAMIC

Alongside the process of synaptic pruning, not only does the number of neural connections decrease, but the potential pathways for realizing genius also diminish. **The brain gradually eliminates the "drafts" of neural networks—configurations that could have been activated if the genius-related neural patterns had been engaged.**

The older the child becomes, the more connections have already been lost, and the lower the probability of fully unlocking their innate abilities.

This gradual loss of the ability to realize genius unfolds in stages. It is closely linked to age-specific periods of synaptic pruning and the maturation of neural structures. However, because the "blocking" of genius potential is inseparably tied to the unconscious mechanisms of System 1, this process has its own unique characteristics.

Three Critical Thresholds in the Loss of Genius Potential

- **By age 6**, approximately **20% of the potential for realizing innate genius is lost**—if no deliberate development has occurred in the appropriate direction before this age.
- **By ages 12–16**, an additional 40% is lost.
- Between approximately **25–35 years**, the remaining **40**% is gradually diminished.

WHY DOES THIS HAPPEN?

In addition to the gradual elimination of unused neural connections—many of which could have been instrumental in activating latent genius—an equally significant role is played by the automatic, unconscious System 1, which increasingly influences a child's development.

Around the age of 5–6, children become more self-aware. However, at the same time, **the influence of System 1 intensifies.** Evolutionarily, System 1 is programmed not to activate already formed neural patterns but to foster the development of new and promising connections—new talents and forms of genius—for future generations.

As System 1 begins to dominate, the internal **mechanisms that "block" access to existing genius become more active. Simultaneously, the internal resistance to unlocking one's potential grows stronger.**

After age 6, overcoming this internal barrier becomes significantly more difficult.

The second key point involves the development of System 2, which by this age becomes sufficiently mature to conduct an “audit” of the brain’s neural architecture. However, the neural patterns shaped by evolution that contain the potential for genius remain invisible to System 2 if they were not previously activated.

As a result, these patterns become inaccessible at the level of conscious thought. They are preserved in a “dormant” state under the control of the unconscious System 1—as part of an evolutionary “reserve.”

This further reinforces the “restrictive barrier” in the form of internal resistance to activities associated with the area of genius. **The child begins to perceive the emotional regulation signals generated by System 1 as personal preferences:** “I’m not interested in this,” “I’m bored,” “I don’t want to do this.”

“

Everyone Is Born a Genius—
But Not Everyone Remains One

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As a person ages, the “restrictive barrier” of System 1 intensifies, and with it, creativity and genius—as well as the capacity to develop them—gradually diminish.

Only rare exceptions exist: individuals whose genius emerged due to a disruption in this mechanism. Even then, it's essential to recognize that had someone like Einstein begun nurturing his genius at an earlier age, he might have made even more groundbreaking discoveries and contributed vastly more to science and human progress.

If a child’s area of genius is identified early—and active, targeted development begins as early as infancy, even around age one—there is a real possibility of preserving and fully developing the child’s innate genius potential, achieving up to 100% realization.

However, with each passing year, the number of lost opportunities increases, and many facets of that potential—left undeveloped—may be lost forever.

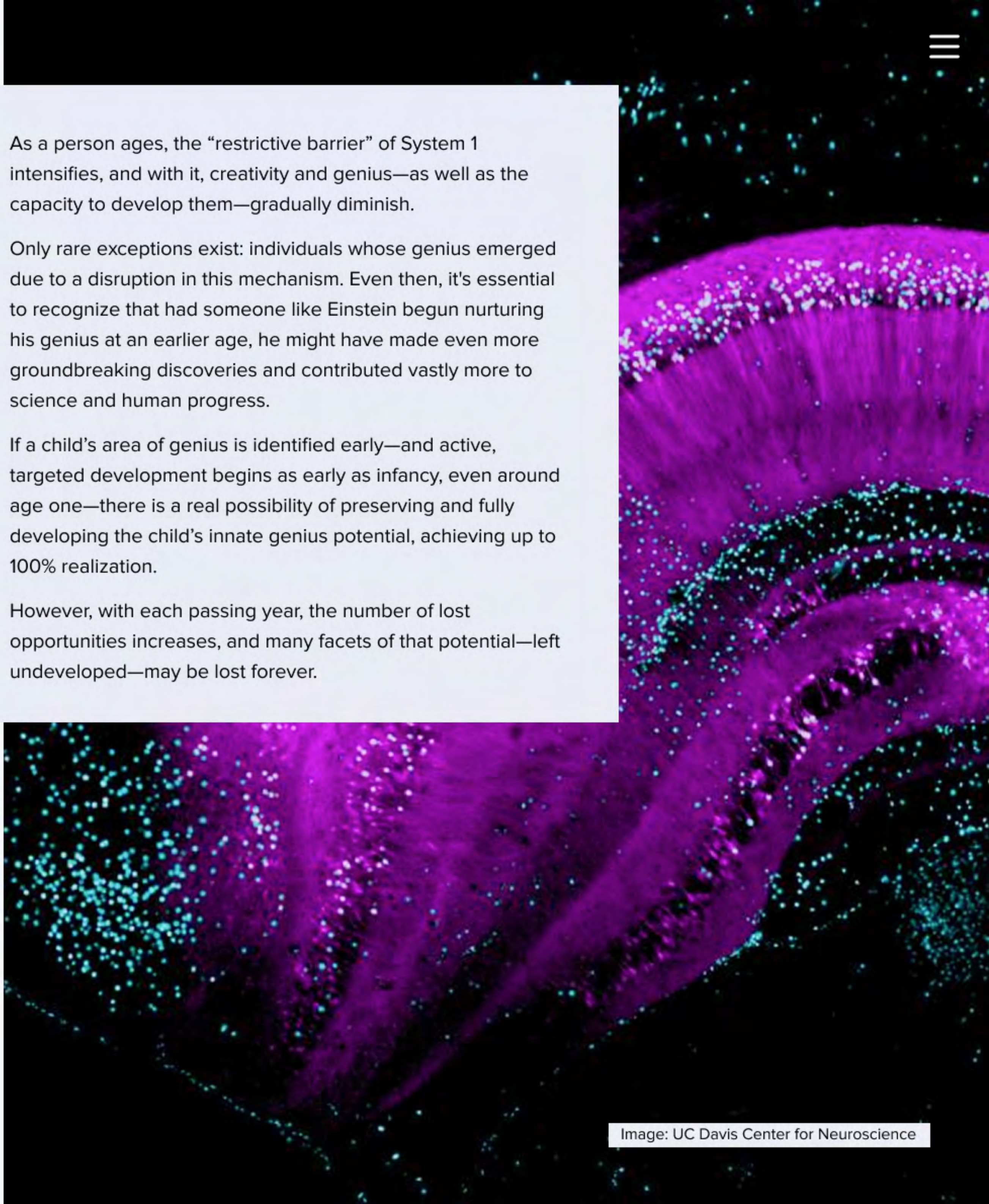


Image: UC Davis Center for Neuroscience

FROM UNFULFILLED POTENTIAL TO EVOLUTIONARY BREAKTHROUGH

Every child is born a genius. This is not a metaphor, but a scientific fact: the newborn's brain inherits the evolutionary mechanisms of an explorer's thinking and the immense potential for genius passed down from previous generations. Holding the baby in their arms, parents are embracing the future Einstein or Newton — but only if they recognize and nurture the innate abilities, developed by evolution, at the right time.

Modern research shows that **the key to unlocking genius lies in accurately identifying areas of genius and starting specialized education at the right time. The earlier** development begins, the greater the chances of preserving and fully realizing innate potential.

THE "GOLDEN" AGE FOR DEVELOPING GENIUS IS BETWEEN 1 AND 6 YEARS OLD.

The key factor in unlocking a child's potential is the timely start of specialized education at an early age—specifically between 1 and 6 years old. **The first year of life, when natural curiosity is activated, becomes a critically important moment, ideal for laying the foundation for development.**

Between the ages of 1 and 6, a child's brain retains its unique, innate settings that support the formation of an exploratory mindset:

- **High neuroplasticity**, enabling rapid skill acquisition;
- **Minimal synaptic pruning activity** (the natural process of "trimming" rarely used neural connections), which preserves cognitive flexibility;
- **Intensive formation of branched neural networks** for information processing;
- And a relatively low resistance threshold from the unconscious **System 1**, which facilitates the unlocking of genius potential.

It is these characteristics that make the age of 1 to 6 the **ideal time to begin developing innate genius.**

Targeted developmental methods can:

- **Optimize the process of synaptic pruning** (the natural removal of unused connections), slowing down its excessive activity;
- **Preserve more neural resources** by reducing the loss of functional connections;
- **Activate extensive neural networks**, including those that typically remain unused under ordinary conditions.

This is precisely why education focused on unlocking genius potential between the ages of 1 and 6 offers a unique opportunity **not only to preserve but to amplify a child's innate abilities**, laying the foundation for future discoveries.

THE "SILVER" PERIOD SPANS AGES 6 TO 16.

After the age of 6, unlocking a child's potential becomes more complicated:

- The first wave of synaptic pruning **has already reduced cognitive flexibility**, partially **eliminating the provisional "draft" sensory connections that—if nurtured earlier—could have served as a foundation for developing genius.**
- **Resistance from the automatic, unconscious System 1 becomes stronger**; its "restrictive barrier" manifests through emotional responses such as irritability, boredom, apathy, and diminished interest, along with internal resistance and subconscious avoidance of activities in the very domain where the innate potential is concentrated—that is, within the individual's genius area. Overcoming these limitations requires deliberate, conscious effort.

However, the brain at this age retains significant resources:

- **Moderate neuroplasticity** allows for adaptation to new tasks;
- **Synaptic pruning has not yet reached its peak activity,** leaving room for the formation of new connections.

This makes the **"silver" period an effective time to begin unlocking genius potential**, though it is less productive than early childhood (1–6 years).

THE "BRONZE" PERIOD—FROM AGES 16 TO 24—

is **the final significant window** for realizing innate genius potential. During this stage, neurobiological changes still allow for breakthrough development, but doing so **requires a more sophisticated and targeted approach.**

Key challenges of this period:

- **Peak synaptic pruning activity** — the "trimming" of unused neural connections reduces resources for forming new skills;
- Completion of prefrontal cortex maturation: **the brain gradually transitions from a flexible "experimental mode" to optimizing energy expenditure**, increasing reliance on established patterns. New learning strategies require more time than in childhood;
- Reduced neuroplasticity — **with each passing year or two, developmental tasks become increasingly more difficult.**

This period requires conscious effort and specialized methods, as the natural mechanisms of early learning are no longer available.

Although the "bronze" period is less effective than the earlier stages (1–6 and 6–16 years), it **remains critically important for those who missed the early start.** After the age of 24, neurobiological limitations become even more pronounced.

> **The age range from 1 to 24 years represents a critical "window of opportunity" during which the innate potential for genius can be realized.**
>
> WORLD OF GENIUSES

After the age of 25–35, the brain shifts into "evolutionary economy" mode, maintaining neuroplasticity but requiring significantly more effort for change. However, it would be a mistake to assume that development opportunities completely cease **after 25–35 years**. Despite a significant reduction in neuroplasticity compared to earlier periods, the brain retains the ability to form new neural connections throughout the whole life.

The possibility of “restarting” potential remains through:

- Targeted overcoming of cognitive barriers;
- Systematic formation of new neural networks;
- Emotional-volitional regulation to compensate for the resistance of System 1.

However, after this age threshold, even with intensive intellectual activity, an **individual will primarily develop talents**, while a significant portion of their innate genius potential will remain unrealized. After this age, the Quantum G test will only be able to identify the lost potential — the area of genius that was innate but remained unrealized.

The phenomenon of Einstein or Curie, who made their first great discoveries after the age of 25, demonstrates that with favorable circumstances, breakthroughs are possible even in later years. However, it is the **preschool age that represents the “golden” time for the maximum development of innate genius potential.**

PRESERVING THE "ORIGINAL CODE" OF HUMANITY

The phenomenon of excessive neural connection formation in the child’s brain remains one of the intriguing mysteries in neurobiology. According to one contemporary theory, **a human is born as a kind of ideal version. But over time, depending on the conditions of a given civilization and environment, the brain “specializes,” losing part of its originally embedded functional settings.**

In other words, human development is less about advancement and more about adaptation through simplification. Synaptic pruning—the process of trimming unused connections—acts as a biological algorithm that **calibrates us to meet the demands of society, technology, and culture**. The more monotonous (and therefore more primitive) the environment, the more drastically the neural networks responsible for creativity, multitasking, and sensory integration are pruned.

This process can be viewed as a form of forced degradation —a biological adaptation to the current stage of societal development. **At birth, a human being represents a potentially more advanced form, which then adjusts to the prevailing conditions of civilization, losing part of its original potential.**

This is precisely why the **Dark Matter Association**, in collaboration with the company World of Geniuses, has focused its efforts on developing a fundamentally new system of preschool and school education, set to launch by 2030. This system is designed to preserve each child's innate **neurobiological** potential and fully unlock its many dimensions. The program will give every child the opportunity to become who they were truly born to be—a **genius.**

At the core of this new educational model is a close alignment with the natural learning mechanisms that the child's brain is biologically "programmed" to follow. The key innovation of the system is its **neuroadaptive approach**, which takes into account all aspects of natural neuroplasticity and the specific functioning of the developing brain:

- **Individualized learning:** Development of a curriculum tailored to the specific developmental level of each child.
- **Comprehensive sensory stimulation:** Engaging all sensory systems and immersing the child in dynamic, multisensory environments that foster deep interaction and integration of information across neural networks.
- **Nature-aligned education:** Recreating conditions that closely mirror the brain's innate methods of absorbing information—play, exploration, experimentation, and discovery through direct experience.
- **Delaying pruning processes:** The program creates conditions that allow excess neural connections to be preserved for a longer period of time.

Holistic Perception: Why It's Vital to Develop and Preserve a Child's Unique Ability to Sense the World

In early childhood, a child possesses a rare, innate ability to perceive the world in a fully integrated way—through the combined operation of all sensory systems. The child doesn't simply see or hear—they sense the entire environment as a unified whole, picking up on even the slightest shifts in temperature, air movement, vibrations, scents, and other subtle signals.

This holistic sensory perception is a unique state in which all sensory systems—sight, hearing, touch, and proprioception—work in harmony to form a rich, multidimensional understanding of the world.

This phenomenon is most vividly observed through electroencephalogram (EEG) analysis: in preschool-aged children with preserved sensory development, a significantly larger number of neurons are engaged during learning. In contrast, adolescents who have gone through a standard education system show neural activity confined to narrow regions—an effect of diminished plasticity.

Purposeful stimulation of a child's sensorimotor development not only helps to "slow down" the process of synaptic pruning—making it more selective—but also enables the formation of stable neural ensembles that serve as the foundation for holistic sensory perception.

Deliberate support of all-encompassing sensory perception in early childhood allows this ability to be reinforced and preserved for life.

Scientific studies show that a sensory-enriched environment enhances neural connectivity. Therefore, a key component of the new educational model will be the comprehensive activation of all sensory systems, enabling the child's innate potential to be fully preserved and developed.

> **The future of education lies in recreating a multidimensional developmental environment and returning to the natural learning mechanisms embedded in the very architecture of the child's brain.**

HOMO GENIUS: PRESERVING WHAT NATURE HAS GIVEN US

Building on a deep understanding of the neurobiological mechanisms of the child's brain, the Dark Matter Association, in collaboration with World of Geniuses, is developing an innovative educational ecosystem. In this system, natural learning principles—refined by evolution—are seamlessly integrated with cutting-edge technological solutions, including immersive VR technologies. This fusion opens entirely new horizons for the development of human potential.

The innovative educational system being developed under the World of Geniuses project is fundamentally different from traditional models of education, which in many ways contradict the brain's evolutionarily designed pathways of development. Modern classroom-based systems, with their monotonous memorization and passive reception of information, are a relatively recent invention of civilization. For millennia, humans learned and evolved differently—through direct experience, active engagement with the world, activation of the mirror neuron system, observation, and imitation.

The key feature of this innovative educational system is the full activation of the innate learning mechanisms that a child's brain possesses from birth. One need only observe the phenomenal speed at which an infant learns about the world: every second, their brain forms thousands of new associative connections, comparing and analyzing information across multiple sensory channels. By engaging these natural mechanisms through a specially designed multisensory environment, we do more than build skills—we establish stable neural networks that, once activated, **will not be subject to pruning.**

This approach gives the child's brain a developmental experience that lasts a lifetime: the activated surplus neural connections do not disappear but continue to function, strengthening and expanding cognitive capacity.

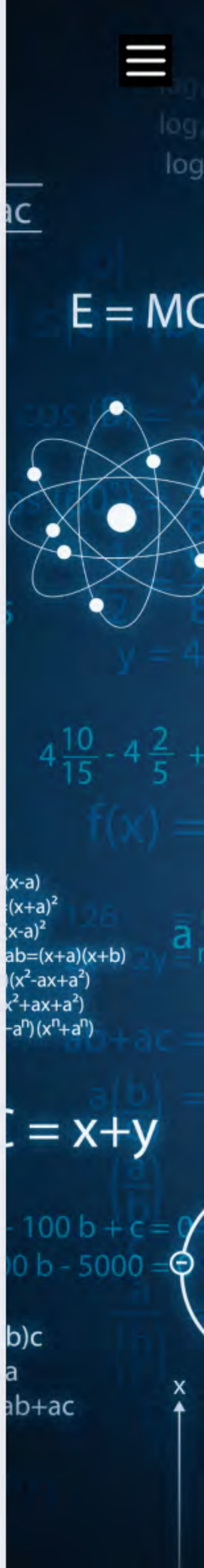
With this educational model—deliberately focused on unlocking genius—the development of exceptional cognitive abilities becomes an inevitable outcome.

It is difficult even to hypothesize the extraordinary speed and multidimensional growth the child's brain could achieve if its natural resources were preserved and its so-called "surplus" neural networks remained active through adolescence. These children's potential could manifest in forms of genius we are not yet capable of fully comprehending.

With this understanding, the Dark Matter Association has designated the development of an innovative methodology for preschool and school education as one of its strategic priorities. The Association has tasked World of Geniuses with developing a technological solution that will make it possible to establish a new educational system—starting from the earliest stages—to preserve and amplify each child's innate potential.

This will empower a new generation to become who they were truly born to be, unlocking their natural genius and extraordinary cognitive abilities rather than becoming mere products of modern civilization and a standardized education system.

The goal of the specialized, innovative educational system developed through the World of Geniuses project is to fully unveil the potential encoded in humans by evolution, allowing each person to fulfill their true purpose: to transform from **Homo sapiens** into **Homo genius**—the perfected version of themselves as intended by nature. **And the starting point for this transformation will be the widespread use of the Quantum G early genius identification system.**



ON THE THRESHOLD OF THE WORLD OF GENIUSES: THE PATH TO A NEW HUMANITY

Today, nearly **8 billion unrealized geniuses** live on Earth, with only a handful having unlocked their full potential. But now, as science reaches a deeper understanding of the true nature of genius and the mechanisms that activate it, for the first time in history, humanity has the opportunity to fully harness the resources of the human brain. This offers immense hope and opens up extraordinary possibilities for our entire civilization.

The modern human brain already engages 1.5–2% more neural connections than that of 19th-century intellectuals—a result of the preservation and accumulation of genius potential over the course of evolution. Yet, **at this rate, the natural evolutionary refinement of humankind would still take millions of years**. Now, thanks to a systematic approach to developing genius, we can compress that timeline into a single generation.

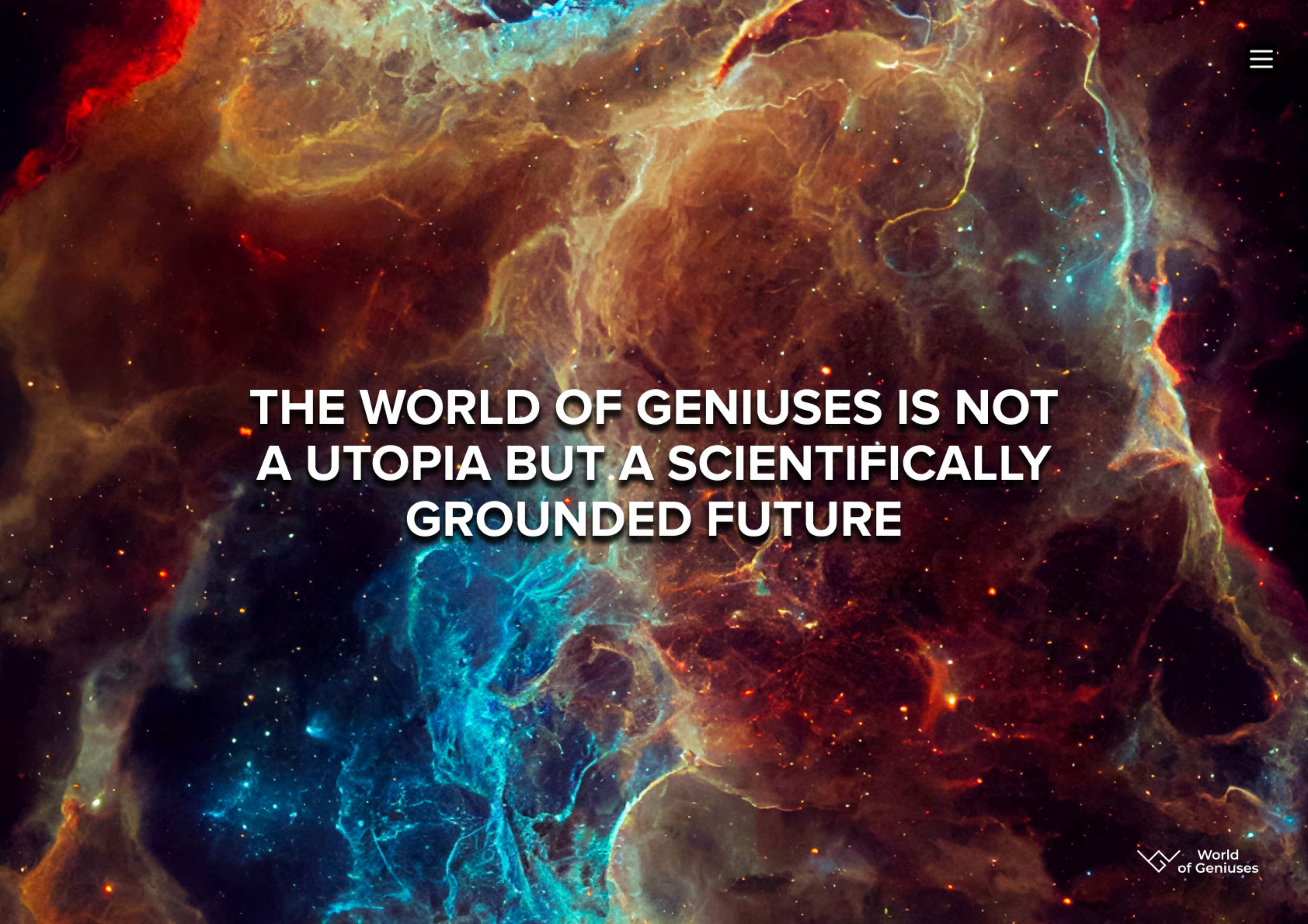
We stand at the dawn of a new era—one of intentional human potential activation, where evolution becomes a guided process. **Finally, we have the ability not only to preserve innate potential but also to amplify it.** This path leads to the emergence of a new kind of human—one capable of utilizing 100% of their brain's resources, with an intellect fundamentally beyond the reach of artificial intelligence.

We are standing at the threshold of the transformation from Homo sapiens to Homo genius.

Imagine a world where not hundreds or thousands, but millions of people realize their genius potential. **A world where millions of minds with the creative power of Leonardo da Vinci, Albert Einstein, or Marie Curie are active simultaneously.** A society capable of producing scientific and technological breakthroughs at an exponential rate. After all, true geniuses retain their ability to innovate throughout their lives.

> **The only limit to what geniuses can achieve is the length of their lifespan.**
>
> WORLD OF GENIUSES

In just 50 years of such development, scientific and technological progress could elevate society to heights we cannot even begin to imagine today. This is more than an acceleration of progress—it is the possibility of **reaching a qualitatively new stage in the evolution of civilization.** Today, this is no longer a hypothetical concept but a set of concrete objectives that the World of Geniuses project is actively bringing to life.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