



Research article



VALUE UNDER THE ROOTS (A Mathematical Approach)

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ABSTRACT



Roots are the divine designs, forming the framework for growth, reproduction, and eventual decay. They represent nature's laws, governing everything from atomic bonds to the gravitational pull between celestial bodies. This article explores the significance of roots as a symbol of discipline, showing how staying connected to our roots enhances our value, fosters positive attitudes, and transforms negativity into optimism. By delving into our roots, we can find greater eternal happiness. To illustrate this concept, we also use a mathematical approach to emphasize the importance of roots in shaping our lives and perspectives

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Introduction

Roots are the fundamentals of existence, the rules of governance, the rubrics of science, and the formulae of theories. Constitutions are the roots of the nations. Roots include the genetic properties we inherit from our ancestors. They express themselves with the change in seasons for the weather. They are the existential and survival skills of animals. A frog will never make the mistake of laying its eggs on land, and a crocodile will never lay its eggs in water. Migrating birds travel to the temperate zones covering long distances and go back with the change in seasons. These are the laws of nature that every creature follows. It is only human beings that violate the roots. We know for sure that the soil is our root source for food but we spoil it by spraying poisonous pesticides and using artificial fertilizers. We know for sure that the air we breathe in is our root but we pollute it with belching clouds of smoke across the globe. We know for sure that the water we drink is the root source of our life but we contaminate it with industrial effluents. We know for sure that forests are the root sources of ecological balance to a great extent but we hack them. We do all kinds of mischief to satisfy our selfish ends. If we act against the roots or rules of nature, we are not protected any longer, we are doomed to perish. Taking shelter under the wings of roots is the only way to protect ourselves and make progress.

Man is an optimist. The circumstances in which he lived – the severity of the elements of nature, the cruelty of the beasts around him – turned him into a warrior. His love for life, his necessity for dominance over the elements of nature and the beasts, and his thirst for progress were so insatiable that he started conquering the obstacles he encountered one by one[1]. Ever since the dawn of civilization, his optimism has taken mankind forward, making it pass through different phases of progress. The milestones of his progress in the history of mankind include using fire, inventing the wheel, and turning himself from a hunter-gatherer into an agricultural labourer [2].

[1]. Midgley, Mary. *Beast and man: The roots of human nature*. Routledge, 2021. <https://doi.org/10.4324/9780203380192>

[2]. Widlok, Thomas. (2020) 2023. "Hunting and gathering". In *The Open Encyclopedia of Anthropology*, edited by Felix Stein. Facsimile of the first edition in *The Cambridge Encyclopedia of Anthropology*. Online: <http://doi.org/10.29164/20hunt>



As of now, science and technology have become his tools. What his senses once could not detect, the machines he invented could detect them for him. Everything is now almost in his fists. Isn't Artificial Intelligence his latest signature in science and technology? In spite of all this tremendous progress, there is still something that haunts his mind and heart and throws him into a world of dissatisfaction [3]. After making a deep philosophical and spiritual inquiry into the reasons for his dissatisfaction, we can find one reason for his dissatisfaction, and that is his hankering for absolute freedom [4]. And absolute freedom is hellish.

Except for an occasional threat in the form of a beast or a poisonous creature, man has enjoyed absolute freedom living in the thick forests that stretched to the limits of the earth. Enjoying this absolute freedom in wandering about the forests, hunting for food, eating whatever he liked, and mating whenever his desires urged – all these activities never imposed any restrictions on him, and this went on for thousands and thousands of years [5]. The spirit of this unrestricted freedom might have crept into his genetic matter so much that man in the modern era exhibits to some extent his aversion to following rules and restrictions imposed on him. Frankly speaking, not many of us like them. We want to live our lives as we like and always hope to be free. But is it possible?

In the evolutionary process, as the awareness of the 'self' of the primitive man grew, as entities like 'family' and 'society' came into being, as one race of human species started attacking the colony of other human species, as the need to protect themselves became necessary, then these rules, regulations, and restrictions gradually found their way into their lives [6]. The man started losing his absolute freedom.

[3]. Russell, Stuart J.; Norvig, Peter. (2021). *Artificial Intelligence: A Modern Approach (4th ed.)*. Hoboken: Pearson. ISBN 978-0134610993. LCCN 20190474.

[4]. Berofsky, Bernard (1992). On the Absolute Freedom of the Will. *American Philosophical Quarterly* 29 (3):279 - 289.

[5]. Breasted, J. H. (1920). The origins of civilization. *The Scientific Monthly*, 10(2), 182-209. <https://www.jstor.org/stable/6810>

[6]. Gough, K. (1971). The origin of the family. *Journal of Marriage and Family*, 33(4), 760-771. <https://doi.org/10.2307/349449>



The Code of Hammurabi [7], the first of its kind, came into existence, and now, in modern existence, rules, regulations, restrictions, and limitations are absolutely inevitable. These very rules and regulations are now our roots of progress and prosperity. Our freedom is now subjected to these rules and regulations. The beauty of our lives and the happiness we derive depend to the greatest extent on these rules. The freedom we seek should not be away from these rules, which are truly the roots of our existence and the roots of our progress. The rights of the oppressed, the freedom of the downtrodden, and the happiness on the faces of millions of the poor are retained by the rules, which are the roots or sources that we should never ignore. Can we imagine anarchy? Can we imagine countries without constitutions? What do you think actually protects the sovereignty of a country?

We must always keep in mind that everything in this universe is steady and orderly, goes smoothly and properly, and is bound to exist within the boundaries as ordained by the universe. These boundaries, or the paths of the planets, are the roots of their existence. They never cross the limits of the intelligence they have inherited from their root – the universe [8]. But we, as human beings, are growing and making progress, but we are violating our roots – the morals and ethics, the rules and regulations. This is the only reason why, in spite of our having lots of development, we do not have the happiness we wanted to have. There will be true freedom, courage, joy, and progress in life when it is within the boundaries of its roots, i.e., the framework of the law. In this article, we have tried to explain this through the language of mathematics.

[7]. Prince, J. D. (1904). The Code of Hammurabi. *The American Journal of Theology*, 8, 601-609. <http://www.jstor.org/stable/3153895>, <https://doi.org/10.1086/478479>.

[8]. Agostini, Cristina de Souza, Isabel Porto da Silveira, and Cauê Cardoso Polla. 2021. "Scientific Evolution of Philosophical Concepts of the Origins of Universe and Life". *Revista Archai*, no. 31 (December). https://doi.org/10.14195/1984-249X_31_16.



The Beauty of Mathematical Language:

Why in mathematical language? It's because mathematics is the only language in which we can explain science in a better way. Science can speak meaningfully only in that language [9],[10]. Because in that language, there are proofs of the subjects, specific values for quantities, and concrete evidence of unknown things. That is why mathematical language is the only way to explain science and technology [11]. We all know very well that many theories that could not be supported by mathematical explanations were simply rejected. To put it in a nutshell, mathematics is the language of nature. Descartes says, "All things in nature occur mathematically." Mathematics speaks about the structures, patterns, and relationships in the natural world. This language tells us, in simple language, from the motion of the big star to the motion of very small particles, such as sub-atomic particles. We are also a part of it. Even the great astrophysicist Galileo also said, "The great book of nature can be read only by those who know the language in which it was written. And that dialect is mathematics."

It is a capable instrument, an excellent device, and a brilliant craftsmanship to clarify things. Mathematics serves as a concise and powerful language that conveys complex ideas with clarity. Hence, in this article, we have utilized mathematical language to present meaningful concepts effectively which helps us understand how we should identify our values and how much value we have in our roots.

[9]. Oliveri, G. Mathematics. A Science of Patterns?. *Synthese* **112**, 379–402 (1997). <https://doi.org/10.1023/A:1004906107430>

[10]. Wigner, E. P. (1960). "The unreasonable effectiveness of mathematics in the natural sciences. Richard Courant lecture in mathematical sciences delivered at New York University, May 11, 1959". *Communications on Pure and Applied Mathematics*. **13** (1): 1–14. <https://doi.org/10.1002/cpa.3160130102>.

[11]. Putnam, Hilary (1975). "What is Mathematical Truth?". *Historia Mathematica*. **2** (4): 529–543. doi:10.1016/0315-0860(75)90116-0. Reprinted in Putnam, Hilary (1975). *Mathematics, Matter and Method: Philosophical Papers*. Vol. 1. Cambridge University Press. pp. 60–78. ISBN 978-0-521-20665-5.



The Roots

If you ask the students who study mathematics what a 'root' is, the answer you will get is about a square root. They will show you the symbol of a square root. They can even give you examples like $\sqrt{25}$ is 5 and $\sqrt{100}$ is 10. If you pose the same question to the students who study biology, they may tell you that a root is part of a tree that grows down into the earth to get water and food and holds the tree firm in the ground. If you ask the students who study history, they may tell you that it is about the book 'The Roots' written by Alex Haley, or they may talk about the primitive men or the aborigines of a country [12]. For those who study anthropology, the word 'root' may convey human beings, their customs, cultures, traditions, behavioral attitudes, and aspects like when a particular clan, race, or civilization came into being, the answer that comes to their mind most probably will be the genetic 'roots'. All these answers are correct, although their contexts are different. All these examples refer to the same word 'root', and this 'root' is different for each individual.

Something that is valuable is always hidden or protected [13]. For example, in our body, all valuable organs are hidden inside. A man won't die if one of his fingers is broken, but if his lungs are damaged, he will die. He won't die if his leg is broken, but a small hole in his heart may turn out to be fatal. An injury to the external organs, such as skin and muscles, does not kill us, but any injury to the vital internal organs of the body, such as the heart, liver, lungs, and kidneys, is very dangerous and difficult on our part to survive. It is only because of this that they are all hidden in the safe zone within the ribs. The brain is safely protected in the cranium. All hidden or protected things are valuable. Another example of this is that precious elements like diamonds, gold, platinum, gems, and pearls are hidden beneath the layers of the earth and underneath the waves of the oceans.

[12]. Haley, A. (1974). *Roots: the Saga of an American Family*. Garden City, NY, Doubleday & Co.

[13]. Hrdy, Camilla A. "The value in secrecy." *Fordham L. Rev.* 91 (2022): 557.

<https://ir.lawnet.fordham.edu/flr/vol91/iss2/8>



I. Your value increases when you go under your roots:

Let us consider the premise in the last sentence of the previous paragraph in mathematical language. For example, take 10. If 10 is under its root, its value becomes 100. If it comes out of the root, its value is reduced to 10.

Similarly,

$$\sqrt{100} = 10$$

$$\sqrt{400} = 20$$

$$\sqrt{10000} = 100$$

From the above examples, what we can discern is that the value of something becomes higher when it is in its root. In the same way, your value increases or even multiplies when it lies in the roots. Grow your value or worth by adhering to your roots. As said earlier, morals and ethics, rules, and regulations are your roots. You can add extra value when you do something in conformity with these roots. Many of us live in frustration, despair, and depression. We don't even understand the state of affairs of our lives. People who get addicted to bad habits think that they are not fit for anything. You can understand your value only if you go into your roots.

II. The negative becomes positive under the roots:

Many of us feel and think that they have become very bad and have become an object of contempt in the eyes of society. Even in such conditions, you can turn yourself into a person with a positive attitude if you are only willing to protect yourself by taking shelter under your roots. For example, if you are -10 (negative), it doesn't matter. If you get into your roots, you don't become -100. Instead, you become +100. Whatever you are outside a root, inside you will always have a positive (+) value. If you just happen to exist, your mere existence makes you equivalent to the real number. Not only +10 but also -10 assumes a positive value if it goes inside the root and becomes +100.



If -10 goes inside the root, its value becomes +100.

Similarly,

$$2 = \sqrt{(4)} \text{ and } -2 = \sqrt{(+4)} \quad (\because \sqrt{4} = \pm 2)$$

Also if -5 goes inside the root then its value becomes + 25.

$$-5 = \sqrt{(+25)}$$

You may think that everything is over about my life and I have no future at all. You are afraid of may be engulfed in negativity spread around you. Just go into your roots. You get your original value. It depends on whether you are in your roots or not. Contrary to what has been said above, if you leave your roots and come out of your roots, your value not only diminishes but sometimes its value even becomes negative. So, be careful. That's why you must always stay within your own roots.

It is the same in the case of plants and trees. The trees whose roots go deep into the layers of the earth stand firm, sustain themselves from calamities, and will bear good fruits. On the other hand, the trees whose roots are spread on the surface of the earth will have stunted growth and are prone to fall down and wither away in times of calamities. Here, the question is, are we protected by our roots? Are we staying safely in the care of our roots? Without deepening our roots, are we running helter-skelter in order to prove what we are to the world?

This world is always trying to distract you from your roots. These distractions can affect your habits, the way you dress, or it can affect your behavior. If you ignore your roots and hanker after worthless things, your value becomes zero but if you confine yourself to your roots or stay within your roots, you will have great value.

To be disciplined is your Freedom

Roots mean the rules that we should follow. There are rules for everything in nature. For example, the earth has a law. It has to revolve around the sun in its prescribed orbit, at a prescribed speed. It is like the root of the earth. It will be very difficult to survive for any life



form on the earth if it declares itself freedom feeling that it is tired of rotating round the sun in the same orbit at a particular speed for millions and millions of years. Life on earth is impossible and unimaginable in such a lawless state. The same is the case with almost anything that is already following certain rules. You can take anything in the universe as an example. Everything in the universe does not act beyond its laws or limits. The gravitational force is the weakest of the 4 fundamental forces in the universe [14]. If the gravitational force were to decrease to what it is now, all the planets would go helter-skelter into the universe, collide with the other planets or asteroids, and blast, or anything disastrous might happen. If the gravitational force were to increase to what it is now, all the planets would merge in the sun. This rule applies not only to the solar system but to the entire universe. So one of the reasons why the universe is so systematic and beautiful is the gravitational force. Gravity engulfs the whole universe in its embrace. The universe has its value as it lies hidden within the gravitational force. Similarly, we too must live abiding by rules and regulations which are the sources of our freedom. They demarcate the limitations of our freedom.

To live an orderly and disciplined life, we must follow some rules. We can enjoy our freedom only when we live a disciplined life. We can treat them as the sources or roots of our freedom. Some of the roots we have are:

1. Social rules
2. Financial rules
3. Health rules
4. Spiritual rules

When we live in a society we have to follow certain rules otherwise we will become sufferers.

[14]. Huang, K. (2007). *Fundamental Forces of Nature: The story of gauge fields*. World Scientific, <https://doi.org/10.1142/6447>



For example, if we don't follow the road rules or traffic rules, we shall become offenders causing problems for ourselves and others. There will be punishment for every default. In order to avoid punishment and penalty, we have written down some rules on how to live in our society or in our country. We call this big book of rules and regulations 'constitution'. If these rules are defied, the judiciary will punish the offenders. Thus, every region and every country is built on the foundations of some rules, regulations, and laws. Every culture and civilization is developed along similar lines. So development is possible only by observing the laws. Several of the examples in history proclaim loudly that the cultureless and undisciplined societies will perish within no time. Only those people who have no vision will behave like this and a society that abounds with such people will soon perish. A lack of orderliness or discipline is not good for any society. It brings destruction to societies.

- Discipline is freedom
 - Discipline is development.
 - Discipline is wisdom.
 - Discipline is life.
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- Where there is no discipline, there is no wisdom.
 - Where there is no wisdom, there is no vision.
 - Where there is no vision, there is no life.
 - Where there is no life, the people will perish.

The Proverbs in chapter 29 and verse 18 from the Bible declare that '*where there is no vision, the people perish. But he that keeps the law (roots) happy is he*'. We come across this notion in the works of philosophers who touched upon this subject. To cite an example from the famous book *Ikigai*, which has become popular in recent times, says the same thing, "Discipline in all things is health, happiness, and longevity [15]."

[15]. Sone, Toshimasa, Naoki Nakaya, Kaori Ohmori, Taichi Shimazu, Mizuka Higashiguchi, Masako Kakizaki, Nobutaka Kikuchi, Shinichi Kuriyama, and Ichiro Tsuji. "Sense of life worth living (ikigai) and mortality in



Japan: Ohsaki Study." *Psychosomatic medicine* 70, no. 6 (2008): 709-715.

DOI: [10.1097/PSY.0b013e31817e7e64](https://doi.org/10.1097/PSY.0b013e31817e7e64)

Without discipline, there is no developed kingdom and no individual. If someone does anything without discipline, they will quickly perish.

To be hidden and to hide:

Living in obscurity or unnoticed is something most of us don't like. In my opinion, it is always better for us to hide in the presence of the Creator (our root). In ancient Scriptures, King David said to the root, "You are my hiding place." When problems cropped up, David took shelter in the care of roots. It is well known to all that, in many cases, we hide in or believe in the roots of our origin so that we can avoid problems. The reason why David had his incomparable story in the spiritual history of the world was that he believed in his roots and His protection.

According to the Vedas, Adam and Eve were the first couple in the world. Unfortunately, they disobeyed their Creator. Usurped by the words of the Serpent, Adam and Eve lost the divine care, love, and protection of God. They lost all powers of divinity, and contact from God. They became ordinary human beings and followed the normal ways of the world. Eve was deceived into a colorful world. The foods she ate tasted delicious to her mouth. Everything in the world appeared beautiful to her eyes. She left her roots which was God and followed the Serpent. Not only did Eve commit a sin but she also had Adam commit the sin. When God visited the Eden garden and asked them where they were, they said, "We are hiding behind the tree." But the thing here is 'Can we hide ourselves from being not observed by God?' It's not possible for us because He is our root, it is in Him we all should hide. We protect ourselves and have some value only when we hide in Him. His word is the source of this entire creation. Based on His words, the whole creation and all living and nonliving things should be hidden in their roots. It is only then we can say to be in our roots which is God. It helps us to bear good fruit.



III. There is infinite value in deep roots:

If you go further into deep roots, your value multiplies many folds. Let us consider the following example:

For example, take 10.

Its value under the square root is 100 . *i. e.*, $10 = \sqrt{100}$.

Its value under the cube root is 1000. *i. e.*, $10 = \sqrt[3]{1000}$.

Its value under the 4th root is 10000. *i. e.*, $10 = \sqrt[4]{10000}$ and so on.

The value of a number multiplies several folds with deep roots. So, whoever goes deep into their roots, their value increases exponentially.

When we know our roots, it gives us a sense of identity and self-worth. When we are with our deep roots, we feel loved and happy. We may seem different on the surface, but we all share the same root system. We must know that we are not capable of doing everything alone. Cooperation will ensure our survival.

The strength of trees lies in their roots, but not in their branches. When roots are strong, trees can fight the changes in the environment. Roots provided sustenance not only to plants and trees but also to mankind. The biggest lesson the trees teach us is resilience. Roots provide physical benefits to soil by helping to reduce compaction and erosion, as well as serving as the main pathway by which nutrients, sugar, proteins, and other exudates are exchanged between plants and the soil biome. Consequently, maximizing living roots—both in terms of density and length of time in the soil is a key contributor to the physical, biological and chemical health of soils.

It is worth quoting Wangari Maathai, the Nobel Peace Prize Winner of 2004. She says that a tree has roots in the soil yet reaches the sky. It tells us that in order to aspire, we need to be grounded and that no matter how high we go, it is from the roots that we draw sustenance. It is a reminder to all of us who have had success that we cannot forget where we came from. It



signifies that no matter how powerful we become in government or how many awards we receive, our power and strength and our ability to reach our goals depend on the people, those whose work remains unseen, who are the soil out of which we grow, the shoulders on which we stand. In the Bible, King David, who did not leave his roots onto his last, was seen to gain greater glory than anyone else. He knew for sure that the roots must not be left. That is why King David says, referring to the creator, that '*you are my hiding place*'. We wonder whether we could live and prosper in this world without cooperation, roots, and rules.

In Revelation 22:16, God describes Himself as the '*Root and Offspring of David*.' This divine declaration holds profound significance, as no one else has been given such an honor. It signifies that if we remain rooted in humility and hidden from pride, God will dwell within us. Just as a tree draws strength from its roots, our spiritual foundation must be deeply connected to Him. This article reminds us that true greatness comes not from outward recognition but from being firmly grounded in God's presence.

Conclusion

Anyone, any organization, any society, any country, or for that matter, any object in the universe, that wants to prosper, progress, be protective, and be productive, must cling to its roots. Abiding by the roots or the originators is the discipline and the doctrine of Nature. There are no instances of things to the known knowledge in the entire human history that something can survive outside its roots. Life, including all its liberties and limitations, falls safe and secure, survives and sustains, as long as it never crosses the boundaries of its roots. The article underscores that roots—whether moral, ethical, societal, or natural—are the foundation of stability, progress, and fulfillment. Drawing insights from mathematics, nature, and philosophy it emphasizes that value and strength multiply when individuals remain grounded in their roots. Just as deep roots sustain trees through adversity, humans thrive by adhering to rules, embracing discipline, and fostering cooperation. Discipline is not a restriction but a pathway to freedom, wisdom, and development, ensuring harmony and resilience. Neglecting roots leads to chaos, while nurturing them fosters growth, stability, and happiness. True success lies in recognizing and deepening one's connection to their roots, as they are the source of identity, strength, and enduring progress.