# LEIBNIZ'S PROMETHEAN PRINCIPLE OF CREATIVITY

A Pedagogical on the Leibniz Method of Investigating the Unknown by Inversion of Tangents

by Pierre Beaudry, September 8, 2014

> ***"To the weak Became I as weak, that I might gain the weak: I am made all things to all men, that I might by all means save some."***
>
> Saint Paul, 1 ***Corintians 9:22***

> ***"The more you measure with numbers, the less precise you are in your results; because the way to get closer to the truth is through proportionality."***
>
> Dehors Debonneheure, ***Incomplete Works***

**FOREWORD**

Happy birthday Lyn!

The creative process of the human mind is the most natural state of mind that there is, and yet, it is the easiest thing to lose when the great majority of people are focussed on sense perception effects as opposed to paying attention to the truth behind things. By the same token, the creative process is also the hardest thing to restore once you have lost it, because society induces you with fears of rejection if you don't kiss asses. In fact, the creative process is the most precious state of mind that humanity depends on for its survival.

Why? Because there are periods in human history when the whole of mankind is at risk of becoming extinct unless it recovers the loss of creative powers it has suffered during a previous extended period of degeneration. We have come to the end of such an extended period time today; that is, since the assassination of John F. Kennedy. And this is the reason why everyone on this planet must have a chance to rediscover how the creative process works by recovering how to access the unknown. This report has two sections relating to Leibniz's conception of creative invention.

1. THE PROMETHEAN GENIUS OF THE CHINESE EMPEROR KANGXI
2. HOW THE LEIBNIZ INVERSION OF TANGENTS MAKES YOU DISCOVER THE UNKNOWN

## INTRODUCTION

Ask yourself: How should mankind be governed? How could the governments of the world treat every human being on this planet such that each individual might become everything to each and all of the peoples of the world such that he could help some of them? That is the most important strategic question of today.

The question is not simply to increase the standard of living of the peoples of the world, but rather to increase their power to think creatively. In order to fulfill that epistemological requirement, one must discover what kind of unique epistemological power the human mind has, and how it must be fostered and nourished everywhere by the governments of the world, in order that every human being be given the chance to become all things to all people by all means possible. The answer to that, as Lyn had been emphasizing, is creativity.

However, these questions cannot be answered without posing and answering another question, first, which is: What is it in the human mind that makes you abandon your creativity and makes you accept a degraded form of life which depends on an oligarchical form of government? The answer to this question is the paradoxical situation of abject servitude. You cannot look someone in the eye and kiss his ass at the same time. And, the only way to crush such abject servitude is to become all things to all men.

Thus, all previously known forms of government must be thrown out the window and replaced by a new form of governing principle which calls for the development of universal minds: the ***principle of creativity***. For example, this is what the new president of Egypt, El-Sisi, is doing for his people by launching the construction of a forth Great Pyramid of Egypt. That approach by government has never been used before for mankind as a whole, and such an intention has never been made the explicit intention of a universal constitutional government of mankind.

The closest form of government that implied such an intention was the Constitutional Republic of the United States, because its Constitution advocates the ***general welfare*** based on the "***Pursuit of happiness***" of all of its people. Unfortunately, this constitutional principle has been abandoned by every President, Supreme Court, and Congress of the United States since the assassination of President John F. Kennedy.

This report investigates the epistemological conditions which make you able to decide, out of sheer willfulness of your mind, how to reject the form of epistemological serviture which depends on old modes of deductive thinking, and makes you discover how to generate a form of thinking known as

inferential thinking. Gottfried Leibniz identified this as his ***method of inversion of tangents***. So, the question you must be able to answer is, what is the method you have to discover in order to lead more than 7 billion people to access the standard of creative mental life necessary for the next step of development of mankind?

The irony of the present strategic situation is that this form of thinking by inversion has become necessary for the survival of mankind. Because this new form of thinking is the only way of facing the future function of the human purpose on this planet from the vantage point of the Solar System. Thus, the time has come where the question of how to discover the unknown must be addressed if we are to free ourselves from the current destructive forms of Zeusian governments of the world, and establish completely different Promethean forms of government that never existed anywhere on Earth before; governments whose powers are not merely necessary for mankind today, but are also necessary for future generations. So, where and how was this extraordinary Leibniz method of inversion of tangents first applied to a government?

## 1. THE PROMETHEAN GENIUS OF THE CHINESE EMPEROR KANGXI

In 1699, Gottfried Leibniz brought together a collection of diverse reports that he had prevuiously published two years earlier on the subject of China. The small book, called ***Novissima Sinica*** (*The Latest News from China*) was a compilation to which Leibniz wrote a preface and in which he established a unique hypothesis based on what he anticipated was to become the political future of the world, that is to say, he recognized the great genius of Manchu Qing Dynasty Emperor, Kangxi, and he assigned to Russia the crucial role of becoming the arbiter of justice between the Europe and China.

The point I wish to emphasize with Kangxi is that his thinking reflected in every way the Leibnizian principle of proportionality between reason and power in all of his public decisions and actions. Leibniz emphasized that special quality of mind in his evaluation of the great Chinese King:

> "[VII] Until the reign of the present emperor, Cam Hi [Kangxi], a prince of almost unparalleled merit, the magistracy opposed any disposition on the part of the ruler to grant the Europeans freedom to practice the Christian religion legally and publicly until its purity should be investigated. This objection rested on no better pretext than that the prince's great and salutary decision to introduce European arts and sciences into China might lead to ruin. In this matter, he seems to me to have had individually much more foresight than all his officials. It is further evidence of his personal good judgment that he has brought European and Chinese civilization together. For he was taught from childhood in all things Chinese a discipline almost beyond the capacity of a private individual. For example, in the mandarins' examinations, on the basis of which distinctions and magistracies are granted, he is considered a very acute judge. With his astonishing ability to write the characters (which to them is the highest erudition), he could even improve the composition of a petition drawn up by the most learned of Christians. And so, while understanding primarily the learning of his own people, he was still not a bad judge of European knowledge when he first received a taste of it from Father Ferdinand Verbiest of Bruges in

Belgium, of the Society of Jesus, a pupil of Johann Adam Schall of Cologne." (Donald F. Lach, ***The Preface to Leibniz' Novissima Sinica,*** University of Hawaii Press, Honolulu, 1957, p.72.)

Kangxi's reign of 61 years makes it the longest reign in Chinese history. His commitment to the improvement in the arts and sciences for the Chinese people makes him the greatest emperor of all because of his Promethean qualities of improving the minds of his people.

By the end of his reign, Kangxi had unified the whole of China by successfully imposing peace with his neighbors and by increasing China's population after the Manchu conquest of China. Kangxi may have been one of the few emperors who did not play god with his people, but who worked unceasingly to understand their needs, and personally took care in improving the well being of their minds first and foremost. For instance, according to historian Samuel Edward Finer, Kangxi set a personal example of how his relationship with people demonstrated "how intimate and caring was his communion with the rank-and-file, how discriminating and yet masterful his relationship with his generals." (Samuel Edward Finer, ***The History of Government from the Earliest Times: Ancient Monarchies and Empires***, Three Volumes, pp. 1142.)

**Figure 1** Young Chinese Emperor Kangxi (1661-1722)

The first peace treaty between China and Russia, the Treaty of Nerchinsk of 1689, rekindled the hope that after the Manchurian conquest of China around 1644, the land route known as the Silk Road between Europe and China might be reopened. The agreement signed in the name of Tsar Peter the Great and Emperor Kangxi established the current border which runs along the Argun, Amur, and Ussuri Rivers in Manchuria, and the Treaty of Kiakhta of 1727 settled the border between Russia and Mongolia, thus actually opening the northern Silk Road for trade with Europe. Diplomatic and trade relations between Russia and China lasted until the mid-nineteenth century. It was this agreement with Russia which contributed the most to the westward expansion of China until today.

Leibniz' most important interest was to watch very closely "the closing of the gap that separated Moscow from Peking." (Leibniz, Ibidem, p. 5) And, the interest was not merely for Russia. As he pointed out, nations of Europe, such as Austria, Poland, and Brandenburg also held high hopes of establishing direct land trade and cultural exchanges with the "Middle-Kingdom." As American historian Donald Lach put it:

> "The successes of the Jesuits in India, in Japan (for a time) and in China aroused among Catholics and Protestants alike the hope that Christianity might be extended across the vast expanse of the Eurasian continent. The heyday of these hopes arrived when the Turks finally retreated at the end of the seventeenth century before the onslaught of the Austrians, Russians and Poles, and when it was shortly learned in Europe that Russian emissaries had concluded the Treaty of Nerchinsk (1689) with the Manchu rulers of China. The way to China across the land routes of Asia appeared to be open. If these could be developed, the northern and eastern Europeans believe they possessed an excellent opportunity to break the monopoly of the maritime

nations and to take the lead in what was acknowledged to be a lucrative trade and a flourishing mission." (Donald F. Lach, ***The Preface to Leibniz' Novissima Sinica,*** University of Hawaii Press, Honolulu, 1957, p.6)

Leibniz's understanding of the character of the strategic situation is such a Promethean intention that it is almost impossible to give it its full measure of significance based on only a few pages of his little book. Yet, in making such a forecast, more than three hundred years ago, Leibniz was able to see the strategic dangers of a maritime power such as the British Empire today and, at the same time, evaluate a world strategic situation in which China might become a leading proponent of world economic development, whose government, such as reflected in the insightful Kingxi, might be committed to work for the benefit of the general welfare of all of mankind. What sort of epistemological method did Leibniz use in order to make such an accurate forecasting of the unknown? Here is how Leibniz considered the principle underlying his method of invention:

"[IX] Now Geometry ought not to be regarded as the sphere of workmen but of philosophers: for, since virtue flows from wisdom, and the spirit of wisdom is truth, those who thoroughly investigate the demonstrations of the geometers have perceived the nature of eternal truth, and are able to tell the certain from the uncertain. Other mortals waver amid guesses, and, not knowing the truth, almost ask with Pilate what it is. But there is no doubt that the monarch of the Chinese saw very plainly what in our part of the world Plato formerly taught, that no one can be educated in the mysteries of the sciences except through geometry. Nor do I think the Chinese, though they have cultivated learning with marvelous application for thousands of years, and with great rewards to their scholars, have failed to attain excellence in science simply because they are lacking one of the eyes of the Europeans, to wit, geometry. Although they may be convinced that we are one-eyed, we have still another eye, not yet well enough understood by them, namely, First Philosophy. Through it we are admitted to an understanding even of things incorporeal. Verbiest was prepared to teach them this, rightly judging that it would prepare an opening for the Christian religion, but death intervened." (Lach, Ibidem, p. 74)

Why would Leibniz attribute so much importance to the epistemological geometry of First Philosophy, and why would he consider that what was most manifest in the geometrical mind of the Fourth Emperor of the Qing Dynasty, Kangxi, was ***"the happiness of his people even in posterity?"***

Kangxi was so taken by the power of knoweledge for the good of future generations that he even wrote a book of geometry for the education of his own children. I have not been able to find this imperial book, but translater Donald Lach says it can be found under the reference of Yu Ting Hsu Li ChingYun ***Imperial Edited Essential Collection of Mathematical Works***. (Lach, Ibidem, p. 74)

**Figure 2** Gottfried Leibniz, 1646-1716

The point that Leibniz is making with Kangxi is the same that the current Prime Minister of India, Narendra Modi, made on July 15, 2014 at the BRICS meeting in Brazil, when he referred to the ***Panchsheel Principle*** of the future:

> ***"Restoring a climate of peace and stability is an urgent global need. This calls for newer avenues of cooperation and collaboration.***
>
> ***"I believe BRICS can answer this call. This I do because of the uniqueness of BRICS as an international institution. For the first time it brings together a group of nations on the parameter of 'future potential'; rather than existing prosperity or shared identities. The very idea of BRICS is thus forward-looking."*** (BRICS Summit: What Narendra Modi said, India Daily, July 16, 2014.) See my previous report: **NARENDRA MODI AND THE PANCHSHEEL PRINCIPLES OF THE FUTURE**

The ***Panchsheel Principle*** of the BRICS is committed to eradicate poverty as a matter of survival for mankind. The legacy that Leibniz left for future generations to understand how to shape young minds with the ***method of inversion of tangents***. His first nominal definition of his theorem was: "***Given the ratio of two functions, find the curve."*** (**THE LEIBNIZ DISCOVERY OF PRINCIPLE OF THE CALCULUS IN ACTA ERUDITORUM**, p. 67.)

So, ***given the ratio of power and reason, find the unknown***.

## 2. HOW THE INVERSION OF TANGENTS MAKES YOU DISCOVER THE UNKNOWN

Examine the following form of proportionality and see how it correcponds to the Leibniz theorem for his method of inversion of tangents:

***The present state of mind of standing before the unknown***

***Is as***

***The integral of all functions of future developments of mankind***

***In the same proportion as***

***The creative power of the next generation of young human minds to come.***

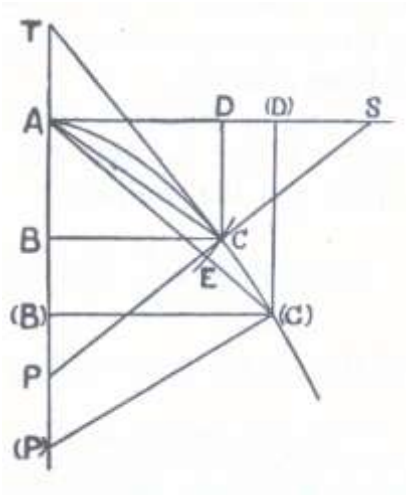
On November 11, 1673, Leibniz wrote the following theorem on his method of inversion of tangents:

# *"Methodi tangentium inversae exempla.*

[Examples of the inverse method of tangents.]

"A year or two ago I asked myself the question, what can be considered one of the most difficult things in the whole of geometry, or, in other words, what was there for which the ordinary methods had contributed nothing profitable. Today, I found the answer to it, and I now give the analysis of it.

*"Find the curve* C ( C ), *in which* BP, *the interval between the ordinate* BC *and* PC *the normal to the curve, taken along the axis* AB ( B ), *is reciprocally proportional to the ordinate* BC.




"Let AD ( D ) be another straight line perpendicular to the axis AB ( B ), and let ordinates CD be drawn to it, so that the abcissae AD along the axis AD ( D ) are equal to the ordinates BC to the axis AB ( B ), and the ordinates CD to the axis AD ( D ) are equal to the abcissae AB along the axis AB ( B ). Let us call AD = BC = y, and AB = DC = x; also let BP = w, and B ( B ) = z. Then it follows from what I have proved in another place that

$$\int wz = \frac{y^2}{2}, \text{ or } wz = \frac{y^2}{2d}$$ 27

"But from the quadrature of a triangle it is evident that $\frac{y^2}{2d} = y$ ;

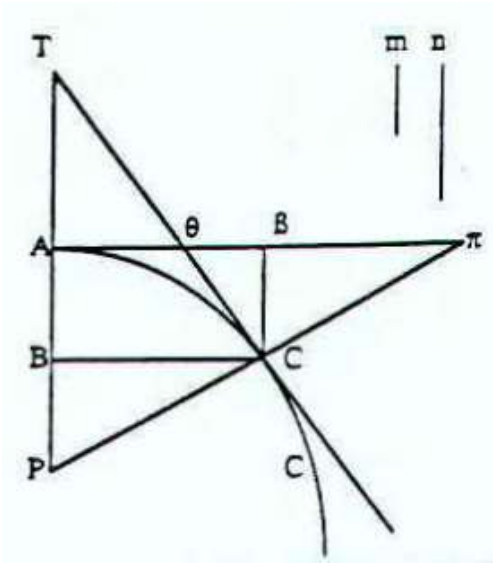
"And therefore wz = y." (J. M. Child, ***The Early Mathematical Manuscripts of Leibniz***, Merchant Books, 2007, p. 93.)

As Leibniz put it, provocatively: "***Now, in truth, it is a much harder question, if the curve, in which AP is reciprocally proportional to the ordinate BC, is required***." (Leibniz Ibidem, p. 95) The beauty of this theorem is that it leads directly to the discovery by Leibniz of the fact that Platonic geometry is exactly the inverse of Aristotelian and Euclidean geometry; that is, the discovery of the unknown cannot be derived by deduction, as being given by the circle for instance, because it can never be derived from what is already known. The best example that I can find to demonstrate this truth is the use of the ***method of inversion of tangents*** that Leibniz had made in his discovery of the principle underlying the Catenary and Tractrix curves, which I call the ***Creative Principle***. For further reading on this matter, I refer the reader to the translation that I made of **GOTTFRIED LEIBNIZ, "TWO PAPERS ON THE CATENARY CURVE AND LOGARITHMIC CURVE."**

I also refer the reader to the main piece that Leibniz wrote on the inversion of tangents in ***Acta Eruditorum***, which I have translated in a report entitled **THE LEIBNIZ DISCOVERY OF PRINCIPLE OF THE CALCULUS IN ACTA ERUDITORUM**. From this last report, I refer, particularly, to section 8. A NEW MODE OF APPLICATION OF THE DIFFERENTIAL

CALCULUS TO DIFFERENT POSSIBLE CONSTRUCTIONS OF A CURVE FROM A PROPERTY OF ITS TANGENTS, July, 1694, p. 62-70, where Leibniz elaborates the non-deductive method of inversion based on minimum-maximum function ratios and non-linear effects of multiply-connected circular action. His approach is very simple, but devastating. He formulated the ***Creative Principle*** in the following manner: ***"Given the ratio of two functions, find the curve."*** (**Figure 3**)

Here, Leibniz is totally anti-Euclidean by the simple fact that he does not deduce from already known knowledge but, instead, projects into the unknown future the discovery of a curve which does not yet exist. Without going into the calculus of the construction of **Figure 3**, which is almost the same as the one he produced twenty one years earlier, I will simply follow the method of proportionality that Thales of Miletus used for discovering the height of the Great Pyramid. As Leibniz stated, the key is proportionality:




***"Let the ratio of two magnitudes be given, such as m and n. I call function any segment of a straight line which may be drawn from indefinite lines with respect to a fixed point, and to points of curvature on the curve.***

***"Such are abscissas AB or Ab, the ordinate BC or bC, the tangent CT or C-theta, the perpendicular CP or C-pi, the segment cut by the tangent AT or A-theta, the segment cut by the perpendicular AP or A-pi, the segment delimited by PT or pi-theta, the radius of the osculation, that is, the radius of curvature, CP, and a lot of other things."*** (**THE LEIBNIZ DISCOVERY OF PRINCIPLE OF THE CALCULUS IN ACTA ERUDITORUM**, p. 67.)

**Figure 3** ***"Given the ratio of two functions, find the curve***." (Leibniz)

In a letter to Huygens dated June 29, 1694, Leibniz asserted: ***"For my part, I find that I can always give the solution whenever a reason (ratio) is given between two arbitrary functions…Even if there was an equation in which would enter no other straight lines but these functions, no matter how many functions could be included at the same time, the curve would always be constructible***."

The reason why Leibniz was able to find any curve from any two arbitrary functions is because he always followed the principle of proportionality between reason and power. This may not be self-evident at first glance, but if you follow the construction of the inversion of tangents in the following construction of the Catenary Curve, Sine Curve, and Tractrix Curve, that I discovered in 2001, you can easily find that, given any position of the tangent DE and the radius of curvature AE to the circle, the same two straight lines, (D) (E) and (A) (E) become the tangents, respectively to the catenary curve and the tractrix curve by inversion. (**Figure 4**) Thus, one side of the tangent line is projected to the catenary (D) G as (D) (E) and the other (inverse) side of the parallel line D E is tangent to the circle CEF.

This is the turning point of the entire report. So, the reader must discover, in the following **Figure 4**, why he has been perplexed up to this point.

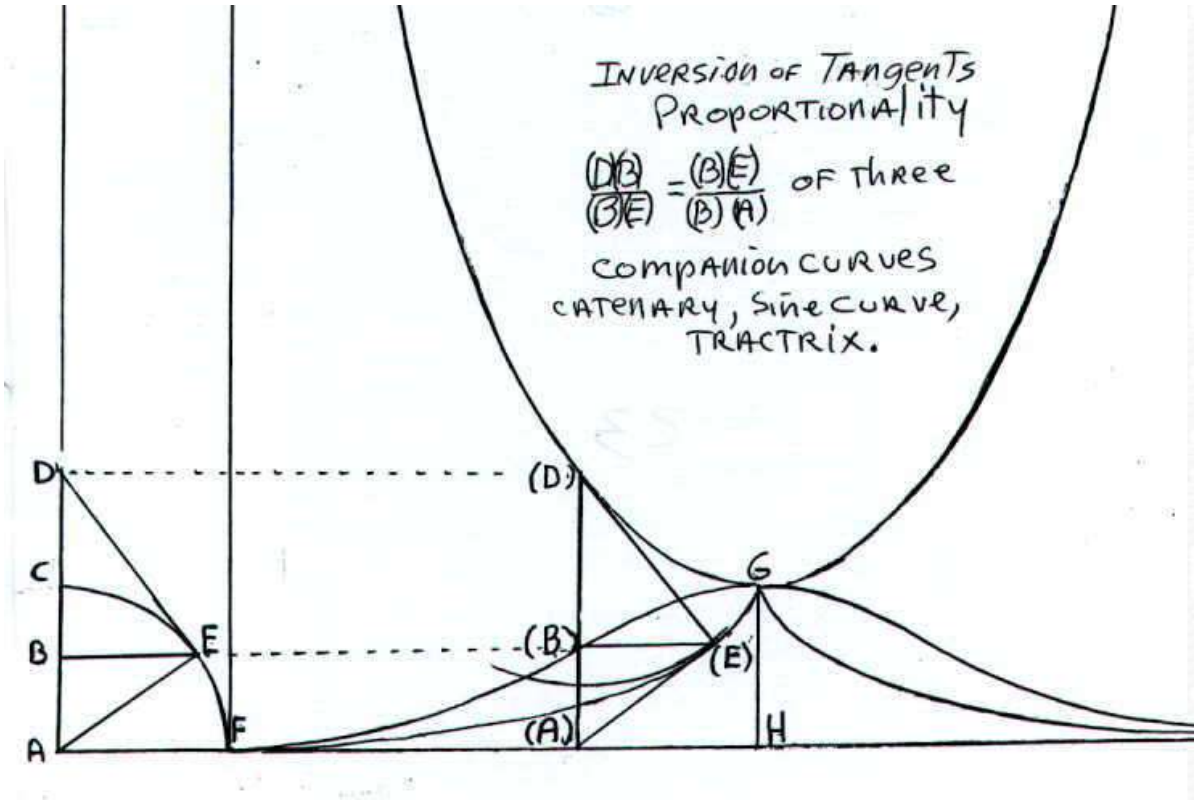



**Figure 4** The construction of the Catenary and Tractrix without using the Leibniz calculus, and by the inversion of the tangents and radii of the circle CEF. Note how the Leibniz ordinate BC of **Figure 3** generates the sine curve (B) (E) of **Figure 4**. [Parallel Proportional Construction, Pierre Beaudry, 2001]

Leibniz referenced in his early works that he had also considered the method of tangents developed by the Belgian mathematician, René-François Walter de Sluse, but that those tangents were all derived from a given curve. The point, here, is to take the property of the tangents in the circle CEF and apply it by inversion to the tractrix curve. Note how the property of the tangent, which is to be at right angle to the radius of curvature, is inversed. The radius of curvature of the circle AE becomes the tangent of the tractrix (A) (E), and the tangent of the circle DE becomes the radius of curvature (D) (E) of the tractrix, while it is tangent to the catenary curve at (D).

This is what John Wallis and Isaac Newton were unable to grasp on the subject of inversion of tangents and were almost driven mad by their own impotence. The matter was not a question of calculation, but a state of mind. In other words, the Leibniz idea is not to determine a method to append tangents to already known geometrical curves, but to find unknown geometrical curves from a given property of their tangents. This is a much harder proposition, because you are not starting from what is known, but, rather, from what is unknown. Now, ask yourself: Why didn't I think of that?

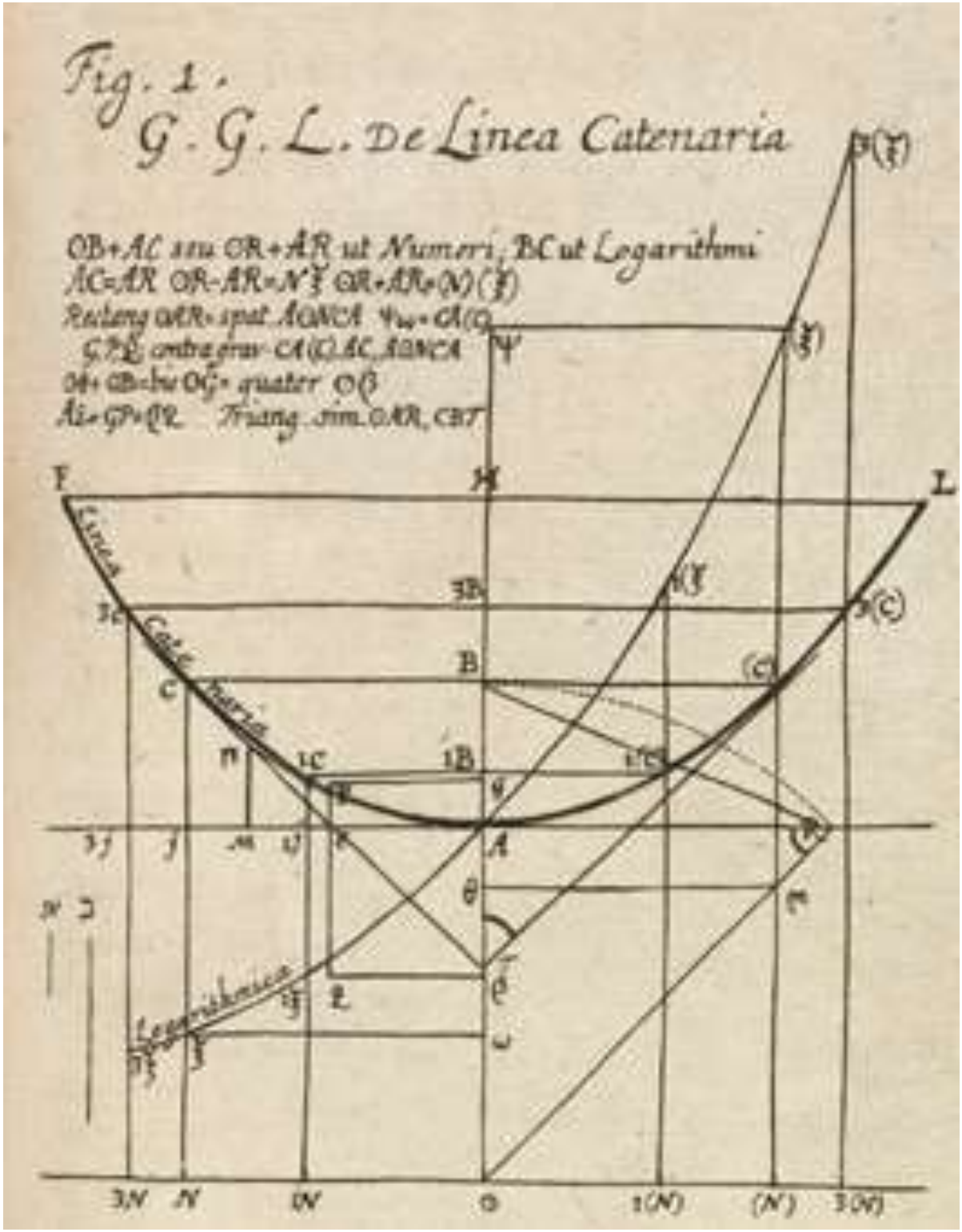



**Figure 5** Original catenary construction by Leibniz. See **THE LEIBNIZ DISCOVERY OF PRINCIPLE OF THE CALCULUS IN ACTA ERUDITORUM**.

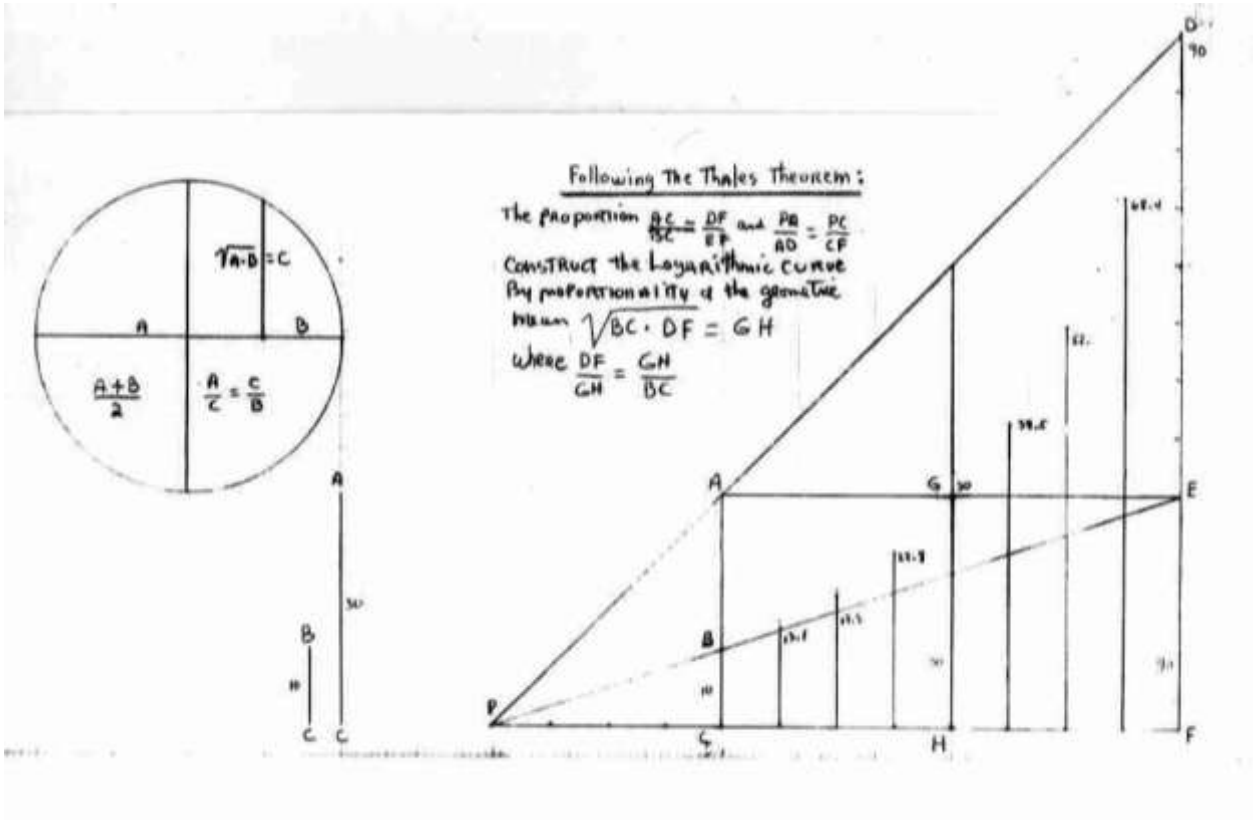



**Figure 6** Mean proportionals for the construction of the Logarithmic Curve using the Leibniz method.

Leibniz will universalize the process. Thus, if an underlying principle of things is such at a given time, it is also such at all times. The point to understand here, therefore, is not to learn the Leibniz calculus, although it is commendable to do so, but to determine the reason behind the Leibniz calculus. This is where the principle of proportionality between reason and power gets to be directly applied to the unknown beyond calculation, per se. Let me explain this by the following.

The Leibniz ***method of inversion of tangents*** is exceedingly remarkable not merely for the purpose of measuring, but because when the mind does not yet have the power to affirm a new discovery of knowledge, it has, nevertheless, the knowledge of how to access that power. And, conversely, when the knowledge of the power to get to the discovery of knowledge is established, the new higher power is then obtained through an increase in energy-flux-density of your mind. So, the whole thing comes down to knowing how to increase your energy-flux-density by means of discovering the unknown.

Here is how Leibniz found the logarithmic curve and the catenary curve of **Figure 5** by finding a series of mean ratios between two segments D and K. See the two examples of **Figure 7** and **Figure 8.**

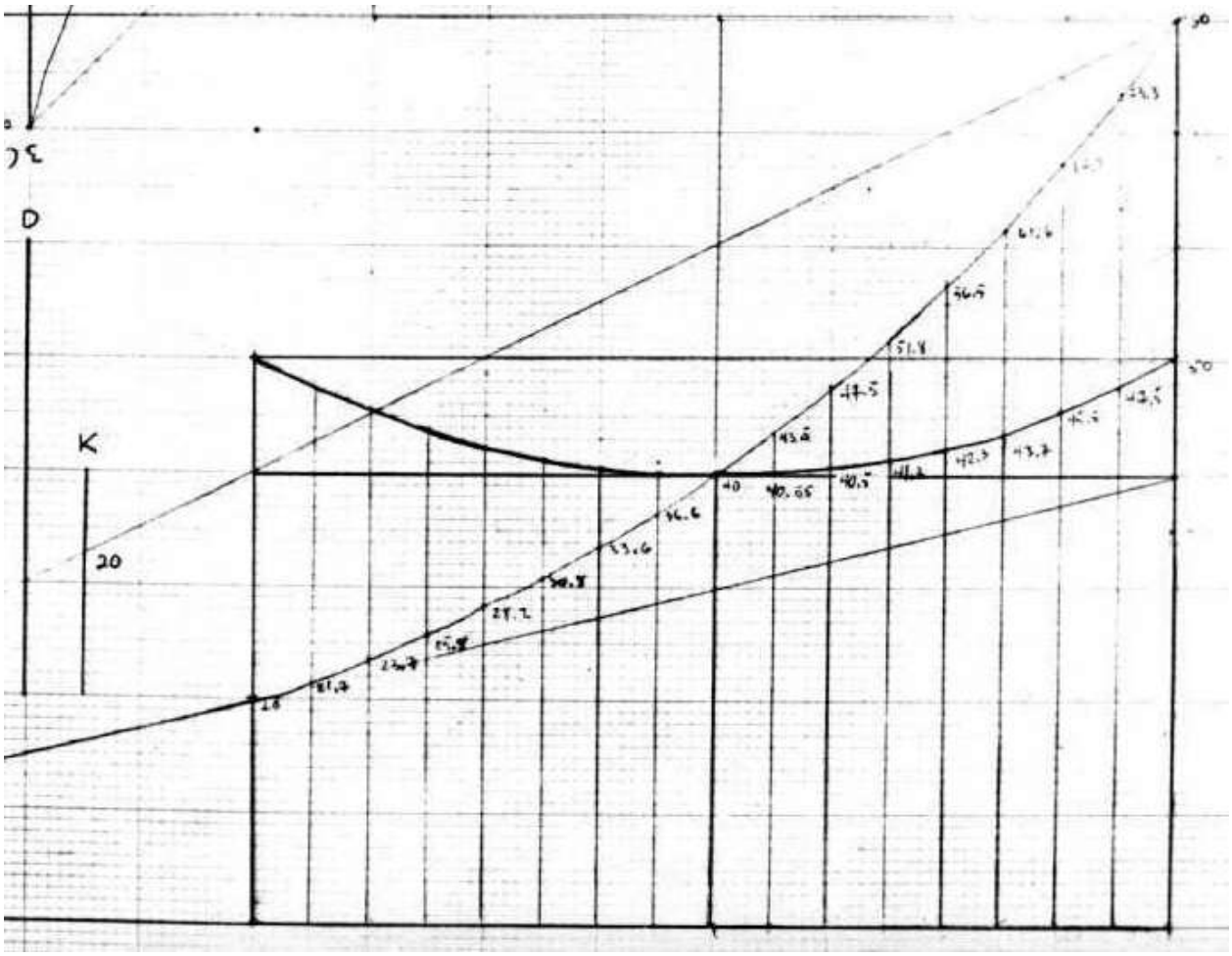



**Figure 7** Two arbitrary functions D and K in the ratio of 2/1 using the Leibniz method.

The principle of this composition consists in obtaining all of the means between any maximum and minimum. In the case of **Figure 7**, the ratio of D and K is 2/1. Although you may not know what the curve will end up being, you know how to get it by knowing the proportionality. Obviously, this Leibnizian process is a much more difficult problem to solve in comparison with the Euclidean method of finding the tangent when you have already been given the circle. The idea of this remarkable theorem comes from what Leibniz identified as the principle of proportionality between reason and power:

> "All beauty consists in a harmony and proportion; the beauty of minds, or of creatures who possess reason, is a proportion between reason and power, which in this life is also the foundation of the justice, the order, and the merits and even the form of the Republic, that each may understand of what he is capable, and be capable of as much as he understands. If power is greater than reason, then the one who has that is either a simple sheep (in the case where he does not know how to use his power), or a wolf and a tyrant (in the case where he does not know how to use it well). If reason is greater than power, then he who has that is to be regarded as oppressed. Both are useless, indeed even harmful." (Gottfried Leibniz, ***On the Establishment of a Society in Germany for the Promotion of the Arts and Sciences (1671)***, The Schiller Institute.)

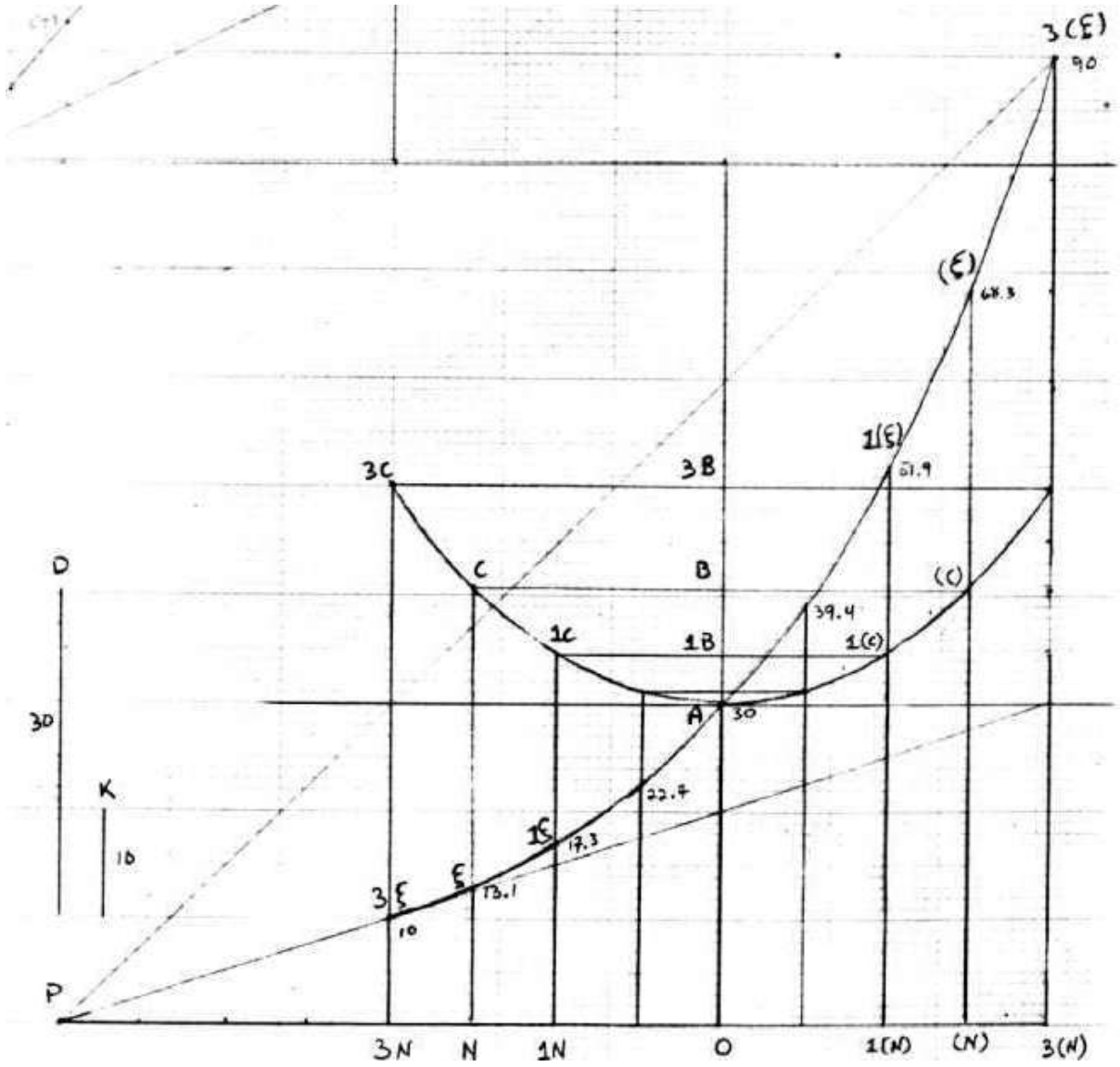



**Figure 8** Two arbitrary functions D and K in the ratio of 3/1 using the Leibniz method.

This is the creative principle that Indian Prime Minster, Narendra Modi, implied in his BRICS statement of ***"'future potential'; rather than existing prosperity or shared identities"*** for the next generations and that, consequently, the ***"very idea of the BRICS is thus forward-looking.***" Note the inversion between "***existing prosperity***" and "***future potential***."

The beauty of this method is that it acts like a sky-hook to which your mind is attached as if from a loose catenary, and all you have to do is to pull yourself upward on it as if it were created with the purpose of giving a new knowledge to mankind from the ***"mandate of heaven;"*** because the ***"future potential"*** that Modi is talking about is the eradication of poverty of mind from the entire planet.

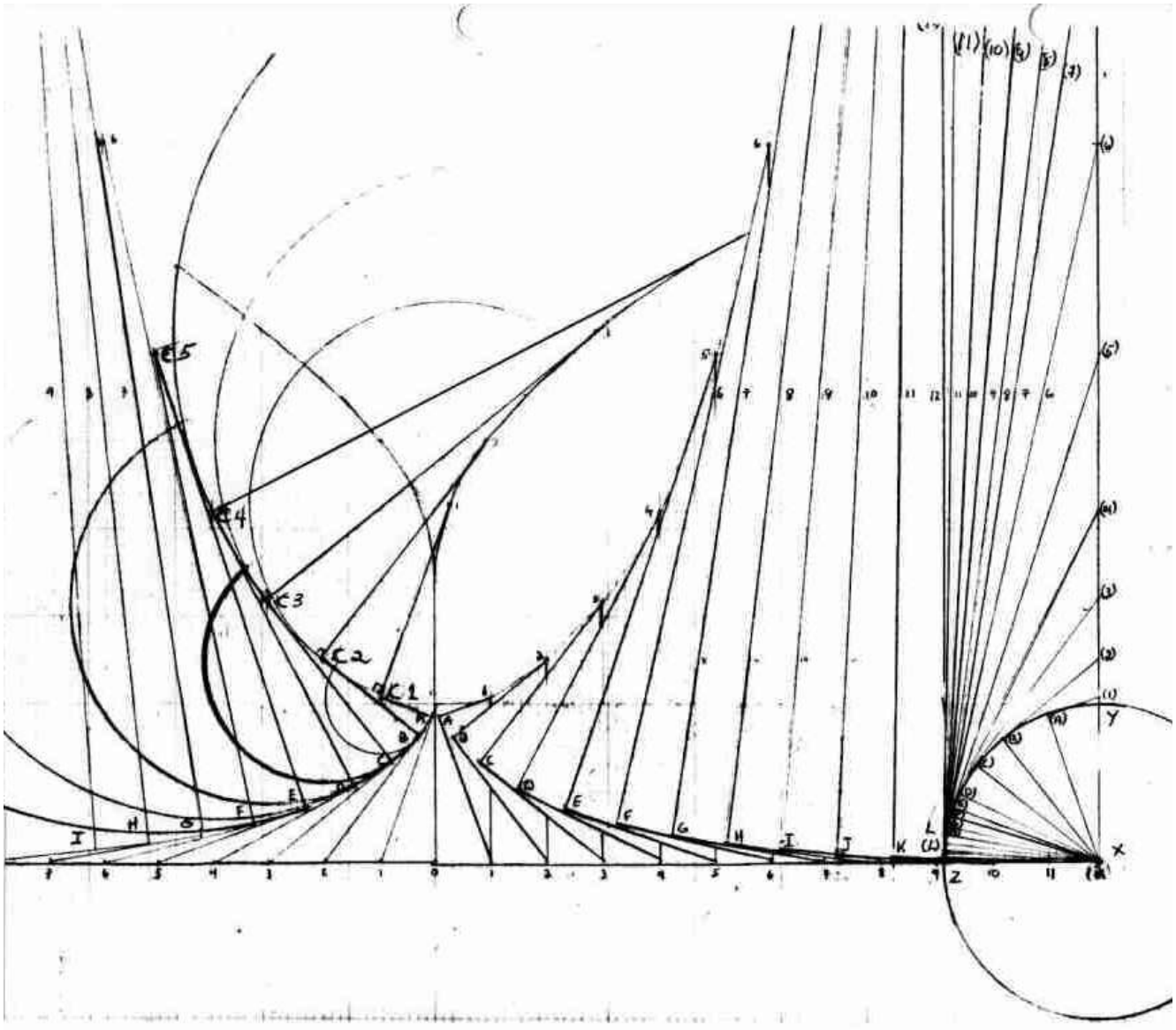


**Figure 9** Application of the inversion of tangents to the catenary and the tractrix by using the ***method of inversion of tangents*** as in **Figure 4**. Note the axiomatic difference between the Euclidean method of constructing the tangents from a circle and the Leibnizian method of constructing the catenary and tractrix curves from the property of the tangents. [Parallel Proportional Construction, Pierre Beaudry, 2001]

All of the catenary tangents, 1 to 12, are the inverse of the circle tangents (1) to (12), and all of the tractrix tangents A to L are the inverse of the circle radii (A) to (L). Although Leibniz established the ***method of inversion of tangents*** to both the catenary curve and the tractrix curve, separately, my construction in **Figure 9** and **Figure 4** shows how both the catenary and tractrix curves are connected together in a single construction by using the same method.

**CONCLUSION**

The point to be made, finally, is that discovering the unknown by inversion is emphatically not deducing something from what is already established. You must do the opposite. When Leibniz says, "***given the property of the tangent, find the curve***," you must truly start looking for what you don't know. You cannot simply deduce from what is already known.

On the contrary, the Euclidean method is, "***given a circle, find the tangent***." In this case, Euclid starts with something that is already known, i. e. the circle, and he is telling you that you don't need to discover anything, because you can easily deduce the property of a tangent as being at right angle to the radius of the circle. In other words, all you have to do is to deduce the position of the tangent from the already known position of the radius of the circle. That is the best way to remain stupid. Why? Because you are repeating instead of discovering; you are deducing as opposed to creating.

Nevertheless, remember that this Leibniz ***method of inversion of tangents*** only gives you the road to the unknown, not what the unknown is going to be. However, knowing how to get there is almost like being there. It is already a great advance, which you can already use in discovering the necessary future from the top down. Try it and let me know what you have come up with.

**FIN**