

From the desk of Pierre Beaudry



RAPHAEL SANZIO: THE CATENARY/TRACTRIX PRINCIPLE OF THE TRANSFIGURATION

by Pierre Beaudry 7/21/2009



Raphael's *Transfiguration* contains a very disturbing discontinuity representing two different and opposite processes that have baffled critics and admirers alike for centuries. The perplexity of the spectator before this painting lies in the fact that the moment depicted in the upper part of the painting, the actual transfiguration of Christ, does not occur at the same time as the tragic event of the curing of the epileptic boy, in the lower part of the fresco, so that the two scenes appear to be completely foreign, separate, and even opposite subjects. This first impression is neurotic, incomplete, and misleading merely because a true cognitive connection of unity has not been discovered between the two events.

On the other hand, if one looks at the whole scene as a metaphor of the creative process, the perplexity is dissipated, and the unity of effect is reestablished. In other words, if the *Transfiguration* is considered as the reflection of a catenary/tractrix envelopment by inversion of two different times, mortality and immortality, and two opposite movements, local and infinite, woven into an extraordinary singular unity of effect, the enigma of Raphael is resolved. Here, Leonardo da Vinci's conception of the *catenary/tractrix function* shows how the human mind works at the same time that one discovers the process of its discovery in a Cusa contracted infinite. That is the central irony of Raphael's *Transfiguration*, and the object of this report: to show how Raphael treated the external appearance of the subject in such a manner that it corresponded to the internal nature of the event.



Figure 1. Raphaël Sanzio, *Transfiguration*, 1517-1520.

Moreover, this Raphael masterpiece should provide us with sufficient artistic compositional proof of the argument that Lyn made with respect to the difference between the construction of the catenary/tractrix as opposed to the concoctions of Aristotle and Euclid that Raphael was fighting against. As Lyn reported in his latest paper: “This subject of the distinction between what are to be classed as “naturally” physical curves, such as the catenary, and the formal-geometric curves of the intrinsically, scientifically fraudulent system of Aristotle and his follower Euclid, is of crucial importance for locating a demonstrable sort of experimental form of proof of the

true nature of the human mind.” (Lyndon H. LaRouche Jr., *THE RULE OF NATURAL LAW*, June 21, 2009, p. 59.)

In order to understand Lyn’s argument from the vantage point of artistic composition, you have to discover that the *catenary/tractrix function* is performatively subjective; that is, the function is not dependent on the construction of an objective hanging chain or funicular curve. The chain is merely the effect, the end result of a dynamic process that says what it does by virtue of the very exercise of discovering and elaborating the principle of its physical construction. In constructing the *catenary/tractrix function*, for example, you are actually showing how the mind works in a discovery of principle. For our purpose, here, let it be understood that the catenary and tractrix both reflect the process of discovery of the least action principle which describes, physically, the dynamics of the discovery that is built into its construction. It is in that sense, and in that sense only, that the *catenary/tractrix function* is a performative function that merely requires, as Leibniz put it, the knowledge of the property of its tangent envelopment in order to understand it. In other words, the process is one of *osculating envelopment by development*. That is Leibniz’s differential of forecasting future events.

Therefore, this Raphael fresco is not the expression of a schizophrenic form of Manichean “light and darkness struggle,” between good and evil, as too many British art critics have falsely interpreted this painting. The principle of suspended projection characterized by the *catenary/tractrix function* generates two events in one, as causality impregnates its potential effect before it actually produces it. However, Raphael caused a disturbing singularity to occur. He represented Peter and John, twice in the same painting as if they reflected two different subjects at two different times: once in the upper part, when they had to shield their eyes after having caught a glimpse of divine nature, and again, in the section below, where they were seeking to discover the truth about the possessed boy. This may be reminiscent of the Massachio treatment of two different times in the same painting; however, the Raphael *Transfiguration* is using physical space-time, here, in a completely unique and new way that has not been replicated, to my knowledge, in any other classical artistic composition, except in music and poetry.

In using this unique form of diacaustic method of projection, Raphael showed that John and Peter had experienced a true discovery of principle by way of a unique singularity of light propagation in physical space-time. This is entirely in keeping with Leonardo’s scientific experiments with light propagation and human vision. (See Figure 2.) As Lazare Carnot put it, Raphael is expressing the idea of “*generating ideas by means of the senses, of acting on the soul by the organ of vision.*”

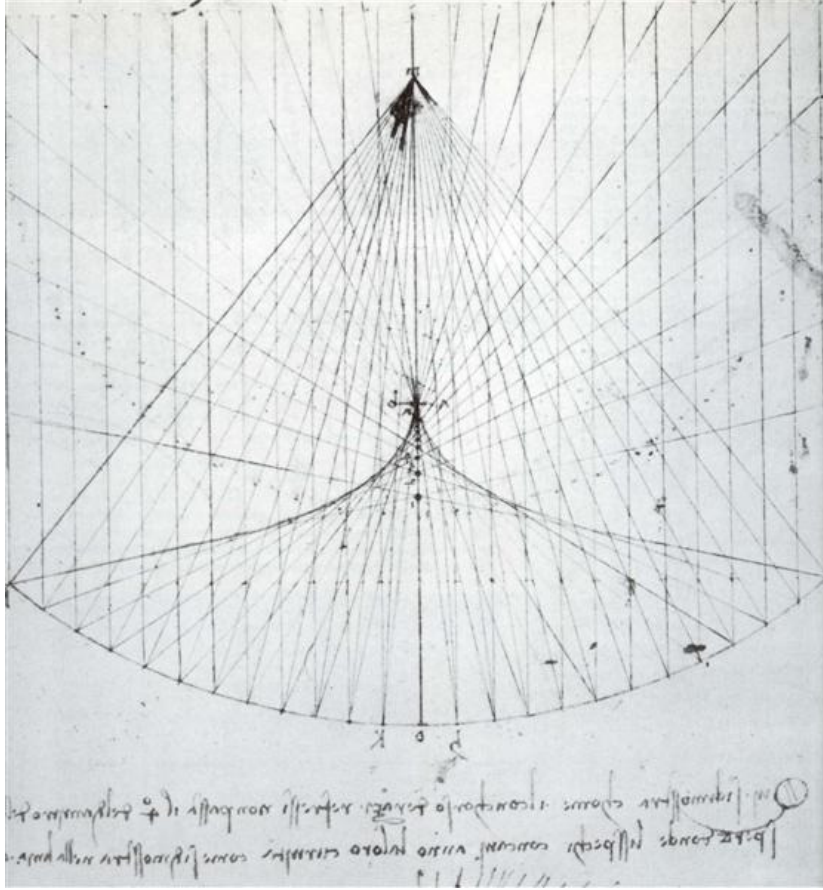


Figure 2. Leonardo da Vinci drawing of a caustic reflection.

It is important to note that Leonardo was the first to establish the principle of least action, later developed by Pierre de Fermat, by applying it to the universal phenomenon of undulating motions of heat, light, magnetism, and gravitation. Two hundred years before Fermat, Leonardo wrote: “Each natural phenomenon is generated by the shortest pathway.” (*Anatomy Notebook*, IV, fol., 16 recto, and *Cod. Arundel*, fol. 85 verso) Leonardo was also the first to study the refractive rays of light going through different media, or passing through a continuously changing medium such as the atmosphere, thus providing both a conceptual and experimental basis for future investigations on the least action curvature of light by Huygens, Fermat, Leibniz and Bernoulli. Leonardo’s investigations also included some relevant experiments from the Arab father of modern optics, Alhazen Ibn al-Haytham.

Since in the above section of the *Transfiguration*, John and Peter cannot see the principle with their physical eyes, the consequence must be that they can only see with their minds through the shadows of sense-perception as developed in the event of the section below. That is the conceptual unity of the painting and the dense point of transformation to be made here. Therefore, the question that Raphael poses for the spectator to resolve is: *could the mental event above represent the result of the failure of the apostles to understand the significance of the perceived event occurring below? Is*

that what Peter and John have understood and that others have failed to grasp? The attempt by Raphael to represent this ambiguity, in the simultaneity of eternity of a single painting, is probably one of the greatest examples of a dramatization of the creative process itself.

As Lyn has further shown in his recent Sequel # 1: *THE RULE OF NATURAL LAW*, the vantage point of artistic composition is to understand that scientific knowledge is an experimental shadow-envelope of the real universe formed in our minds, as opposed to an objective view of the world as registered by the instruments of our sense-perception and their extensions. The shadows of perception cast on our minds, for example, in a “pairing of the catenary and tractrix relationship by Leonardo da Vinci,” (p. 33) is of the same type of enveloping process between the cognitive reality of principle and the false sense certainty of perception; that is, a sort of differential in which reality is not the perceived object, but the transformation of the mental and perceptual process together, the measure of change between the two. That is what science is.

This was the method mastered by Leonardo da Vinci in *The Last Supper* and in *The Lady of the Rocks* that he inherited from Nicholas of Cusa and passed down to Raphael during the beginning of the fifteenth century. Take this measure of change to be of the character that Raphael had created in his last painting, the *Transfiguration*, and you will get a good sense of that Leonardesque transformation principle. Furthermore, don't forget the anomaly in the fresco that reinforces this idea: Peter and John are present in both the upper and lower parts. How can you be in two places at once? What does that mean? What do Peter and John see that others have not seen and that they are attempting to get us to see: that you are the same and not the same?

We might be in a better position to answer some of those questions, if we focus our attention on the historical specificity of the painting. First of all, the painting was commissioned by Cardinal Giulio de' Medici, Bishop of Narbonne, France, who became the anti-ultramontane Pope Clement VII a few years later, and who also became famous in his fights against Habsburg Emperor, Charles V, at the time of Rabelais and Francois Premier. I must remind the reader that the Habsburg-led imperialist Ultramontane enemy of the Renaissance had already pushed Leonardo out of Italy, into Francois Premier's France, and they were about to do the same to Raphael; but Raphael suddenly died of a paludal fever at the age of 37, on April 6, 1520, while putting the finishing touches to his fresco. On his dying bed, Raphael asked for the fresco to be exhibited publicly at his funeral, which it was, and, as a result of his death, the *Transfiguration* was never sent to France.

The *Transfiguration* had been executed as an altarpiece for one of the two transepts of the Cathedral of Narbonne in southwestern France. Another altarpiece for the Cardinal's church, on the subject of the *Raising of Lazarus*, was executed by the student of Michelangelo, Sebastian di Piombo. The Gospels of Matthew and Mark provided Raphael with a complex range of emotional and conceptual opportunities that he treated in accordance with the scientific and artistic principles of Leonardo. In fact, the treatment of the *Transfiguration* is very much reminiscent of Leonardo's dynamic treatment of *The*

Last Supper, which was also inspired by the gospel of Matthew. In the present case, Jesus is descending from *Mount Tabor* to cure an epileptic boy that the apostles were unable to cure. As in the case of Leonardo, the secret lay in the mastering of the shadows relative to that biblical account. The text of Matthew is the following:

“Now after six days Jesus took Peter, James and John his brother, brought them up on a high mountain by themselves, 2 and was transfigured before them. His face shown like the sun, and His clothes became as white as the light. 3 And, behold, Moses and Elijah appeared to them, talking with Him.

4 Then Peter answered, and said to Jesus, ‘Lord, it is good for us to be here: if You wish, let us make here three tabernacles; one for You, one for Moses, and one for Elijah.’ 5 While he was still speaking, behold, a bright cloud overshadowed them; and suddenly a voice came out of the cloud, saying, ‘This is My beloved Son, in whom I am well pleased. Hear Him!’ 6 And when the disciples heard it, they fell on their faces, and were greatly afraid.

7 But Jesus came and touched them, and said, ‘Arise, and do not be afraid.’ 8 And when they had lifted up their eyes, they saw no one but Jesus only. 9 Now as they came down from the mountain, Jesus commanded them, saying, ‘Tell the vision to no one, until the Son of man is risen from the dead.’ 10 And his disciples asked Him, saying, ‘Why then do the scribes say that Elijah must come first?’ 11 Then Jesus answered and said to them, ‘Elijah truly is coming first, and will restore all things. 12 But I say to you that Elijah has come already, and they did not know him but did to him whatever they wished. Likewise the Son of man is also about to suffer at their hands.’ 13 Then the disciples understood that he spoke to them of John the Baptist.

14 And when they had come to the multitude, a man came to Him, kneeling down to Him and saying, 15 ‘Lord, have mercy on my son for he is an epileptic and suffers severely; for he often falls into the fire and often into the water. 16 So I brought him to Your disciples, but they could not cure him.’

17 Then Jesus answered and said, ‘O faithless and perverse generation, how long shall I be with you? How long shall I bear with you? Bring him here to me.’ 18 And Jesus rebuked the demon, and he came out of him; and the child was cured from that very hour.

19 Then the disciples came to Jesus privately and said, ‘Why could we not cast him out?’ 20 So Jesus said to them, ‘Because of your unbelief; for assuredly I say to you, ‘If you have faith as a mustard seed, ye will say to this mountain, ‘Move from here to there,’ and it will move; and nothing will be impossible for you. However, this kind does not go out except by prayer and fasting. (Matthew 17: 1-21)

In his Gospel, Mark offers a few more instructive details about the state of the epileptic boy and how it is possible to do the impossible for curing him.

“16 And He asked the scribes, ‘What are you discussing with them?’ 17 Then one from the multitude answered and said, ‘Teacher, I brought you my son, who has a mute spirit. 18 And wherever he seizes him, he throws him down; he foams at the mouth, gnashes his teeth, and becomes rigid. So I spoke to Your disciples, that they should cast him out, but they could not.’

19 He answered him and said, ‘Oh faithless generation, how long shall I be with you? How long shall I bear with you? Bring him to me.’ 20 Then they brought him to Him and when he saw Him, immediately the spirit convulsed him, and he fell on the ground and wallowed, foaming at the mouth. 21 So He asked his father, ‘How long has this been happening to him?’ And he said, ‘From Childhood. 22 And often he has thrown him both into the fire and into the water to destroy him. But if You can do anything, have compassion on us and help us.’ 23 And Jesus said to him, ‘If you can believe, all things are possible to him who believes.’ (Mark, 9:16-23.)

Here, Raphael shows us that not only the impossible is possible for someone who believes, but also that this is the only way to bring a solution to the world crisis. So, the transformation of the physical state of the epileptic boy is also the cure for the psychological condition of the apostles’ fears and states of disbelief with respect to the powers of their own minds. This subject, here, is not religious as such, but epistemological in character. It is about the subjective power of what you can do, and what you think you cannot do with your own creative potential. The question is: can you accomplish miracles? Can you do the impossible? Can you cure the madness of this tragic world? Do you have enough compassion to do the job, and to do it right? In other words, can you create a Renaissance?

If you remain in perplexity and doubt about these questions, as do most people, including the majority of the apostles, as the Bible and this painting show, then, it seems hopeless. Because, there seems to be no other remedy for curing the madness of mankind. However, if you study closely the minds of John and Peter, there is hope. So, look at their faces and ask yourself: what is going on in their minds?



Figure 3. Raphaël's cartoon of John and Peter: the shadows of a discovery of principle.

In Figure 3, Raphael reproduced a most beautiful sublime moment of “acting on the soul by the organ of vision.” He has John and Peter looking inside the domain of a tragic world gone mad. While all of the other apostles are distraught to various degrees, Peter and John are the only two figures who show understanding and compassion for the boy's deranged state. The impression that Raphael gave to all of the other faces and

gestures is that no one else is capable of solving the crisis of the young boy, because no one is making an effort of understanding how to transfigure madness into sanity; that is, how to elevate someone to a higher moral state of spirituality.

However, Peter and John's facial shadowy expressions tell a different story. They show how John and Peter are attempting to solve the problem. Both apostles express love and compassion for the other, however strangely he may act. That is the *catenary/tractrix function* that Raphael restored from Leonardo, Brunelleschi, and Cusa, as an anti-Euclidean principle, and whose physical geometric construction Leibniz had later developed from his method of inversion of tangents. This is what you cannot fail to perceive through the shadows of the tense and attentive minds of John and Peter: a caustic process that describes a mental state of alertness and concern for a fellow human being who is going through existential distress.

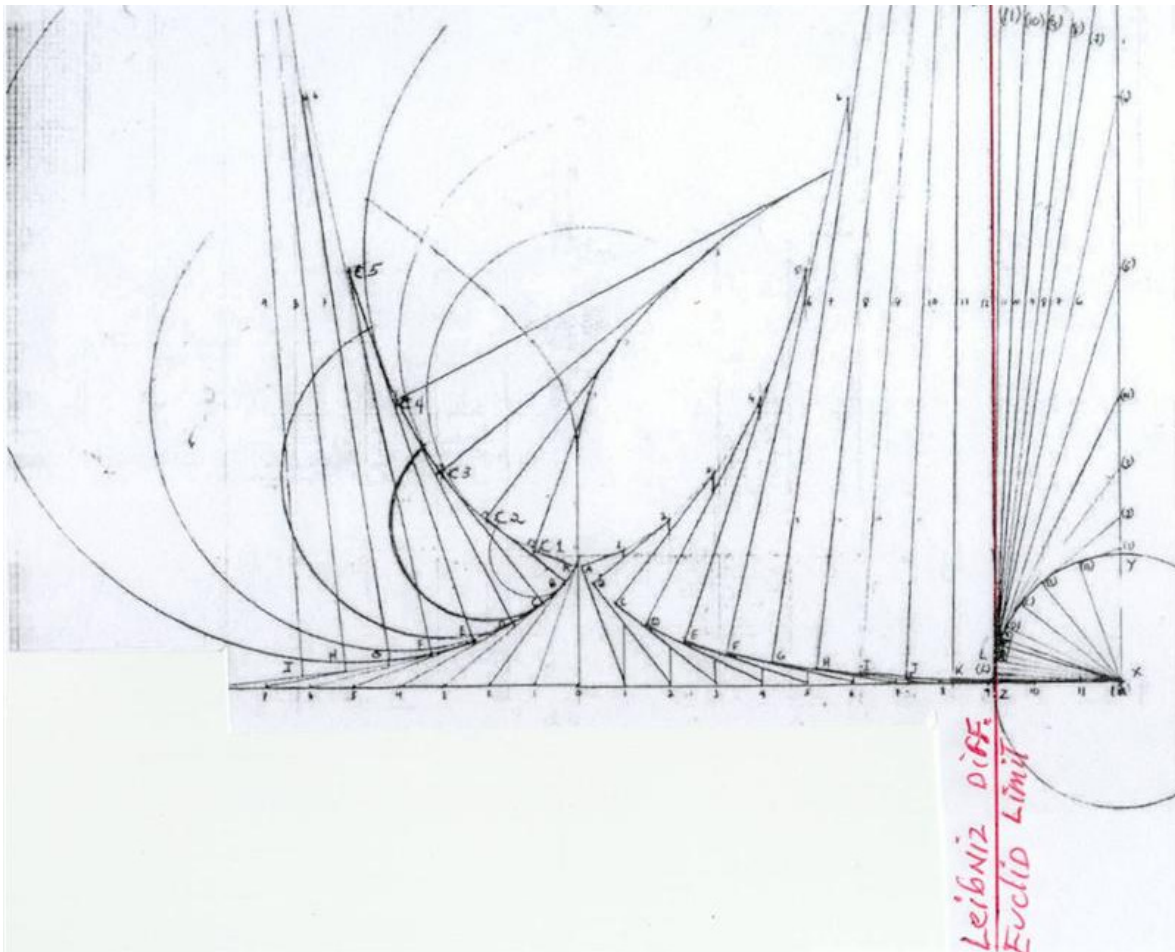


Figure 4. The *catenary/tractrix function* constructed by inversion of tangents and osculation. Note the locus of the Euclid limit and of the Leibniz differential.

For Leibniz, the idea of *inversion of tangents* was a crucial means of identifying his principle of creativity which resides in the simultaneity of eternity, and which the human mind accesses through a passionate fight for truth, in opposition to Euclid's and

Descartes' a priori geometric concoctions. In order to understand this, the problem you may want to start with, for example, is a very simplistic Euclidean question: "*Given a circle, find the tangent.*"

The circle on the right of Figure 4 shows that the problem can easily be solved, because the property of the tangent is "visibly" established as being at right angle to the radius of curvature, or the normal of the quarter circle XYZ. On the one hand, this sort of formal Euclidean q. e. d. consideration is fraudulently self-evident, intrinsically, because it is based exclusively on self-serving sense-certainty. However, sense-certainty fortunately ends here.

On the other hand, the situation is completely different when the whole process is reversed at the last circle tangent (12); and you must, then, discover the impossible without the aid of sense-perception, if you wish to discover the catenary and tractrix curves. As Leibniz said in his anti-Euclidean formulation: "*Given the property of the tangent, find the curve.*" This is an axiom buster. How can you find a curve if you are only given the property of a straight-line?

The difference between Euclid and Leibniz, here, is that the solution to that inversion problem requires the principle of creativity. It cannot be solved without throwing out Euclid and throwing up a catenary sky-hook onto the zenith of the infinitely large sphere of the heavens over your head, as if you were to throw upward the radius of an infinite circle and attach it to an infinite straight line at right angle to it.

As Figure 4 also shows and implies, at those precise points of the circle tangent (12) and the catenary tangent 12, which are respectively the last tangent to the circle and the first tangent to the catenary curve, the projection calls for a solution of the sort that Cusa used with respect to infinity, where, for example, an infinitely large circle becomes an infinite straight line. This locus of transformation, however, is the measure of change of the Leibniz differential. You cannot see this differential, but it is there, between the Euclidian line (12) and the Leibnizian line 12, which are two different lines in one separating two absolutely different axiomatic domains, as between the past and the future. This is the Leibnizian measure of change, that is, the Leibnizian differential of forecasting events in the future. There is no truth in Euclidean self-evident sense-certainty of "*given a circle, find the tangent.*" Truth exists only in extrapolating from past knowledge such as "*given the property of the tangent, anticipate events from knowledge to come,*" but that you don't yet have. In this case, what is required is to risk mobilizing your imagination into transforming an indefinite infinite into a contracted infinite.

Thus, the creative process of inversion of tangents relies consciously on Cusa's idea of transformation of a non-existing point at infinity, which is the place where an anti-Euclidean axiomatic change begins to occur; and the same process expresses the dynamic infinitesimal differential where Leibniz completely violates and repudiates the Euclidean fallacy of deduction. The irony, here, is that this Cusa non-existing zenith point, projected from the infinite horizon of your mind, is more real and significant than any fraudulent existing point perceived by your senses in Euclidean geometry. It was the

same anti-Euclidean measure of change that Leibniz required to construct his catenary and tractrix functions as I reported before from *Acta Eruditorum*. However, you must go to infinity first if you wish to discover this; only to come back as a changed person.

After you have gotten back, then, take the same *catenary/tractrix function*, and look at it as a contracted infinite: that is to say, as the contraction of a caustic expressing the process of change during the propagation of light through a finite sphere of water. Leibniz described this dynamic process in his 1671 *Outline of a Memorandum*:

“From this it follows inexorably that charity, the love of God above all, and true contrition, on which the assurance of blessedness depends, is nothing other than the love of the public good and of universal harmony; or rather, on that account, the glory of God and understanding are the same, and how great it is in itself to make greater, for there is no more distinction between universal harmony and the glory of God, than between body and shadow, person and picture, between a direct and reflected ray of light, since the one is what is in fact, the other what is in the soul of him who knows it. For God creates rational creatures for no other reason but that they should serve as a mirror, in which His infinite harmony would be infinitely multiplied in some respects. From which must arise in due course the completed knowledge and love of God, in the beatific vision or the incomprehensible joy which the mirroring, and to a certain degree the concentrating of the infinite beauty in a small point in our souls, must bring with it. And thus, a burning mirror or burning glass is the natural image here.” (Quoted in *The Real Political Economy of the American Revolution*, EIR, 1977, p. 217.)

Raphael’s *Transfiguration* reflects such an experiment as if the scene were projected through the Noosphere of the “glory of God.” The idea is that of a caustic image of axiomatic change that is too luminous and too bright to be seen with physical eyes, but which only the eyes of the mind can see the “universal harmony” through the cusp of an evolute inversion (Monge’s *développée de rétrogression*). (See Figure 5.) In contrast with the blinding light of Christ, the epileptic boy calls attention to the same caustic image by inversion, but this time, formed with dark rays, as if generated through a black hole. In a way, one is the negative caustic image of the other. In a similar manner, for Raphael, once that Leonardo least action principle was discovered and understood, the division between the two levels of his fresco could be resolved by turning the tragic existential moment into a sublime moment.

The experiment is simple, but it is also excruciatingly difficult, since it is a life-and death question for all of humanity. Thus, the mirroring brings up the question of mortality and of immortality, because it brings up the question of how to change the lost society of today, and how to create a new Renaissance. So, as Lyn has shown us many times, the answer is to become anti-Euclidean. How do you do that?

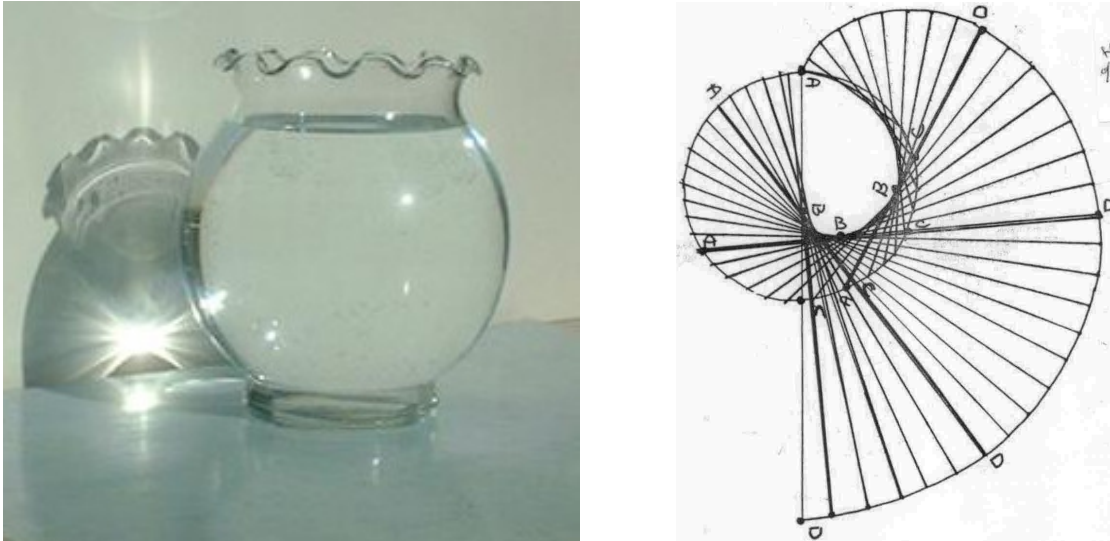


Figure 5. A caustic envelope and its harmonic range $AD : CD :: AC : BC$.

How do you transform an ordinary circle into an anti-Euclidean caustic? The singularity of Figure 5, representing the wavicle envelope of change between the positive and negative curvatures of a caustic, reflects the same axiomatic change as the propagation of light going through a water-filled sphere, causing a stereographic change of curvature between the sphere and the plane. Leonardo showed that such caustic inversions were also the basis for human vision, as he demonstrated in his experiments with the Camera Obscura.

The same process of change is generated by the human voice in a Bel Canto register shift. This is the process of a well-tempered universal change in curvature that is generated from a musical caustic as in the image of God examined by Leibniz. In the case of Raphael's *Transfiguration*, the change that is required to go from the tragic to the sublime is generated by the same counterpointal transformation required by a Bel Canto singularity that bridges the change of physical geometry between the chest register and the head register. The idea is that the vocal chords of the human voice obey the same function of curvature inversion when you mentally place your voice properly to reach the higher register in your head. (Rabelais expressed this by saying that the worse toothache that Panurge ever got was when a dog bit him on the leg. That may also have been when the wolf tone was invented.)

The way this irony works is like this: the rays of curvature of the involute curve formed by points **D** are all tangent to the evolute curve formed by points **B**. Imagine that points **A**, all around the circle, would be located in the chest register, while points **D** would be located in the expanded head register. This change would occur through the dynamic inversion singularity of the *tension cusp of evolute inversion* between points **B** and **C**, and at the boundary limit of the circle. Ironically, but not surprisingly, it was also the same harmonic range $AD : CD :: AC : BC$ of Lydian intervals that Archytas used in his scalene conical projection to discover the solution to the Delian problem for doubling

the cube. You can hear this sort of transformation in a good rendition of the *Mozart Mass in C Minor* on our LPAC site.

LPACTV: A Mozart Musical Offering

Thus, Peter and John were making explicit how to bring a solution to the crisis of a sick society. The extraordinary shadows of their figures show that they perceive how to solve the crisis, that they are attempting to calm the turbulent scene around them, and that they are endeavoring to save the boy from his state of delusion. John seems to be saying to Peter: “We must help this poor child out of his convulsion!” And Peter seems to reply: “Yes, but you must be very calm and be very clinical about it.”

Now, in conclusion, how did Raphael know he was accomplishing such an axiomatic change? The reason should be obvious. John and Peter had already discovered, through their caustic experience of the transfiguration of Christ on *Mount Tabor*, that one could not see the truth of a discovery of principle with one’s physical eyes, and that the turbulences of this mad world could only be understood and corrected by a carefully crafted reading of their shadows through the instrumentality of sense-perception. It was the distillation of both these experiences into a single *sense-conception* that characterizes the poetic idea of beauty as truth in Raphael’s *Transfiguration*. That is what made it a successful scientific experiment. It was the factor of a new measure of change that he had to internalize in order to act effectively in transforming the real world. Such was also the pathway of the infinitesimal domain as defined by Leibniz’s differential. Failing to do that, one is either blinded by the light of divine truth or by the darkness of human folly. Either way, one fails to know where one is going, because both cases lead to dead ends and destruction. However, since Raphael ingeniously constructed both cases together, he was able to forecast quite clearly where he was going and how a renaissance would come out of it.

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