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Foundations of the economic and social history of the United States: Theoretical

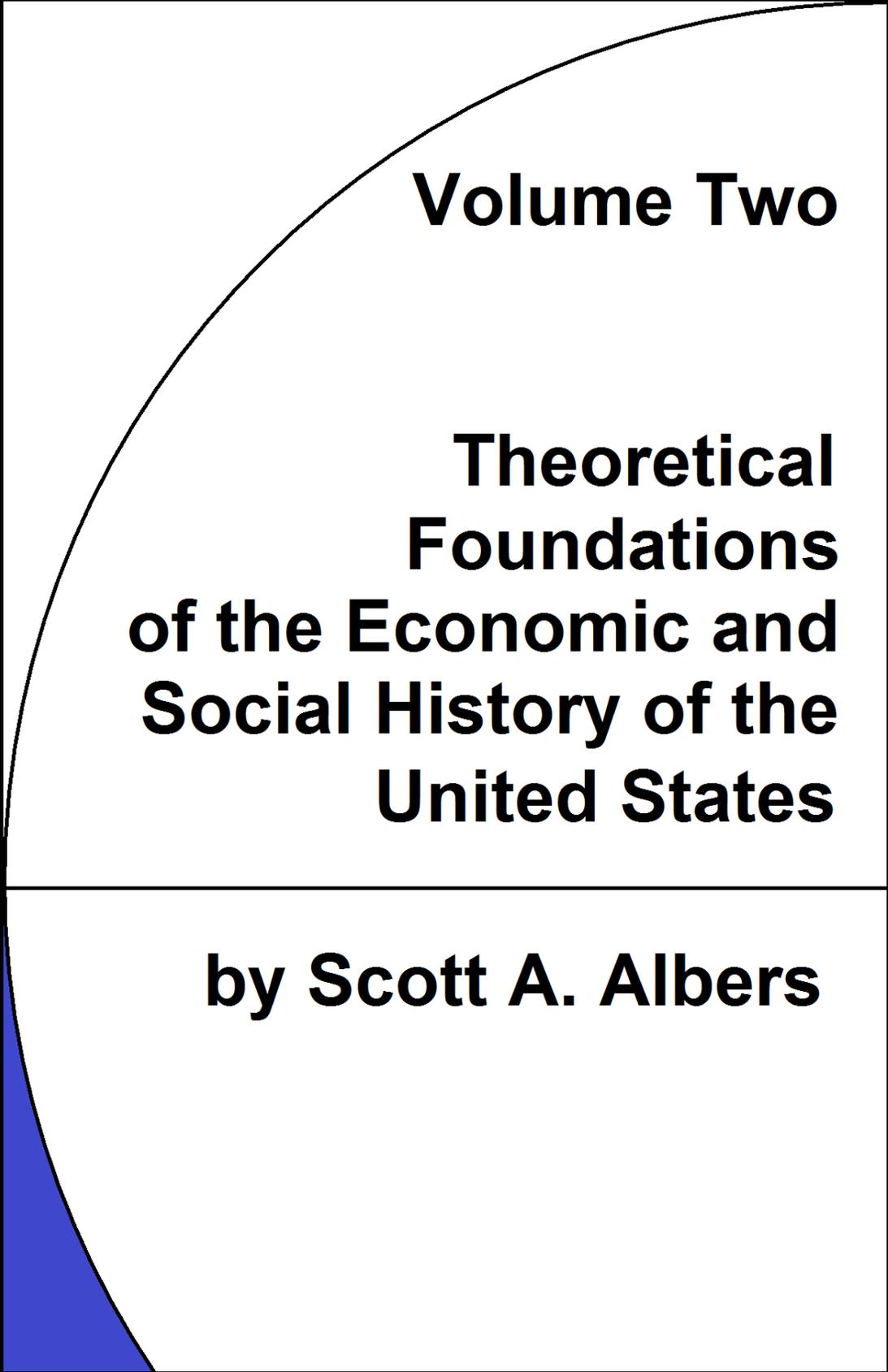
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Volume Two

**Theoretical
Foundations
of the Economic and
Social History of the
United States**

by Scott A. Albers

Now all depends on whether your idea stands up to physical criticism.

Einstein to Kaluza, Correspondence of 21.IV.1919

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INTRODUCTION: AN AFTERNOON IN PARIS

1.0 Reality and Complexity

There is a small and pleasant cafe not far from the Eiffel tower on the avenue de la Bourdonnais in Paris, a block or two from the River Seine which flows through the middle of the city. On an afternoon in spring you can sit and watch the world go by, sipping your tea and dreaming about whatever you want.

Across the street from the cafe towards the river is a bakery filled with pastries, breads of different sorts, cakes, tarts, cream-filled Mille Feuilles, baguettes and demi-baguettes, holiday treats for Easter, Lent or Christmas, rolls, croissants, Pain-au-chocolates, and fine bars of white chocolate, dark chocolate, and liquor-filled chocolate. A stern-faced yet attractive girl hands out purchases never smiling - unless she has just been speaking to an unseen but probably young man in the back room.

Next to this bakery one step closer to the river is a small grocery shop filled with exotic meats and vegetables, coffees, candies, salmon, caviar, wines and liquors, some cheeses, brightly packaged cookies, expensive and rare teas and herbal teas, baskets full of oranges, boxes full of pears and apples, hundreds of small toys from around the world - all pleasantly served by a man and his wife and all *tres cher* ... *very* expensive.

If you walk toward the river you will come to a footbridge which crosses the Seine in a pair of arches, formerly black, today powder blue. A map of the city will tell you that the name of the bridge is "Passerelle." The bridge is otherwise unmarked.

From the arches hangs suspended a wooden platform stretching across the river, one which makes a solid clapping sound as you walk across. On cold and foggy mornings standing on the bridge, the Eiffel tower rises behind you and you can watch the boats drift up and down the river beneath you without seeing a soul or hearing a sound.

If you are lucky and have some money in your pocket, you might take the metro to the Latin Quarter where food is cheaper than the avenue de la Bourdonnais. There you will find plenty of Greek pastry shops filled with baklava dripping with honey and sugar and almonds, meat sandwiches cut from large legs of lamb hanging upright in small white booths, and crowds of foreign-looking people strolling, chatting in French or Greek or Arabic or German, maybe Persian or Aramaic, all seeming to have struggled somehow to arrive at the crossroads wherein the middle ages and the modern world have yet to untangle themselves from one another. You will find churches, knots of roads and half-roads, streets narrow and cockeyed, each one butting into the next in a sort of perpetual surprise and cacophony of movement. Hidden between stone houses are elegant hotels and behind forbidding-looking gates are pleasant gardens and terraces surrounding glass rooms.

If you are bored you could walk across the river to see Notre Dame, the largest cathedral in Paris. If you are out late you might visit Saint Severin. Perhaps they will be giving a late-night master class in the organ and you can hear the tones of great masters booming out eerily in the darkness of the chapel.

Now imagine that you and I are sitting at this cafe along the avenue de la Bourdonnais sharing an afternoon cup of tea. We sit outside and watch the corner of the intersection. Watching the parade of people, dogs, automobiles, trees, language, events and lives passing by, we present ourselves with a question: *How many distinct and recognizable forms of order do we see?*

Perhaps, we both wonder, there are too many gradations and mixtures or organizations to define them all distinctly. Shall we count the arrondissements of Paris - its subdivisions laid out in the gentle spiral of a Nautilus seashell - a social, a legal, a geographic or an architectural “organization”?



No, by “distinct” and “recognizable” levels of organization we refer to the broadest categories of reality - the levels which unify planetary populations, traverse national boundaries, which tie us together as human beings living out a life on this earth. Like containers, these levels of organization are themselves independent of the members of their categories, as “religion” is a category of thought containing but not contained by Islam, Christianity, Buddhism, Confucianism, Taoism, Judaism and others.

Perhaps, we agree, the electric wires overhead, carrying computer, telephone, telegraph, or other electronic information would be considered a form of metal, of synthetic laminate, of tension, of electricity. We ask ourselves more directly, “How many levels of reality, of organization, are there, and by what basic elements do they combine together?” It seems an interesting question.

And so the question is posed.

* * * * *

1.1 The Social Sciences

The most obvious level of organization is the pleasant peacefulness of the scene. Consider the people hurrying in front of us, the lady reading quietly at the next table, the waiters taking orders and the customers reading small menus, ourselves in a discussion, and the general populace before us - all moving about their business, busy with their day to day travails, running home or to work, walking by more-or-less absorbed in their own lives, their own interests, their own occupations.

This peacefulness is one born of a *philosophy* which, in Paris, unifies much of existence. It is an aged blend of medieval and modern Christianity, modern urbanism, socialism, capitalism, a host of other “-isms,” and in particular a general good will towards oneself and one’s fellow human beings. It is the broadest form of social organization - the notion that peacefulness is a good and worthy pursuit.

Beneath this philosophic order one finds that we are all using the same currency. That is, whether one is American, French or Himalayan, the shopkeeper will expect payment in the European currency, the Euro. This Euro is exchanged in return not only for tea from our pleasant Cafe but for salmon from Alaska, wine from the Loire valley, Peruvian chocolate mixed perhaps in Switzerland with sugar from Haiti or Cuba - all items found just down the street. Through the use of this basic and internationally recognized currency enormous volumes of goods, services and ideas daily exchange hands. This currency is truly a marvelous invention of society and the human mind.

There may be exceptions periodically of course - the payment of gold, of diamonds, the signature of a Picasso. But very likely the cafe owner will expect our purchase to be paid for in the amount specified and with good solid Euros. There is then an *economic* order tying together our afternoon in Paris.

Beneath the interconnections of the world economy one might detect that the people around us are predominantly of a white complexion. The clerk, the waiter, the passers-by on the street are all likely to share similar skin color, hair type, facial and body structure, etc. This *cultural* similarity is an important part of European and particularly French organization. It is one which ties together the city of Paris and connects it with the rest of the continent of Europe and Russia, much of North and South America and Australia. The attitudes and perspectives of this group of people vary widely across the globe, and yet they share a common cultural origin which separates them from the other cultures of this planet.

Underlying this cultural order is the fact that to obtain our coffee we must make our request of the waiter in French. The avenue de la Bourdonnais is not friendly to persons who, speaking English with an American accent, believe that they are entitled to order coffee in whatever language they like. No, we must order in French.

I make this point to indicate that there is an intense nationalism in Paris, the capital of France. This then is one aspect of order within the scene before us. The concept of “Nation” originated in France, at least as early as Joan of Arc, just as the power of the nation-state emerged with the reign of Louis XIV. This form of order - the *nation-state* - is a central part of the order which we see before us. We detect this order of the nation-state in the character of the street, the lovely tree-lined boulevard, the Mansard roofs, the stone architecture, the small cars, the stylishness of the dress, the air and character of the people, the care for language, speech and diction, the love of discussion.

We might define the nation-state as a geographically organized group of people unified by language, religion and culture. The history, future, ups and downs of the nation-state are shared by all its citizens in one way or another. Here we have a very specific form of order, one written and charted for centuries in the Roman alphabet as adopted into the French way of life.

On a more intimate level we might notice that the society in which we find ourselves is one in which green and red lights dictate the motion of automobiles. A red octagonal stop sign seems to be capable at least of slowing down drivers as they turn left and right at our intersection. A woman comes out and carefully hoses down the debris which has collected over the day. She will do the same the following morning, almost like clockwork. A school lets out and suddenly the street before the entrance is flooded with students leaving class, all at once, a tide of young individuals dispersing like atoms of chlorine in a warm atmosphere.

The regular, socially expected, legally imposed society in which we find ourselves is type of order in the scene before us. No one uses force to make the automobiles stop; they just do. Should they violate the laws which dictate “green for go” and “red for stop” there may be consequences. But we do not find the use of physical force necessary to order our lives absent unusual circumstances which do not seem pertinent as we watch the traffic flow before us. Just as the students leave classes when permitted, as the shop keeper cleans the street as expected, as the automobiles stop and go as legally ordained, the *laws* of our society - written and unwritten - form a type of order which separates itself from the other forms of order discussed so far.

So now we have described five forms of order as we sit in our cafe. These are a philosophic order, an economic order, a cultural order, a national order, and a legal order.

1.2 The Physical Sciences

But perhaps you have had training in the “hard” sciences and count still more levels of organization. You point out that both you and I are organized by the *psychology* of individuals, and that our dialogue is a type of social game, a type of discourse wherein we share the joys and sorrows, insights and developments of our independent and yet converging lives. We would spot this form of order in each of our fellow individuals sipping tea or coffee at the cafe, playing a game of chess in the park, or strolling along the avenue de la Bourdonnais. The fact that a woman and man stroll hand in hand under the trees is as much a type of order as the nation-state. Union of individual man and woman in lasting relationships ensures the survival of culture and civilization through home life, marriage and the family. This basic truth underlies all other forms of social order.

Beneath the psychological independence which we share as sane individuals, you say, we share a common history with the plants and birds and animals found along the street. That is, we are alive. We are biologic organisms - functioning, deciding, loving, hating, emotional, breathing, eating, drinking, sleeping, working and energized beings - living in the present. This common *biology* underlies our individuality, but it forms a broader form of order, one which ties us to the reality around us in ways unlike that of the doctrines of Christianity, an international currency, the history of Europe, the rise and falls of kings, the morality of cleanliness, the pleasantness of our cup of tea. This biology dictates the types and numbers of fingers upon our hands, the height of our bodies, their weight, their appearance, and their function, as well as their diseases, their aging, their development as living organisms, etc. This biology and its universality in the living things before us unites us to a living - not a dead - planet, one in which we - you and I - both function as credible biologic contributors.

Moreover - you point out - the solidity and liquidity of our bodies and their functions present a still broader form of order - the order of *chemistry*. The color of a woman's hair, the smell of a perfume, the taste of a cup of tea, the solid flexibility of a tire along the curb, the concrete beneath our feet and the smooth-cut limestone of the architecture around us - these blocks of the reality we see before us are combinations of molecules and atoms which are as important to our cafe as they are to our bodies or to the chemical composition of the Seine and the sea beyond.

You have pointed out now a psychologic order of independent individuals, a biologic order of organisms, a chemical order of compounds. But surely we will both notice that each of the persons walking upon the street are walking quite successfully. That is, they are held to the ground by a form of physical attraction denominated "gravity." The operation of the constants and forces of *physics* presents a form of order operable - so they tell us - upon human beings, planets, stars, galaxies and the heavens themselves. And we both agree that this is so.

Combining with this gravity discussions of light, inertia, force, energy and electricity, we find ourselves in a physical universe of order, one permeating space and time as we know and experience it through the motions of our own bodies and lives.

Finally, we might notice that the number of persons passing by on the street are countable. That is, should you and I decide upon a contest by which to count the number of cars stationary at the traffic light - now! - we should arrive at the same number. This stems from our common conception of the number "one" and its additive properties. We will find this ordering of reality useful when the waiter requests that we pay the correct number of Euros, for the specified cups of coffee, at the appropriate time. This *mathematic* order is a basic order, one which Pythagoras - and perhaps Bertrand Russell - would tell us underlies each and every other order in existence.

And so we have counted ten forms of order, these being:

Philosophy
Economics
Culture
Nation
Law
Psychology
Biology
Chemistry
Physics
Mathematics

Perhaps there are others. But these, for our conversation of an hour, will do.

We have posed the question: "How many levels of reality, of organization, are there, and by what basic elements do they combine together?" Putting a slightly different question before us, as we consider these ten different levels, is it possible to find within them a pattern common to all?

2.0 Zeno's Paradox

Any search for a congruent order underlying the foregoing ten levels of research might begin by noticing at least one common characteristic of each of these levels: each level exhibits change over time. In some cases the level itself describes the motion of a physical object moving through space and time. In other levels change in one thing as relative to others is described.

One of the earliest descriptions of motion is found in the philosophy of Parmenides. The Encyclopedia Britannica has the following entry.

Parmenides of Elea (flourished first half of the 5th century BC) ... insisted that "what is" cannot have come into being and cannot pass away because it would have to have come out of nothing or to become nothing, whereas nothing by its very nature does not exist. There can be no motion either; for it would have to be a motion into something that is - which is not possible since it would be blocked - or a motion into something that is not - which is equally impossible since what is not does not exist. Hence everything is solid, immobile being. The familiar world, in which things move around, come into being, and pass away, is a world of mere belief (*doxa*). ... Parmenides tried to give an analytical account of this world of belief, showing that it rested on constant distinctions between what is believed to be positive - i.e. to have real being, such as light and warmth - and what is negative - i.e. the absence of positive being, such as darkness and cold.

This Parmenidean Philosophy was taken up by Zeno of Elea. The article continues.

(O)f very great importance in the history of epistemology was Zeno of Elea (flourished mid-5th century), a younger friend of Parmenides. Parmenides had, of course, been severely criticized because of the strange consequences of his doctrine that in reality there is no motion and no plurality either because there is just one solid being. To support him, however, Zeno tried to show that the assumption that there is motion and plurality leads to consequences that are no less strange. This he did by means of his famous paradoxes, saying that the flying arrow rests since it can neither move in the place in which it is nor in a place in which it is not and that Achilles cannot outrun a turtle because when he has reached its starting point, the turtle will have moved to a further point, and so on *ad infinitum* - *that, in fact, he cannot even start running, for, before traversing the stretch to the starting point of the turtle, he will have to traverse half of it and again half of that and so on ad infinitum.*

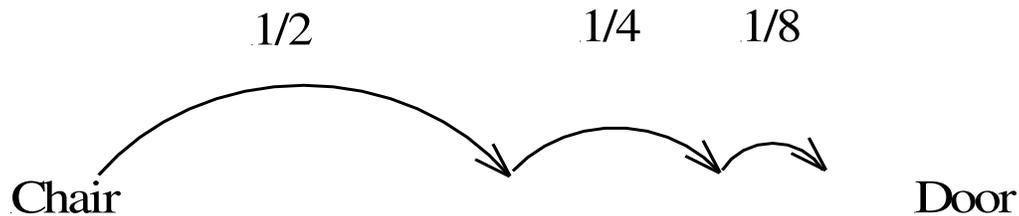
The article sums up the present situation as follows.

All of these paradoxes are derived from the problem of the continuum. Although they have often been dismissed as logical nonsense, many attempts have also been made to dispose of them by means of mathematical theorems, such as the theory of convergent series or the theory of sets. *In the end, however, the difficulties inherent in his arguments have always come back with a vengeance, for the human mind is so constructed that it has two ways of looking at a continuum that are not quite reconcilable.* (emphasis added)

2.1 Views of Zeno's Paradox

Many writers of mathematics texts have taken up Zeno's Paradoxes over the years. Rudy Rucker states the following:

The best-loved of Zeno's paradoxes is the one that states that you can never leave the room you are in. For, Zeno reasons, in order to reach the door you must first traverse half the distance there. But then you are still in the room, and to reach the door you must traverse half the remaining distance. But then...

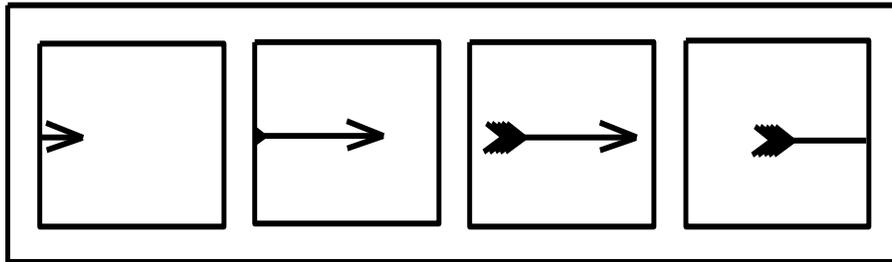


What exactly is paradoxical here? The problem seems to be that we can analyze the passage from chair to door in two ways. First, in the normal way, as a unit, a single, undivided action, as a 1. Second, as the limit of an infinite sequence of actions, as the sum of a series ($1/2 + 1/4 + 1/8 + \dots$) The modern tendency is to resolve Zeno's paradox by insisting that the sum of the infinite series $1/2 + 1/4 + 1/8 + \dots$ is equal to 1. One then goes on to add that since each of the successive steps is done in half as much time, the actual time taken to complete the infinite series is no different from the real time taken to leave the room.

But still... there is some residue of dissatisfaction. The feeling is that if you just keep halving the distances you never really get to the door. You may get arbitrarily close, but you never quite reach the limit.

Zeno claims that our perception of motion is in error, for nothing can traverse the infinity of points between ANY two points. Hence motion does not exist; reality is motion-less. The answer that time and space might best be thought of as separate, discrete entities does not entirely solve the problem. Rucker goes on:

The basic intuition about an Absolutely Continuous line is that such a line cannot be conceived of as a set of points. Zeno expresses this intuition in his paradox of the arrow. The paradox of the arrow seems to constitute a proof that space is not made of points. For, Zeno argues, consider an arrow that flies from the bow to the target. If space is made up of points, then the flight of the arrow can be decomposed into an infinite set of frozen movements, movements where the tip of the arrow successively occupies each of the points between bow and target. The problem is that while the arrow is at any one fixed point, say the halfway point, the arrow is motionless. How can the flight of the arrow be a sequence of motionless stills? Where did the motion go?



A movie of an arrow's flight is, of course, a sequence of motionless stills. But this does not disturb us, as we realize that the arrow moves in between the pictures. The problem Zeno raises is that if space is made of points, and if a still is taken at each point, then there is no possibility of "moving between the pictures" ... *because there is nothing between the pictures.*

The idea that "there is nothing between the pictures" forces us to consider the nature of motion itself. *If the observation of motion around us is, in reality, akin to watching a movie, then the "consciousness" or "belief pattern" of the individuals watching the movie is an essential component of the nature of motion itself.* Rucker mentions Parmenides in this context.

Zeno's way of the paradox is to deny that space is really made up of points. As a Parmenidean monist, Zeno viewed space as an undivided whole that cannot really be broken down into parts. We can find scattered locations in space, but space is always more than the sum of these isolated points. One can pick out higher and higher infinities from an Absolutely Continuous tract of space, but there will always be a residue of leftover space, of continuous little pieces, infinitesimal intervals over which the actual motion takes place.\

Various mathematicians have come to the conclusion that the line segment as described is a set of distinct points between which an infinite number of additional points might be plotted.

This view of space has been held by several philosophers since Zeno, notably C. S. Pierce and, perhaps, Kurt Godel. Godel distinguishes between the set of points described in set theoretic analysis and the continuous line of space intuition: 'According to this intuitive concept, summing up all the points, we still do not get the line; rather the points form some kind of scaffold on the line.'

Pierce goes further than this. According to him, a truly continuous line is so richly packed with points that no conceivable set, no matter how large, can exhaust the line. There should not just be one point between all of $1/2$, $2/3$, $3/4$, $4/5$, $5/6$, ... and 1. There should be ∞ points, \aleph points, Absolutely Infinitely many!¹

My answer to Zeno's Paradox is that the arrow in flight is represented in the physical sciences as a combination of four dimensions, three of space, one of time. Our ability to grasp each of these frames of the "movie" of an arrow's flight brings into these four dimensions a new fifth dimension, that of consciousness. I seek in these essays the structure of consciousness, the operation of this fifth dimension. I propose that it is possible to understand this fifth dimension as added to our understanding of reality in the same fashion which Euclidean geometry analyzes three dimensional space, and which more recent advances have used to study four dimensional space-time.

2.2 A brief history of the "Fifth Dimension"

In short I propose that we may use the human consciousness which is the foundation for every level of social organization as an actual "dimension" of reality. If this dimension is added to the four dimensions studied by the physical sciences (three of space, one of time), it may be possible to bring something new and important into the study of reality as a formal study.

It may be helpful here to draw a brief timeline as to the recent development of the physical sciences as regards the possibility of unifying reality under the single rubric of "consciousness."

¹ This quote presents the views of two of the most celebrated mathematicians / logicians of the modern era, to wit, that "a scaffold on the line" is the best image available at the present time for the continuum. At the present time nothing in any model of space-time, taken to any dimension, resolves – or even attempts to resolve – Zeno's Paradox. This statement includes models taken from Special or General Relativity, Minkowski space-time, tensor analysis, LaGrange analysis, Fourier analysis, matrix theory, etc. It is important for the purposes of these essays to emphasize the centrality of this point.

The purpose of these essays is to propose a form of analysis which resolves Zeno's Paradox under the intuition proposed by Godel, i.e. that this "scaffold of points" must have presented with it a way in which motion across the continuum becomes possible. I propose in these essays to introduce systematically a "fifth dimension" wherein unification in a flow of movement over a scaffold of points becomes possible both as a theoretical approach as well as an experimental reality.

- 1) In 1687 Sir Isaac Newton published his work *Principia*. In this book the force of gravity was presented as an unknown force operating under a fixed set of mathematic principles.
- 2) In 1861-1862 James Clerk Maxwell published his equations for electromagnetism, in effect performing for electricity that which Newton had accomplished for gravity.
- 3) In 1905 Albert Einstein published his Special Theory of Relativity, stating the famous relationship between mass and energy, $e = mc^2$.
- 4) In 1914 Gunnar Nordstrom published his theory of gravity. As a part of this publication he introduced the possibility of a (as yet unobserved) fifth dimension. Using this device he was able to unify both his understanding of gravity and Maxwell's equations. The characteristics of this "fifth" dimension were left un-described and have remained unobserved.
- 5) In 1916 Einstein presented his General Theory of Relativity, a description of gravity.
- 6) In 1919 Theodor Kaluza unified Einstein's General Theory of Relativity with Maxwell's equations, using a fifth dimension not unlike Nordstrom's effort five years earlier.
- 7) In 1921, with Einstein's endorsement, Kaluza published his unification of the General Theory of Relativity with Maxwell's equations.
- 8) In 1926 Werner Heisenberg published his "Principle of Electron Uncertainty," the discovery that the statistical probability of discovering the electron at any given location was balanced against the researcher's knowledge of the mass-energy of the same electron.

The disjoint between the unification of gravity with electromagnetism and the need to connect this also with the quantum mechanics of the subatomic world has created a situation in which modern science has failed to unify the four known forces of reality, these being the strong force (holding together the nucleus of the atom), electromagnetism, the weak force (which degrades the nucleus) and the weakest force of them all, gravity. In the words of one author:

In the second half of the 20th century, the electromagnetic and weak nuclear forces have been bound together as an electroweak force; a powerful scheme was devised to also include the strong interaction (chromodynamics), and led to the standard model of elementary particle physics. Unification with the fourth fundamental interaction, gravitation, is in the focus of much present research in classical general relativity, supergravity, superstring, and supermembrane theory but has not yet met with success. (Goenner, 2004)

Kaluza's original work proposed that the fifth dimension was, by its very nature, not discoverable.

"Kaluza made two assumptions on this metric; that $g_{yy}=1$, and that all other components of the metric are independent of y . Herein lies the greatest detractor to Kaluza's theory: built into this metric is the condition that we cannot detect this fifth dimension with any experiment. This is a problem for two reasons: one is that this condition seems fairly artificial, on the face of it. Secondly, and probably more importantly, the theory appears guaranteed to do nothing better than reproduce equations (1) (Maxwell's equations) and (2) (Maxwell's effect on Einstein). There is no Kaluza equivalent of the experiments Einstein suggested to test General Relativity, e.g. the deflection of light by the sun, or the precession of Mercury's orbit. ..." (Duffell, _____)²

If consciousness can be considered a formal dimension and, in addition, be added to our understanding of the reality in which we live as a formal structure, then a picture of the reality in which we live may be far more complete than it stands at the present time. In this way a large gap which has been present for some time may be closed. As one researcher concluded a brief biography of Kaluza:

Above and beyond the epistemological components, Einstein considered Kaluza's theory a serious contender for achieving real physical unification of electromagnetism and gravitation. In this conviction he labored on constructing theories based on Kaluza's model until 1943. Einstein's main objection to Kaluza's unifying concept seems to have been the nonexistence of a fifth dimension – an objection which, owing to the continuing impossibility of empirical proof, still stands today. (Wuensch, _____)

² See also Bergman (1983). "Even if one goes along with the assumption of a five-dimensional metric manifold the postulates that this manifold have a one-parametric isometry group, and further that the magnitude of any isometric displacement be constant throughout the manifold, are logically arbitrary and can be motivated only by our physical experience." (at 7)

2.3 The Five Dimensions

In light of the above, I propose that the following five dimensions are necessary to describe any event. If one imagines the information necessary to schedule a typical office meeting we have:

- 1) 1st dimension, X-axis, (latitude) Central Avenue, running in an east-west direction,
- 2) 2nd dimensions, Y-axis, (longitude) Fourth Street, running in a north-south direction
- 3) 3rd dimension, Z-axis, (altitude) Sixth Floor, running in an up-down direction,
- 4) 4th dimension, Time, (time) At 2:30 p.m.,
- 5) 5th dimension, Consciousness, With Jones, running in an in-out direction,
the meeting's purpose.

The person "Jones" introduces of a form of "consciousness" into our description of the universe, an "in-out" spatial dimension. The "out" characteristic of this fifth dimension is the ontologic fact of the meeting, its "being," the fact that it is supposed to take place in "reality" as an existing thing. The "in" characteristic of this fifth dimension is the epistemologic understanding one derives from the meeting, its "awareness" or "understanding," the knowledge or perspective obtained from the meeting.

One may develop a systematic way of exploring this fifth dimension, "consciousness," through the medium of the macro-economic data and social history of the United States and Europe. Models resulting from such an analysis may then be consulted in any application of the fifth dimension to physical science.

2.4 A Musical Model of Motion Under The Challenge of Zeno's Paradox

I propose that a model of motion under the challenge of Zeno's Paradox may be made by using the analogy of playing the piano, each individual and separate note indicating a "discrete" point along the continuum and the "flow" of music representing the collection of sounds thereby produced. In this analogy the set of points mathematically calculated along the continuum would be represented by a separate note in time and as placed in relation to the other notes of the piece of music.

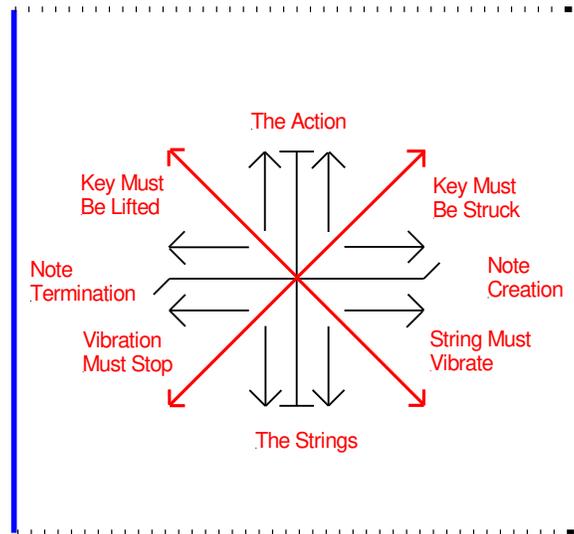


To elaborate on this analogy one might propose two essential dichotomies must underlie this these being (1) the action of the piano, its keys, hammers and dampers, and (2) the strings of the piano which sound musically as controlled by the action.

There are then four essential aspects of playing a musical note on the piano. These are:

1. The key must be struck.
2. The string must vibrate.
3. The key must be lifted.
4. The string's vibration must stop.

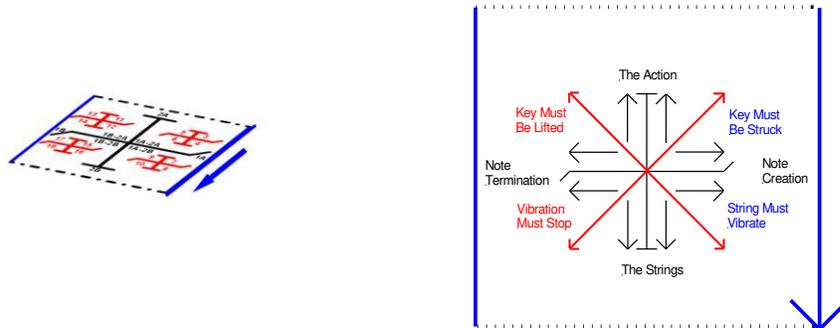
These four points may be presented in this simple model as follows.



On the right hand we have a vertical blue line representing the tension which exists between the key being struck and the string vibrating.³ On the left hand we have a vertical blue line representing the tension between a key being lifted and the vibration stopping.

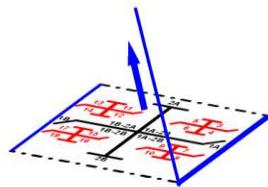
Musically speaking, one can not consider simply sound alone as the equivalent of the concept “note.” One must also consider when the sound is ended, giving way to the next sound, in a motion of sound or melody of music. We might model this by proposing an “Image Axis” in a “circuit of logical relationships.” This circuit is as follows.

- 1) The key/hammer strikes the string, which then vibrates.



- 2) This vibration creates the sound of piano performance.

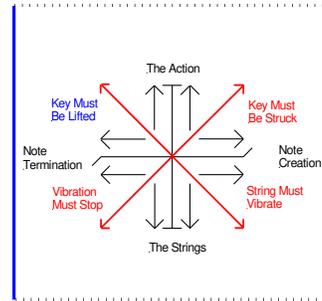
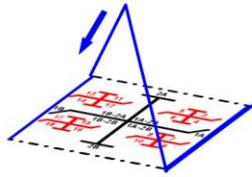
THE SOUND



³ This model will be developed at length through these essays, albeit in various forms. It may be helpful to point out, by way of this footnote, that the tension arising between “Note Creation” and “Note Termination” will be termed a “Primary Opposition” and the tension arising between “The Action” and “The Strings” will be termed a “Secondary Opposition.” These will be related to the distinction between Relative vs. Absolute and Cause vs. Effect in the concluding essay as a way of establishing four dimensions of Relative Cause (x-axis along the equator of spin on a sphere, a first dimension of latitude), Relative Effect (y-axis, a second dimension of longitude of a sphere), Absolute Cause (z-axis, a third dimension of up-down, or the distance from the center of the sphere to a point on the surface of the sphere), and Absolute Effect (a temporal dimension whereby the point specified in the first three dimensions is related to all other available points by way of the time taken to connect them).

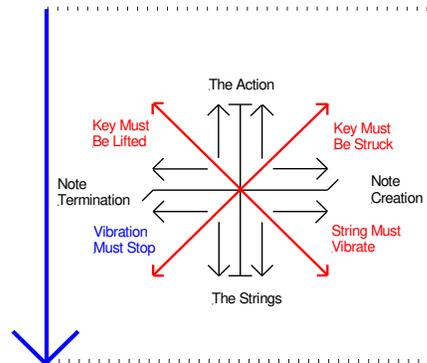
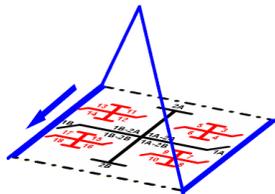
3) A note - a sound which has ended on time - is created by lifting of the key...

THE SOUND



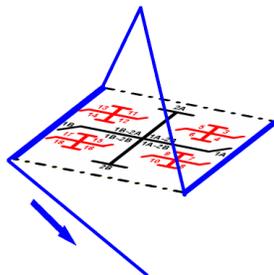
4) ... Which permits the damper to fall onto the string, thereby stopping the vibration and the sound at a particular time in the piece of music.

THE SOUND



5) This in turn terminates the duration of the note and provides a basis to understand the relationship of the note to the rest of the piece of music,

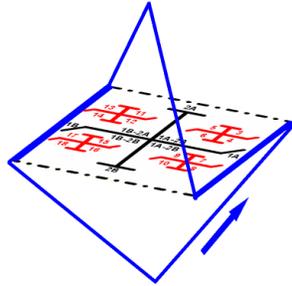
THE SOUND



THE NOTE

6) ... Which in turn gives rise to a new understanding of the note, i.e. it is now a *particular* note in the context of the rest of the piece.

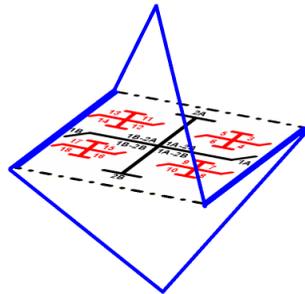
THE SOUND



THE NOTE

7) Each note of music represents a circuit of relationships, as follows.

THE SOUND



THE NOTE

In the above, a circuit has been designed which incorporates the blue lines by way of their connection to the creation of something of any note in the piece, or which might underlie any mathematic point along a continuum of numbers. One may use this analogy of musical notation to examine any phenomena building upon a unit by unit development (discrete change over time), as opposed to a smooth or blurred together development (continuous change over time). For example, one may consider not only “discrete points ... along the continuum” but also moves in a chess game, plays of cards in a card game, chemical elements in their progression, necessary categories, relationships and conclusions in set theory, etc. In this volume of essays I show that the possibility of a repeating pattern organizing nature is quite possible. The origin of five dimensions are taken up at greater length in Volume Three, A Theory of Reality.

3.0 Social Waves as Fractals of the Individual Mind

Returning to our conversation in Paris, one way of solving Zeno's Paradox might be to examine motion at one level and compare it systematically to motion at other levels. If the levels are congruent in their construction to one another, then such a comparison might prove very helpful.

This is not an entirely new proposition. One of the great and central works of Greek, and indeed of Western, political philosophy, Plato's book *The Republic*. In this work the character Socrates introduces his discussion of "Justice" with the following approach. Bloom (1968).

(By Socrates)

"It looks to me as though the investigation (of justice) we are undertaking is no ordinary thing, but for a man who sees sharply. Since we're not clever men, I said "in my opinion we should make this kind of investigation of it: if someone had, for example, ordered men who don't see very sharply to read little letters from afar and then someone had the thought that the same letters are somewhere else also, but bigger and in a bigger place, I suppose it would look like a godsend to be able to consider the littler ones after having read these first, if, of course, they do happen to be the same."

"Most certainly," said Adeimantus. "But, Socrates, what do you notice in the investigation of the just that's like this?"

"I'll tell you," I said. "There is, we say, justice of one man; and there is, surely, justice of a whole city, too?"

"Certainly," he said.

"Is a city bigger than one man?"

"Yes, it is bigger," he said.

"So then, perhaps there would be more justice in the bigger and it would be easier to observe in the bigger and it would be easier to observe closely. If you want, first we'll investigate what justice is like in the cities. Then we'll also go on to consider it in individuals, considering the likeness of the bigger in the idea of the littler?"

"What you say seems fine to me," he said.

"If we should watch a city coming into being in speech," I said, "would we also see its justice coming into being, and its injustice?"

"Probably," he said.

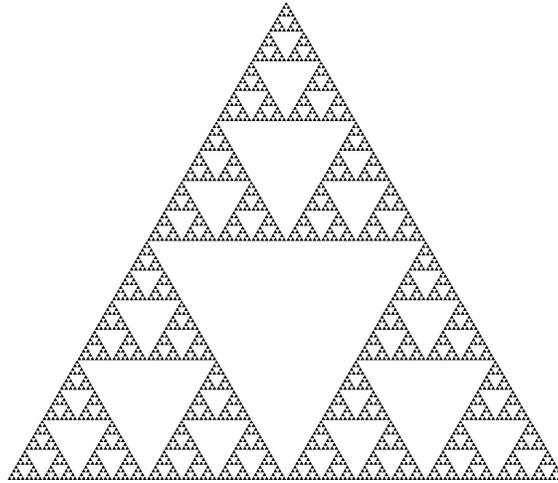
"When this has been done, can we hope to see what we're looking for more easily?"

"Far more easily."

"Is it resolved that we must try to carry this out? I suppose it's no small job so consider it."

"It's been considered," said Adeimantus. "Don't do anything else."

In modern terms, Plato proposes that the city is a larger “fractal” of the individual. A “fractal” is a geometric construction which, through the multiplication and repetition of a simple and uncomplicated basic pattern, develops additional patterns considerably more complex than the original shape. A common example is the Sierpinsky Triangle, as follows.



Plato’s suggestion that social organization is a “fractal” of the human individual is mirrored in remarks made by Benoit Mandelbrot, the inventor of the term “fractal.”

“It cannot be accidental that so many fractal shapes suggest snails, jellyfish, or other forms of life. It raises a basic question of biology: How much genetic coding is needed to obtain the diversity and richness of shape we observe in living beings? ... (F)RACTAL shapes of great complexity can be obtained merely by repeating a simple geometric transformation, and small changes in the parameters of that transformation provoke global changes. This suggests that a small amount of genetic information can give rise to complex shapes and that small genetic changes can lead to a substantial change in shape. ... What will the next ten years bring? I don’t know; I’ve only scratched the surface of everything. Ultimately it’s a matter of how much unity can be created by this one idea. And the ultimate test is the test of time.” Mandelbrot (1984).

We may take this idea and apply it directly to the questions posed by our conversation in Paris.

In a democracy such as the United States individuals are free to meet and discuss the economic, political and social difficulties which they face. We propose that it serves to reason that as individuals form into small groups of persons, and as they use their minds together to come to conclusions affecting their group and the interaction of that group with its environment, they will adopt those rules for themselves which most conform to their own personalities and understandings, and they will reject rules which are not in conformity to themselves, their personalities, and their understandings. Stated directly, the laws adopted by a group of people – including their substantive laws against crime and for the conduct of trials – proceed from the “consciousness” of that people.

If this is true, then it further stands to reason that *the laws of the group in question will eventually display the structure of the individual minds which create it*, that is, the structure of the minds of the individual members themselves. The organization of the rules and operating procedures of the group will take on the same “shape” as the smaller minds within it. This process will be similar to that of a crystal “taking on” precisely the same shape as the molecules which compose it.

If these group functions - in some manner - display the same pattern of the individual mind, then it stands to reason that the *Laws* which produce a given *Nation-State* will impose upon that Nation-State the same pattern - not only of the individual mind - but of the group mind, in the same sort of crystal building. Those minds which are in harmony with the basic understandings demanded by the “crystal-izing” social system will survive because the groups and nations which they create will be sound, enduring and attractive. Those minds which are out-of-harmony with the basic understandings of such a system will not survive, because the groups which are composed of such minds will breed disaster, and the nations which are composed out of these groups will perish.

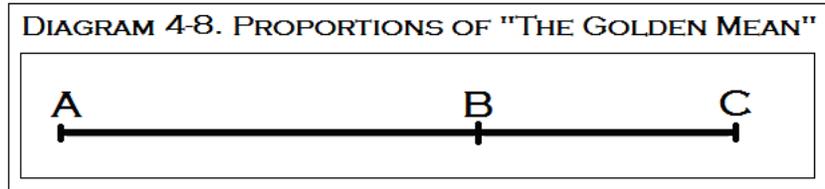
The legal development of the United States is always an outcome of the simplest matters heard in the district courts repeated on appeal and re-considered at the highest levels of society. Consequently the common law of England, as developed in the United States, may be particularly adept at creating, and useful in “drawing out,” “complex” relationships between social levels in fractal form. Following upon the same idea, *Cultural History*, comprising the sum of its underlying *Nations*, will portray the same structure, in a larger form of recurring crystal. The Law of Nations, International Law, as the Private Law “writ large,” shares this approach of crystal building. Beyond this, and comprising all cultures, the *Economy* itself must take on a similar pattern in a similar, larger and equally necessary structure. Finally, all things which might be considered real must fall under a single *Philosophy*, a single governing idea or set of ideas.

If we see that the laws of a particular group of people are the larger fractal of the consciousness of an individual in the group, we have a basis from which to begin our study of the social waves presented herein, patterns of development directly related to the “consciousness” of individuals building into larger, changing patterns of consciousness, as such.

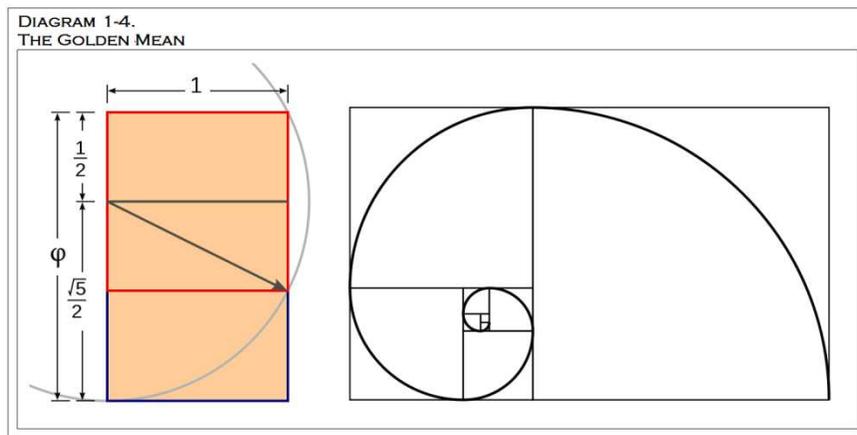
3.1 The “Golden Mean” as Regulator of Social Science Under This Theory

In these papers we will assert that the economy of the United States demonstrates a remarkable regularity as premised upon a mathematical relationship known as “The Golden Mean.” (Albers & Albers, 2011) The numeric constant “phi,” 1.6180339..., (symbolized using the Greek lower case “ ϕ ” after Phidias, the architect of the Parthenon), when set against “1” as a ratio, is also known as the “the Golden Ratio” or “the Golden Section.” This ratio was defined circa 300 b.c. by Euclid of Alexandria, as follows:

A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the lesser.



Geometrically, the proportion of $1 : \phi$ may be created by the construction below left. A spiral may be obtained from this construction below right. This spiral and its relationship to the economy of the United States is a central interest within this series of essays.



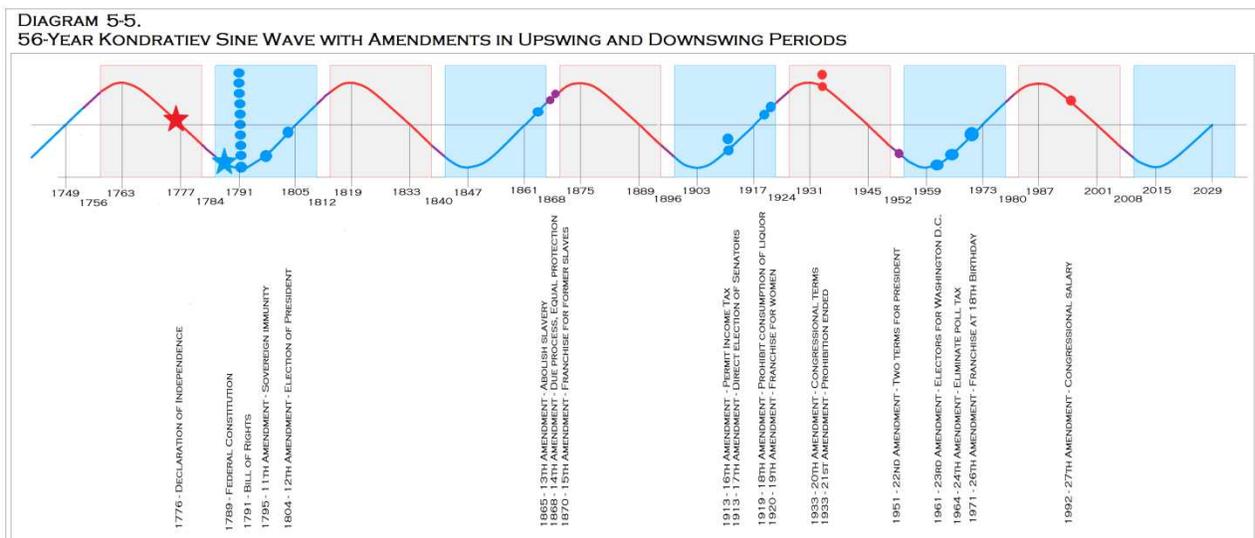
The exploration of this mathematic ratio is of enormous importance to the history of science. As discovered by Johannes Kepler in 1611, if the Fibonacci series is taken as a set of ratios, these ratios oscillate around the constant 1.6180... as follows: (Livio, 2002:101)

1.	1/1	1.000000
2.	2/1	2.000000
3.	3/2	1.500000
4.	5/3	1.666666
5.	8/5	1.600000
6.	13/8	1.625000
7.	21/13	1.615385
8.	34/21	1.619048
9.	55/34	1.617647
10.	89/55	1.618182
11.	144/89	1.617978
12.	233/144	1.618056
13.	377/233	1.618026
14.	610/377	1.618037
15.	987/610	1.618033

Best known for his work in astronomy and the development of laws regarding planetary motion, Kepler once famously noted: (Livio 2002:62)

“Geometry has two great treasures: one is the theorem of Pythagoras, the other the division of a line into mean and extreme ratio. The first we may compare to a mass of gold, the second we may call a precious jewel.”

As will become apparent throughout these essays, in our effort to explore the economic development of the United States we will engage both of these mathematic proportions – π and ϕ – repeatedly. Indeed, a 56-year sine wave of political development within the history of the United States will be fundamental in the development of these essays. If the historic course of amendments to the federal constitution of the United States is tracked according to their placement in a 56-year sine wave in accordance with this model, we have the following. (Diagram 5-5) A strict periodicity may be associated with the upswing of a 56 year sine wave and the creation of new and important amendments (as described in Part One, Essay Five). The purpose of these essays is to describe, explain and make use of these correlations over a very broad spectrum of research.



3.2 The “Material Being Counting Machine” and the Position of Social Science

The presence of the Golden Mean as found within four 14-year “octaves” in a 56-year cycle as a regulating aspect of American economic history (Part One, Essays One through Five) provides a remarkable standard from which to measure and investigate economic and social development. The idea of a “fractal-ized” “crystal-izing” social universe may be described better via the following thought-experiment., “The Material Being Counting Machine.”

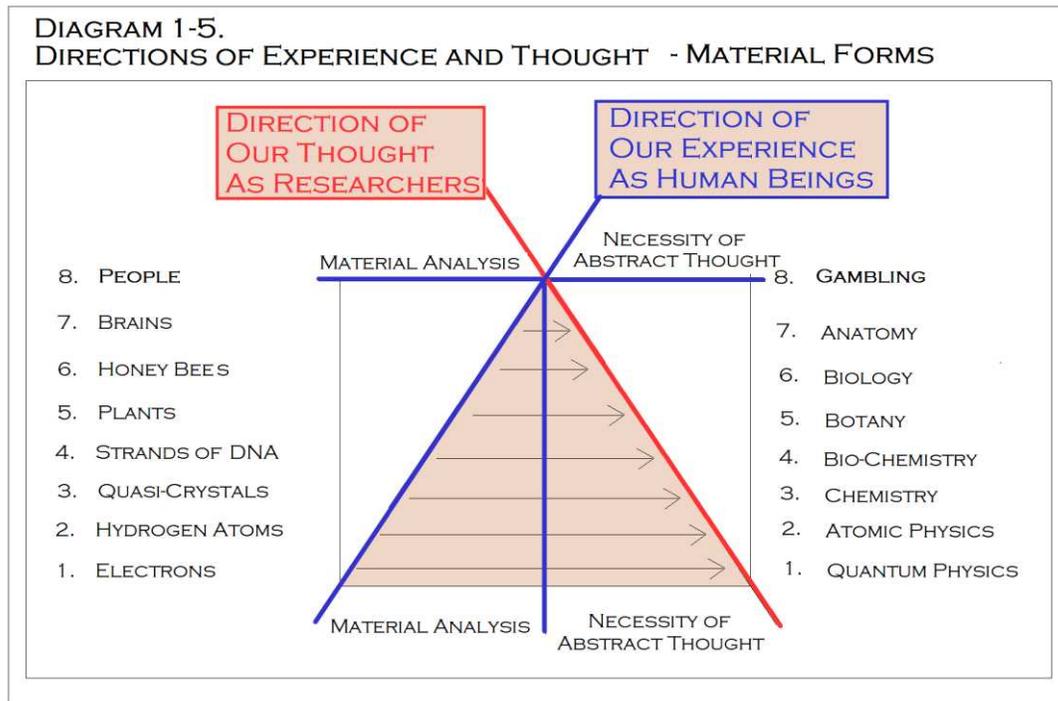
Let us imagine that we construct a machine to count the number of material “beings” in the universe: the “Material Being Counting Machine.” It can count, instantly and accurately, the number of anything which we ourselves can count with our own senses or the magnification of our senses through technologic innovation and extension.

We might organize the work of the “Material Being Counting Machine” with reference to the Golden Mean. The Golden Mean has a solid, if at present a sometimes coincidental and unconnected, place in:

- 1) the study of quantum mechanics, Coldea, et al. (2010-01-07);
- 2) recent discoveries regarding the first excited state of the hydrogen atom, Petrusovski (2006);
- 3) the composition of quasi-crystals, Shechtman, et al. (1984), Lifshitz (____), Shechtman (2010), Senechal (2011), Steuer (2010), Steinhardt (____);
- 4) the structure of DNA, Perez (1991), Yamagishi (2007), Perez (2010);
- 5) patterns seen repeatedly in botany and the form of plants, Brousseau (1968), Brousseau (1971);
- 6) sex selection characteristics of honeybees, Yanega (1966);
- 7) the study of brain waves, Weiss (2003), Roopun (2008); and
- 8) the gambling patterns of patrons of thoroughbred races. Cameron (2002)

Following upon the above list of references to the Golden Mean one would anticipate that the Material Being Counting Machine would count a vast number of electrons and - in decreasing order - a lesser number of hydrogen atoms, quasi-crystals, strands of DNA, plants, honey bees, brains and people. If this is true we can state with some assurance that as the more numerous beings at the lower tiers of reality build themselves into tiers of ever-increasing harmonization and dependence on lower levels, the number of examples in the sample pool decreases, i.e. we count fewer people than electrons.

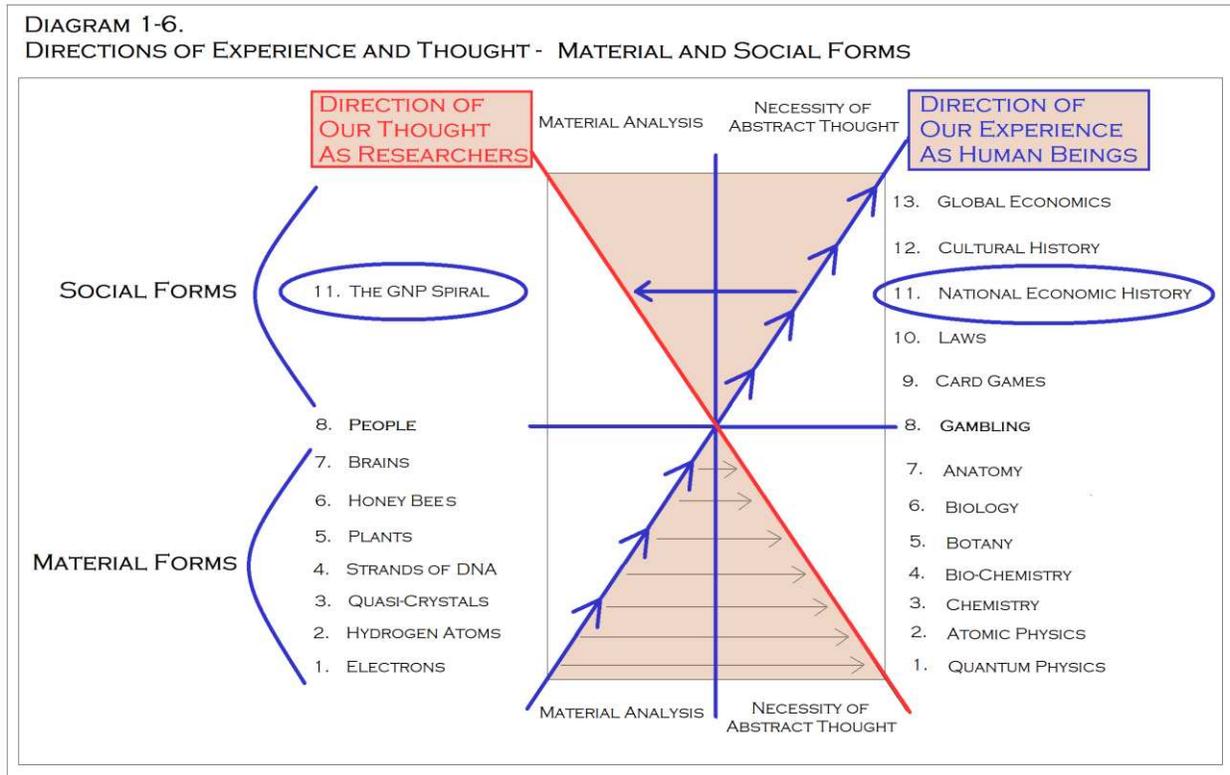
Conversely as we break down the more complicated structures which are easily visible to our eyes and senses into their component parts, the type and amount of thought which must be used to understand and correlate realms not immediately within our experience becomes ever more abstract. In short the urge to gamble is more immediately understandable to us than is the quantum mechanical construction of the electron.



The machine must stop, however, when we come to organizations which can not be observed using our senses. The machine can count all which is physical, including individual human beings. However the size and number of interest rates, inflation rates, rates of currency exchange etc. which inform the study of economics can not be counted. Since these topics of study can not be “sensed,” they can not be numbered by the machine. Nor can it sense a “government,” the presence of “sovereignty,” the nature of a law, the harmony of a group of human beings, and the operation of a global trading center. Since the stuff of these levels of social relationship are not available to the senses of any human being, they can not be considered “material beings” by the machine.

On the other hand as researchers we can determine a hierarchy of social organization which is not unlike that of the material world. A card game is less wide-ranging socially than is a legislature. In turn the legislature is less wide-ranging than the economic history of the nation. The history of the United States is encompassed by the cultural history of Europe which includes as a connecting sub-part the colonization of the Americas and imperialism as a part of its own history. And all of this is encompassed by a world economy which must include within it all nation-states as they strive for productive and peaceful trade-relationships with one another. Although none of this may be “sensed” by the “material being counting machine” we nevertheless know these things to be real and important because we, ourselves, are sub-sets of their operation.

We will assert (in Essays 3, 4 and 5) that a ratio which occurs repeatedly in the lower “material” tiers – “the Golden Mean” – may also be found in the upper “social” tiers. Using the abstract thought which tells us that there exists such a thing as “national economic history,” we will move to a material demonstration of this history and the Golden Mean as a central regulating factor (blue left-pointing arrow above).^{4, 5}



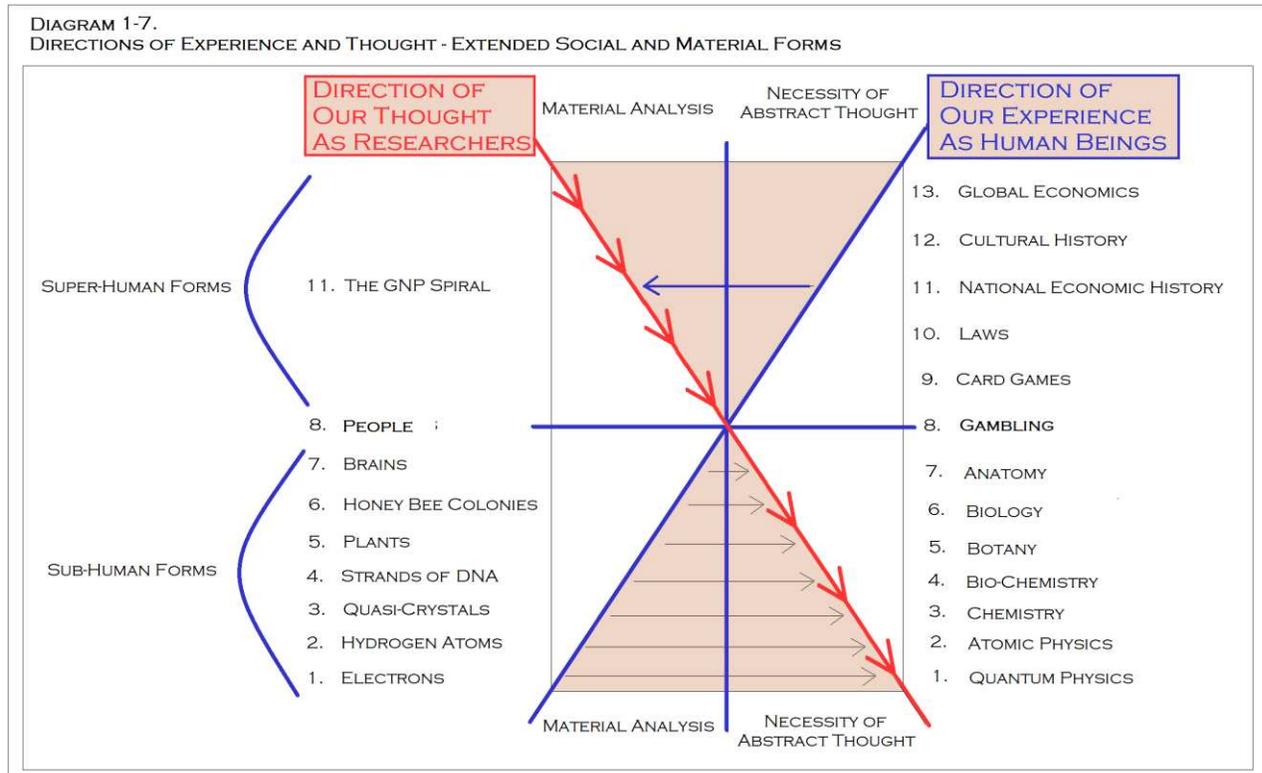
⁴ The Golden Mean is presented by Euclid of Alexandria, in Elements, Book VI, Definition 3, circa 300 b.c. A broad array of texts may be suggested describing the well-known associations between the Golden Mean and patterns discovered in Nature. See e.g. Livio, 2002; Skinner, 2006; Hemenway, 2005.

⁵ See comments by nuclear physicist Wolfgang Pauli and Neils Bohr as to the nature of scientific investigation in general.

(Pais, 2000, quoting Pauli): “It is my personal opinion that in the science of the future reality will neither be “psychic” nor “physical” but somehow both and somehow neither.”

(Pais, 2000, quoting Bohr): “There is no quantum world. There is only an abstract quantum physical description. It is wrong to think that the task of physics is to find out how nature is. Physics concerns what we can say about nature. ... What is it that we humans depend on? We depend on our words. Our task is to communicate experience and ideas to others. We are suspended in language.”

One additional use of the “map” of the above social logic is its potential for adding to our understanding of lower levels. In other words, by considering the material analysis which might be given to social forms, we may gain a new understanding of structural and mathematic analysis of material forms.



Using this approach we may be able to investigate measurable “waves” of social development, each of which possess an effect upon the body politic. As these waves are investigated – wherein we ourselves are the subsets which create them – we may be able to understand waves of physical phenomena better and, through analogy, predict the ultimate behavior of physical forces more specifically.

4.0 Goal.

I propose in the following essays to dissect the concept of motion (development, evolution) in each of the above forms of order to find within each a pattern common to all. We will investigate the possibility that a single, uniform pattern exists in nature which coordinates all levels of reality into a single, comprehensive whole.

The central thesis of these essays is that each of the levels given above builds upon the previous level, and repeats its underlying structure. Thus a clear understanding of the key relationships and elements of philosophy assists in the understanding of the key elements of economics, the key elements of racial history, and next of national history, law, psychology, biology, chemistry, physics and mathematics. This linking of similar levels, a “chain of being,” is an ancient and modern idea, as we shall see.

In order to sum up the goal of these essays the following terms may be helpful.

4.1 Consilience

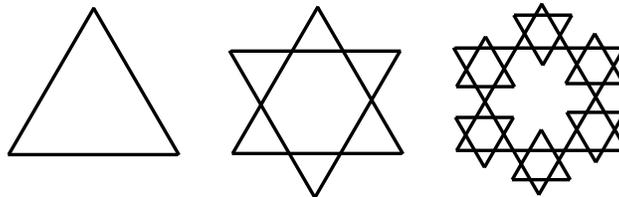
The term “consilience” is taken from Dr. E. O Wilson. “Consilience” means a form of scientific inquiry which seeks to unify in one pattern or understanding both the living and non-living areas of our lives. Dr. Wilson’s book *Consilience* states the idea very well:

The greatest enterprise of the mind has always been and always will be the attempted linkage of the sciences and humanities. The ongoing fragmentation of knowledge and resulting chaos in philosophy are not reflections of the real world, but artifacts of scholarship.

In other words if the levels described above are “consilient” then the insights which we gain in the world of living creatures should add directly to our understanding of the structure of the lower non-living levels of scientific inquiry, and vice versa.

4.2 Fractal

The term “fractal” is taken from Benoit B. Mandelbrot and his work *The Fractal Geometry of Nature*. A “fractal” is a geometric pattern which repeats itself, potentially infinitely, ever breaking apart in structures which are similar to the initial figure, as follows:



If the levels I suggest operate as “fractals” of a basic structure, then as we progress DOWN the chain of being we may speculate and predict the structure of the underlying studies because we have discovered the necessary pattern inherent in all reality. Conversely, an understanding of the most basic principles of the lower levels adds directly to our understanding of the higher levels as we move UP.

4.3 Complexity

The term “complexity” refers to a view of reality in which all levels of scientific inquiry relate themselves to underlying and therefore universal concepts. Roger Lewin’s book, *Complexity: Life At The Edge Of Chaos*, describes this approach as follows.

“It’s a question of structure, of organization,” (Chris Langton) said. “The gas in this room is a chaotic system, very random, very little order. The science of Complexity has to do with structure and order.”

Order, such as you see in the social organization of (the ancient and departed civilization at) Chaco? “Yes.” Order, like when an embryo develops to

become a fully formed adult? “That too.” What about patterns of evolution? “Yep.” And ecosystems? “Absolutely.” If that’s so, I wondered why (the Santa Fe Institute for the study of complexity) isn’t full of anthropologists and biologists rather than physicists and computer jocks.

“Because we’re looking for the fundamental rules that underlie all these systems, not just the details of any one of them.” (quoting Chris Langton)

My goal is to describe the above ten levels as “consilient fractals in a complex reality.”

CONCLUSION

In sum, in these essays I explore the self-similarity between levels, the fractal structure of reality, through an investigation of an *inherent* and *unavoidable uncertainty* which is unique to each level. These essays will demonstrate that as each level struggles to resolve its own inherent uncertainty, a new and higher structure is forced to emerge. This new level largely resolves the problems generated by the inherent uncertainty of the lower level, but evolves its own inherent uncertainty, one which is unique to itself as a new and higher level. By identifying and describing clearly these *inherent* uncertainties we trace the chain of being mentioned above. We may also outline the basic structure of each new level for in the effort to confront inherent uncertainty the new level must and will mimic the structure of lower level which gave it birth. Considering the levels above, we discover therein numerous and random sorts of change.

Our question then becomes, “How might evolution be structured throughout all reality? How might the development of each of the ten levels of order be coordinated in a common law, a universal set of principles? And how might this organization be demonstrated as useful?”

Theoretical Foundations of the Economic and Social History of the United States

Essay One: A Game of Gin Rummy

What is important is the gradual development of a theory, based on a careful analysis of the ... facts. ... Its first applications are necessarily to elementary problems where the result has never been in doubt and no theory is actually required. At this early stage the application serves to corroborate the theory. The next stage develops when the theory is applied to somewhat more complicated situations in which it may already lead to a certain extent beyond the obvious and familiar. Here theory and application corroborate each other mutually. Beyond lies the field of real success: genuine prediction by theory. It is well known that all mathematized sciences have gone through these successive stages of evolution.

John von Neumann

ABSTRACT

Aims: To introduce the basic idea that consciousness has a definable structure which resonates at all levels of reality.

Study design: Philosophic / Mathematic discussion of Russell's Paradox and its correlation to the economic model described in the five previous essays.

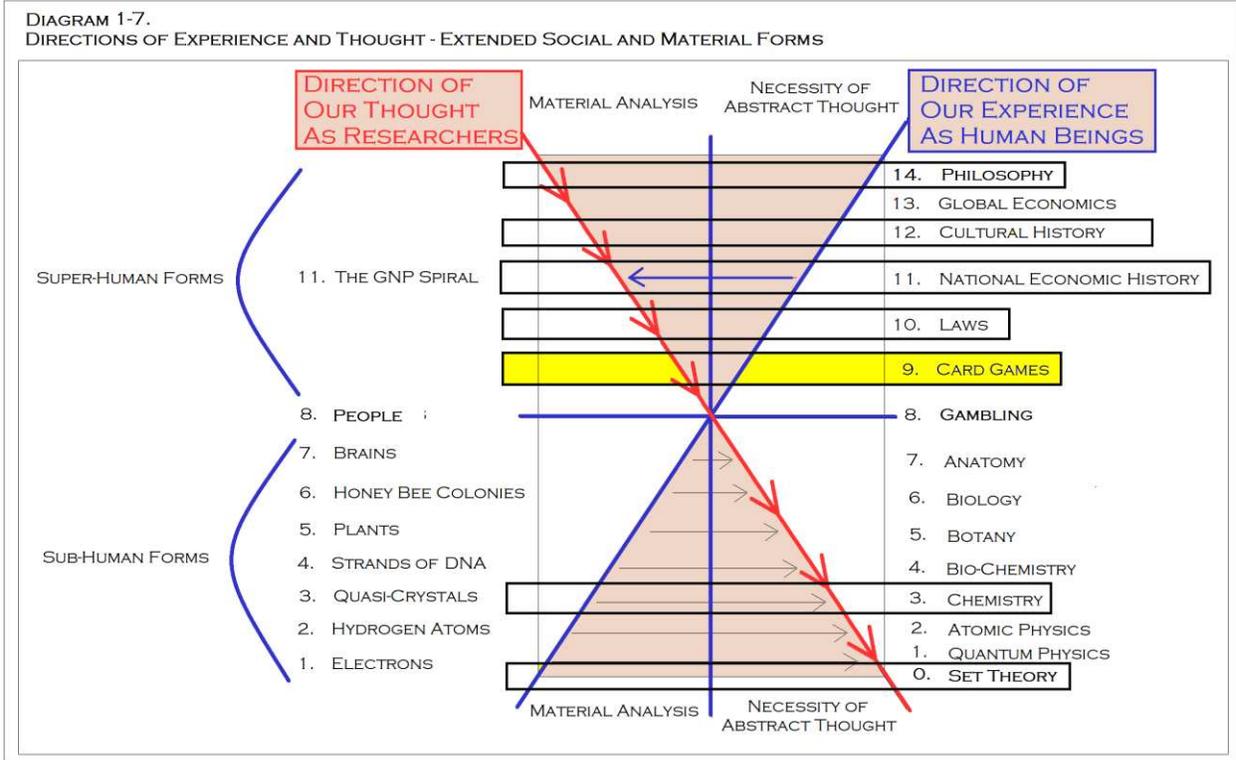
Place and Duration of Study: Library research.

Methodology: In this essay we dissect the basic parts of one of the most famous mathematic puzzles of the twentieth century, Russell's Paradox. We chart correlations between the map thereby developed and the pattern of economic development within the United States.

Conclusions: If Russell's Paradox is an example of the structure of consciousness, it may be the key to understanding the organization of all levels of reality.

INTRODUCTION

In this essay we begin with a description of psychology, i.e. the careful dissection of a simple two-handed card game, Gin Rummy.



METHODOLOGY

1. Hypothesis

We propose that the patterns explored previously enter the psychological realm through the interaction of people with one another. We propose that this pattern may be seen in the pattern underlying Gin Rummy, a simple two-hand card game.

2. Methods

We use the dichotomies introduced previously to explain the basis for social patterns.

3. Data

We use the structure of a card game of Gin Rummy to investigate patterns which underlie social consciousness generally.

4. Procedure – A General Theory

4.0 An Ordered Psychology

In any game of cards players attempt to complete an "evolution" of cards from the first to the last play of cards. As one card is drawn and other cards given up, a player's hand of cards - be it in poker, bridge, rummy or others - slowly takes shape. The direction of this development is towards a hand which under the circumstances and decisions of the players strikes a player as most toward his or her advantage in the attempt to survive the competition of the game and to emerge the winner. The game of Gin Rummy is chosen to display the "consciousness" of an individual because it provides clear and simple categories which support the changes in the game, and which demonstrate the "evolution" of the individual's decisions - consciousness - from beginning to end.

In the game Gin Rummy two players compete with one another to obtain a hand of cards in which each card is joined in matching sets with the others. Three planes - Definition, Relationship, Conclusion - are suggested as the underlying basis of this psychological evolution.

First, let us shuffle and then deal a deck of 52 cards, a card for you, a card for me, ten times. We have then:

Your Hand

My Hand

The object of the game is to place (or "meld") all the cards in one's hand in sets of three or more cards, either by same number (3♦, 3♠, 3♥) or in sequence (3, 4, and 5♣). If I have the following sequence of cards in My Hand...

3♠ 3♦ 5♦ 8♦ 9♥ 10♣ Jack♣ Queen♠ King♠ Ace♥

... I might arrange them in a manner best suited to their possible combinations:

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠

In the above arrangement I am hoping to obtain an extra three to go with my set of threes,

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠

... or a four of diamonds to go with my 3 and 5 of diamonds,

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠

... or a six and seven of diamonds to fill in between my 5 and 8 of diamonds,

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠

... a 9 or Queen of clubs to make a set from my 10 and Jack of clubs,

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠

... or a Jack or Ace of spades to make a set of my Queen and King of Spades.

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠

We next turn over the remaining 32 cards in the deck face down (called the Stock Pile) hiding all of them from the view of both players ...

Stock Pile (32 cards, unknown to both players)

Your Hand (10 cards, known to you, unknown to me)

My Hand (3♠, 3♦, 5♦, 8♦, 9♦, Ace♥, 10♣, Jack♣, Queen♠, King♠, known to me, unknown to you)

... and turn over the top card of the Stock Pile - perhaps the Jack of Diamonds - for both you and I to see (called the Discard Pile).⁶

Stock Pile (31 cards, unknown unknown to both players)

Your Hand (10 cards known to you, to me)

Discard Pile
Jack ♦

My Hand
(3♠, 3♦, 5♦, 8♦, 9♥, Ace♥, 10♣, Jack♣, Queen♠, King♠, known to me, unknown to you)

⁶ It should be mentioned that the play of cards in a two-handed card game, like the notation of moves on a chess board, describes a point-by- point form of motion. In chess, for example, the notation...

White	Black
1. P-K4	P-K4
2. N-KB3	N-QB3
3. B-QN5	P-QR3 ...

... provides a common statement of opening moves on a chess board. This point by point description of motion, as unified in the consciousness of the players in the game, is the same as that explored in this essay. It is also quite similar to the note-by-note movement described briefly in the Introduction as an answer to Zeno's Paradox.



Since I dealt the cards, you must:

(1) choose either the top *unknown* card from the Stock Pile OR take the top *known* card from the Discard Pile,

(2) place the card chosen among the other cards in Your Hand in the manner you think best to meld the cards, and then

(3) discard one of the cards from Your Hand into the Discard Pile.

It is then my turn to do the same.

Through this process of drawing one card and discarding another the players strive to reach a hand of cards in which all cards are "melded" into groups. The first player to have a hand of cards in which each card is part of a set of three or more wins the game.

To win the game I might hope to alter the cards in My Hand from:

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠; to:

I might discard one by one the remaining cards, to wit:

9♥ A♥ Q♠ K♠

If these cards help Your Hand, however, I may find that I have given you by my discard the cards necessary to ensure my defeat.

We have proposed that the Discard pile begins with the Jack of Diamonds.

Stock Pile (31 cards, unknown
to both players)

Your Hand (10 cards known to you,
unknown to me)

Discard Pile

Jack ♦

My Hand,

(3♠, 3♦, 5♦, 8♦, 9♥, Ace♥,
10♣, Jack♣, Queen♠, King♠,
known to me, unknown to you)

If you decide to take this card, you must place it in Your Hand as best fulfills the requirements of winning the game.

Stock Pile (31 cards, unknown
to both players)

Your Hand (Jack ♦ known to me, 10 cards
known to you and unknown to me)

Discard Pile

My Hand,

(3♠, 3♦, 5♦, 8♦, 9♥, Ace♥,
10♣, Jack♣, Queen♠, King♠,
known to me, unknown to you)

I place the name of this card chosen by you and placed in Your Hand in parentheses to indicate the hidden nature of the cards in Your Hand. So long as Your Hand is unrevealed to me, only the cards which you have drawn from the Discard Pile are known to me. I may guess at the identity of the cards held in Your Hand (1) based upon your desire to discard cards which you do not want or (2) to ignore cards which I discard. The more cards you choose from the Discard Pile, the more cards I know with certainty to be held in Your Hand. This knowledge may assist me greatly in my own decisions regarding the game.

Stock Pile (31 cards, unknown to both players)

Your Hand (Jack ♦ known to me, 10 cards known to you and unknown to me)

Discard Pile

My Hand,

(3♠, 3♦, 5♦, 8♦, 9♥, Ace♥, 10♣, Jack♣, Queen♠, King♠, known to me, unknown to you)

You must now discard a card, perhaps the 2♣.

Stock Pile (31 cards, unknown to both players)

Your Hand (Jack ♦ known to me, 9 cards known to you and unknown to me)

Discard Pile
2♣

My Hand,

(3♠, 3♦, 5♦, 8♦, 9♥, Ace♥, 10♣, Jack♣, Queen♠, King♠, known to me, unknown to you)

My question now becomes:

(1) do I want this card, 2♣, or would I prefer to draw an unknown card from the Stock Pile?, and

(2) which card should I discard in order to avoid giving you a card which will help Your Hand?

For some reason you have discarded the 2♣, and this may give me clues as to those cards which you want - or do not want - in Your Hand. But I can really not be sure of your strategy – at least at this point – because the cards in Your Hand are unknown to me.

Because I have the following cards in My Hand...

3♠ 3♦ 5♦ 8♦ 9♥ Ace♥ 10♣ Jack♣ Queen♠ King♠;

... I see that there is no advantage at all in taking the 2♣ into My Hand. That is, it places me no closer to matching sets of cards in My Hand than before. I must therefore take a card from the Stock Pile, perhaps the 6♣.

I must now decide which card to “throw away” in the Discard Pile. If I discard a card which you want for Your Hand, I have hurt my own chances of winning. On the other hand if I keep a card which does not help to complete sets in My Hand, I might again hurt my chances of winning.

Because the 6♣ does not create a set of cards in My Hand any more than I have at present, I decide to discard it and permit you the chance to take it into Your Hand if you wish.

Stock Pile (30 cards, unknown to both players)

Your Hand (Jack♦ known to me, 9 cards known to you and unknown to me)

Discard Pile

2♣, 6♣

My Hand,

(3♠, 3♦, 5♦, 8♦, 9♥, Ace♥, 10♣, Jack♣, Queen♠, King♠, known to me, unknown to you)

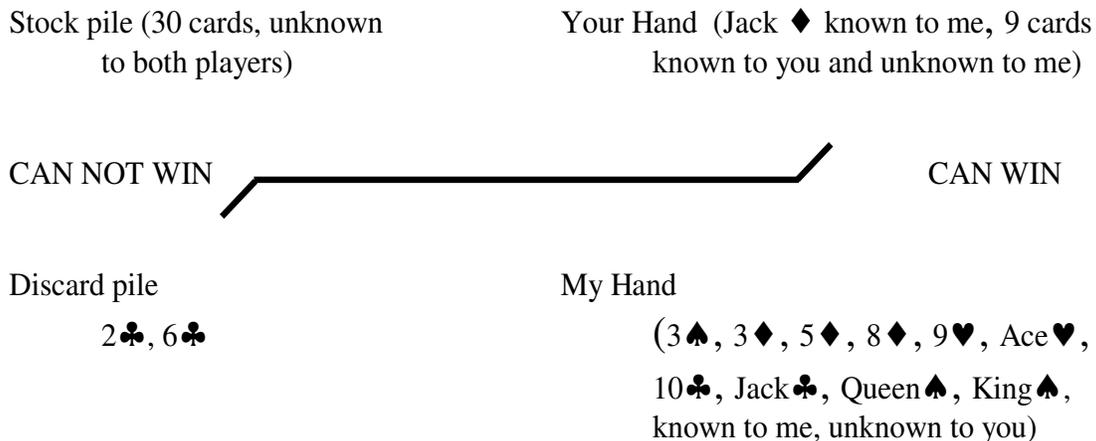
You are permitted now to take the top card of the Discard Pile into Your Hand - here, the 6♣, (not the 2♣) - or to take the top unknown card from the Stock Pile. The game continues in this fashion until one player "knocks," i.e. obtains the desired hand of 10 cards melded into sets as described. Note that the cards in My Hand have not changed during this first round of play.

Having the basic rules of the game before us, let us analyze briefly the psychological aspects of the game. We enter here into a description of a general model whereby we may unify a number of different levels of reality. This model will be referred to as "A System of Movement."

4.1 The Plane of Definition

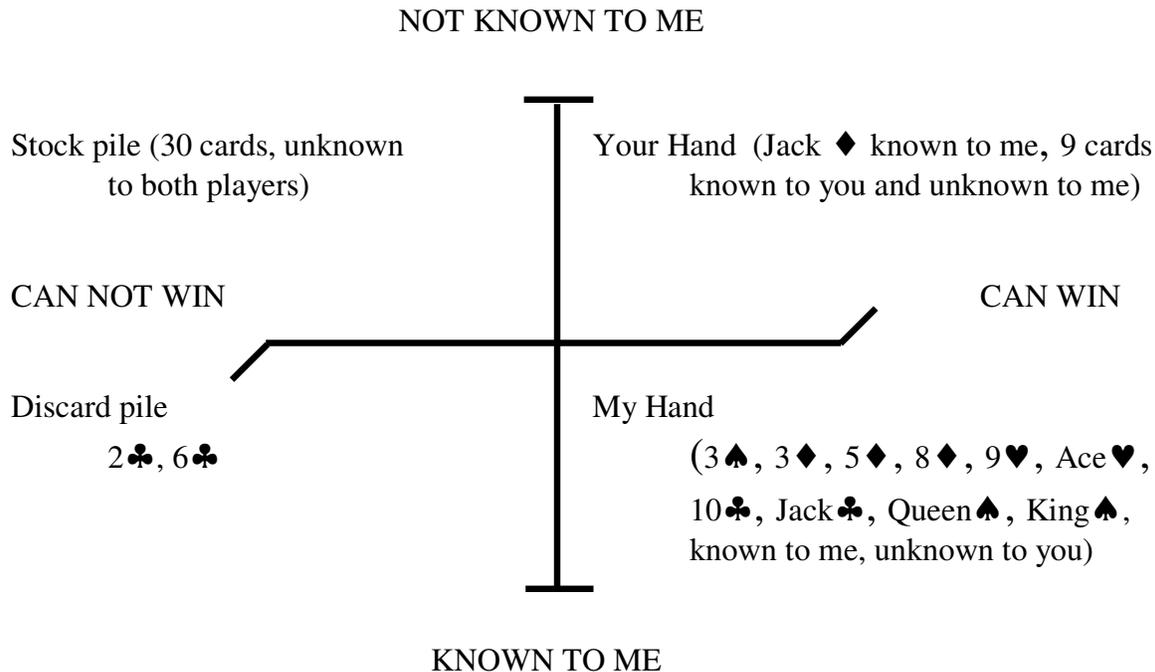
A simple way of analyzing the relationship between these four sets of cards may begin by noting that the groups on the right (Your Hand, My Hand) are in competition with each other because each CAN WIN THE GAME, and that the groups to the left (Stock Pile, Discard Pile) CAN NOT POSSIBLY WIN THE GAME. To the left: The cards in the Stock Pile are completely *unknown to both players*; the cards in the Discard Pile are both *open to and known by both players*. On the right: the hands of the individual players - you and I - are controlled by us individually to "meld" the cards, to create relationships between the cards (1) of all the same number or (2) of a three-card run of cards in the same suit.

Our control of the cards within our hand enables us to challenge each other and – hopefully – to prevail in the game, to win. We *may* know, or we *may not* know, what is held in our opponent's hand; but I *always* know what is in My Hand. The first dichotomy which forms the basis of the game - CAN WIN, CAN NOT WIN - will be termed in these essays simply "The Primary Opposition." The Primary Opposition represents a *difference in kind*, a difference in the basic nature of two things, as opposed to oppositions arising from a struggle between similar elements or a difference in gradation between similar elements.



A Secondary Opposition is created when we consider those cards which are unknown to me, i.e. Your Hand and the Stock Pile. I neither see them nor know their relationships to one another. True, if you take the 6♣ into Your Hand I will know that it is there, just as I must remember that your first decision was to draw the Jack♦ from the Discard Pile. However the basic nature of the group of cards itself is *unknown* to me, hidden from my view. Contrast this with the cards at the bottom of our diagram (Discard Pile, My Hand) both of which are *known* to me. This "unknown/known" dichotomy forms a second dichotomy of the game referred to in these essays as "The Secondary Opposition."

The Secondary Opposition represents an opposition based upon like natures in conflict or in some competition with one another as *gradations of the same basic nature*. To some extent I can guess about the cards in Your Hand or the cards remaining in the Stock Pile. I am not sure, and I can not guarantee, my conclusions. The Secondary Opposition, unlike the Primary Opposition, is not absolute or complete. Rather the Secondary Opposition states oppositions which are based upon difference within like categories, not differences in kind between the categories themselves.



A fundamental point is this: The cards as arranged have relationships with one another by way of their unique contribution to the 52 card deck. There is only one Ace ♠, one 2♥, etc. Thus if I know that the Jack ♦ is in Your Hand, I know that it is not in any other set - My Hand, the Discard Pile, the Stock Pile - in the game.

Moreover the nature of the sets is different. *Your Hand* is in opposition to *My Hand* - you want Your Hand of cards to beat mine, and I want My Hand of cards to beat yours. The *Discard Pile* is the result the players' choice of card to discard at each turn; all cards in the Discard Pile are known to both players. The *Stock Pile* is a randomly arranged remainder of cards the internal order of which is unknown to any player. An important rule of Gin Rummy protects the uncertainty of the cards in the Stock Pile.

"Drawn Game. If only two cards remain in the stock and neither player has knocked (won the game), the game ends in a draw: The final discard may not be taken. The same dealer deals again."

After I subtract from a 52 card deck the 10 cards in My Hand, 10 cards in Your Hand and one card for the beginning Discard Pile, 31 cards remain for the Stock Pile. My odds of choosing any particular card in the Stock Pile are no better than one in 31, but even this number is uncertain because the card *may* be in Your Hand. One's final play occurs when three cards are in the Stock Pile, odds roughly of one in three for drawing a particular card. The game ends when only two cards are left in the Stock Pile.

By keeping your cards "close to your chest" you may be able to encourage me in the false hope that the cards which I seek are in the Stock Pile. My odds of finding them in the Stock Pile may be zero if you hold them in Your Hand. Perhaps if I am very careful not to give you an indication of the cards which I seek, I may be able to persuade you to discard a card from Your Hand a card which otherwise you would not discard. In any event, given the unknown nature of the Stock Pile I can not be sure of the identity of the NEXT card to be drawn from the Stock Pile. Frequently in Gin Rummy one can not be sure of which cards the Stock Pile contains.

This first description of cards may be called the "Definitional Plane." This first plane defines the essential categories of cards upon which all evolution of the game is based. These definitions are based upon two oppositions, the Primary Opposition, i.e.

- 1.a. CAN WIN
- 1.b. CAN NOT WIN

and the Secondary Opposition, i.e.

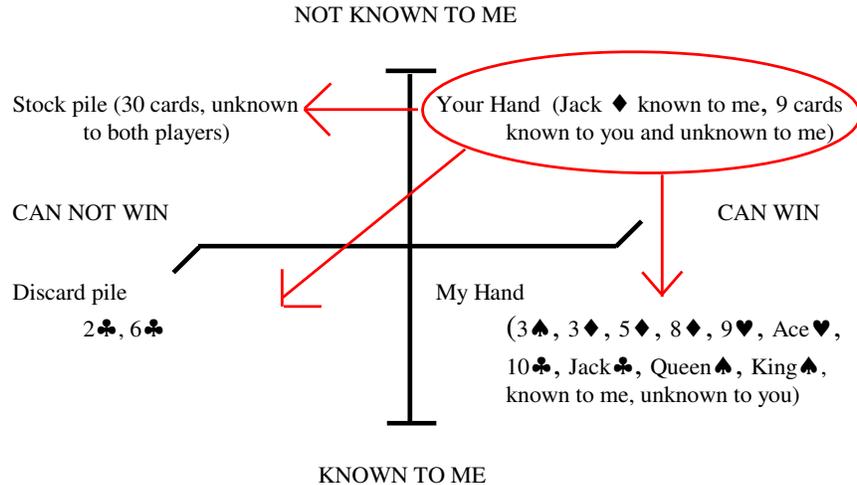
- 2.a. NOT KNOWN TO ME
- 2.b. KNOWN TO ME.

This set of oppositions has given rise to four separate categories of cards, defined as:

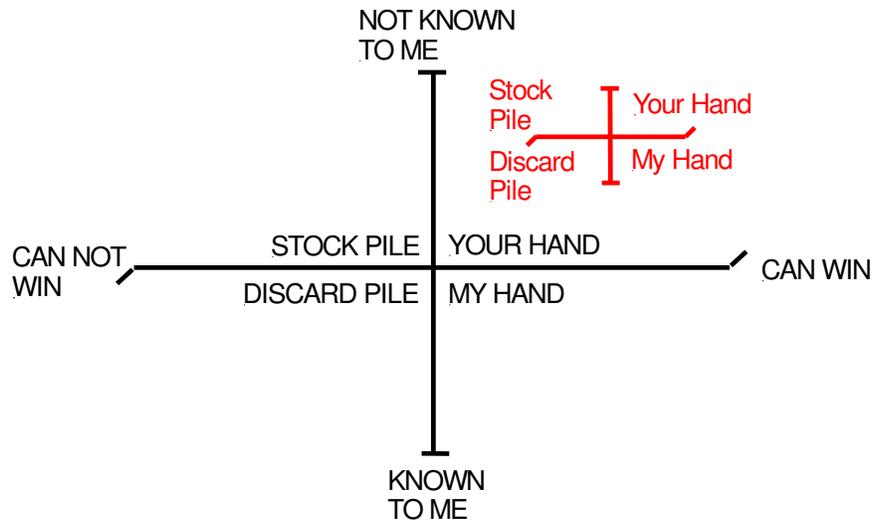
A First Opposite:	1.a. + 2.a.	Your Hand
A Second Opposite:	1.a. + 2.b.	My Hand
A Third Opposite:	1.b. + 2.a.	The Stock Pile
A Fourth Opposite:	1.b. + 2.b.	The Discard Pile.

4.2 The Plane of Relationship

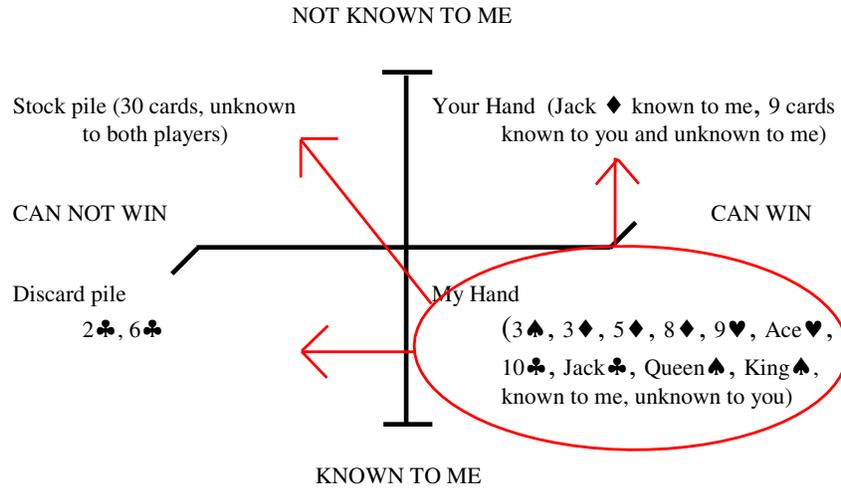
These sets of cards now form relationships with each other. The relationships created are unique; each relationship is unlike any other. For example, each of the cards in *Your Hand* has a relationship with the other cards in *Your Hand*. *Your Hand* also has a relationship with the cards in *My Hand*, with the top card in the *Stock Pile*, and with the cards in the *Discard Pile*.



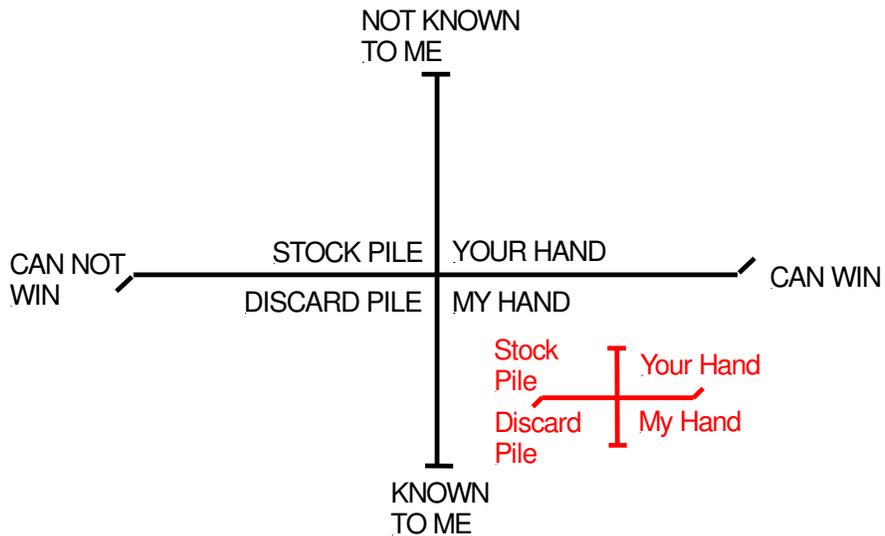
As I consider these relationships I calculate according to the definitions already given. In order to win the game I must consider each card I know or believe to be in *Your Hand* in relation to the other cards I believe to be in *Your Hand*, with the cards I know to be held in *My Hand*, with the cards I believe to be or hope to be in the *Stock Pile*, and the cards which both of us plainly see in the *Discard Pile*. This could be written as:



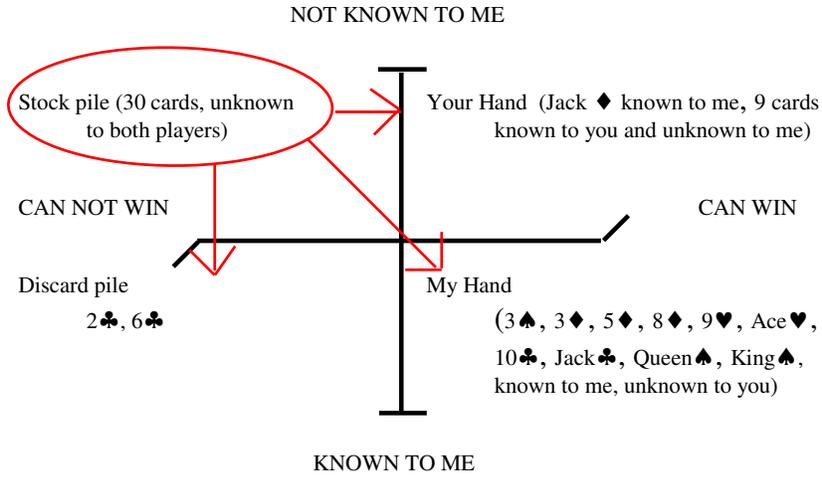
Similarly, each of the cards in *My Hand* has a relationship with the others in *My Hand*, with the cards in *Your Hand*, with the top card in the *Stock Pile* and with the cards in the *Discard Pile*.



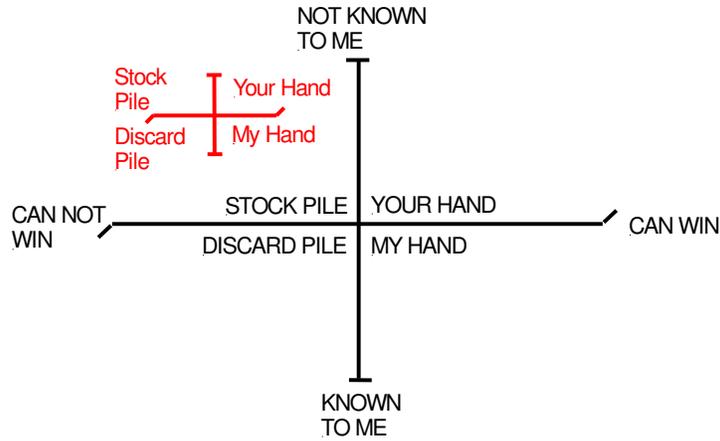
This could be written as:



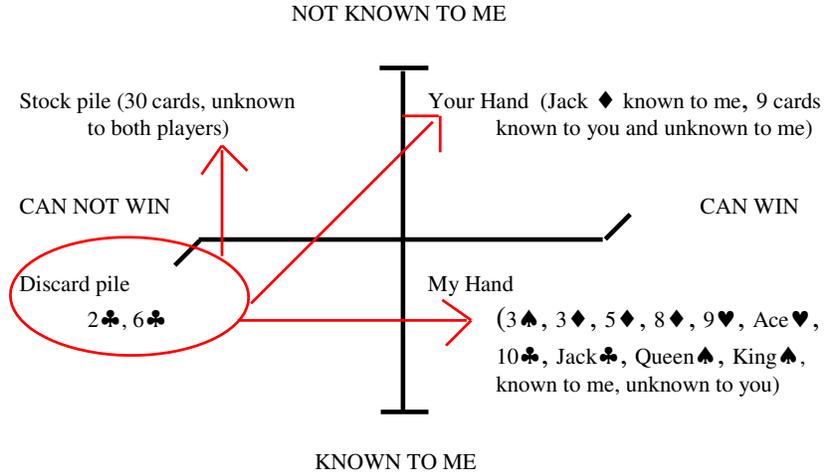
The top card in the *Stock Pile* has a relationship with the other cards in the *Stock Pile* (one card is first, one last, one second, and so on), with the cards in *Your Hand*, with the cards in *My Hand*, and with the cards in the *Discard Pile*.



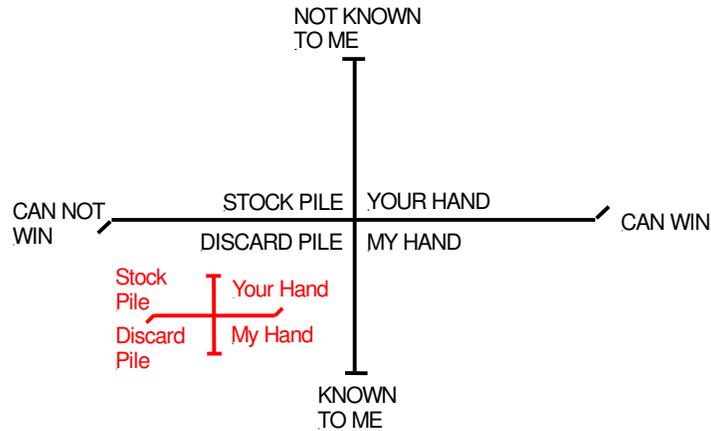
This could be written as:



And the top card in the *Discard Pile* has a relationship between the other cards in the *Discard Pile*, with the top card in the *Stock Pile*, with the cards in *My Hand*, and with the cards in *Your Hand*.

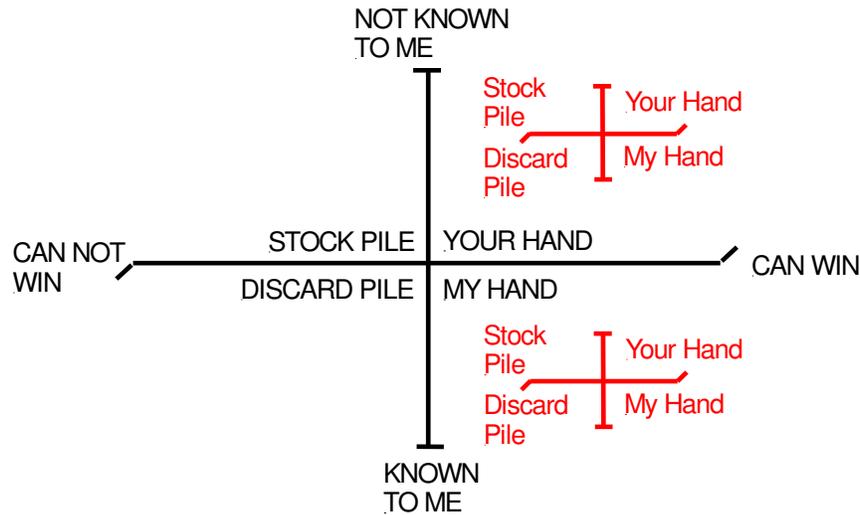


This could be written as:

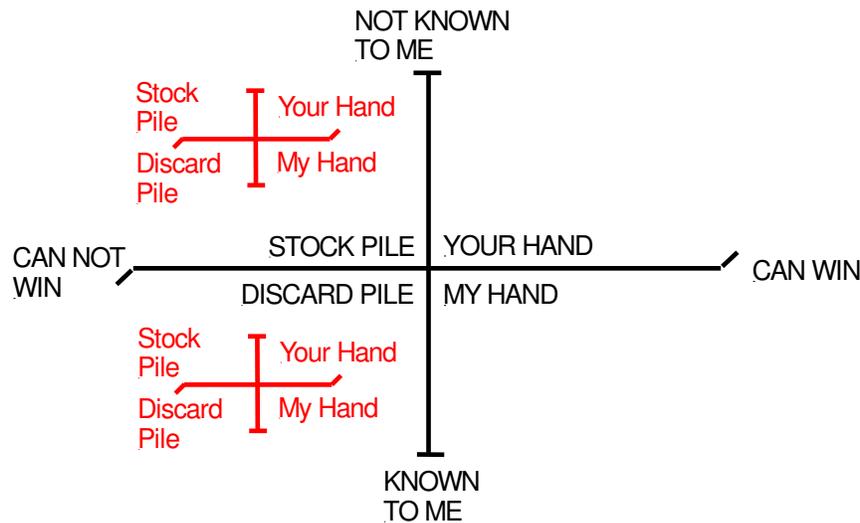


The relationships between the cards are part of the system whereby each player seeks to win the game. As each player attempts to win the game, each decision must be based upon (1) the categories of cards set up by the game and (2) the relationships which these four categories of cards have to one another.

My understanding of these groups of cards and their interrelationships is divided between the two groups in competition TO WIN the game (Your Hand, My Hand) ...

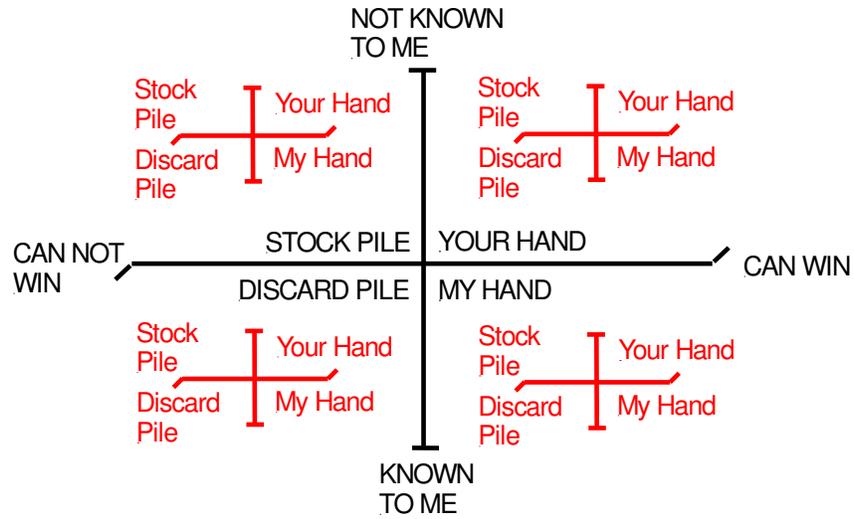


as opposed to the two groups which CAN NOT WIN the game (the Stock Pile, the Discard Pile).

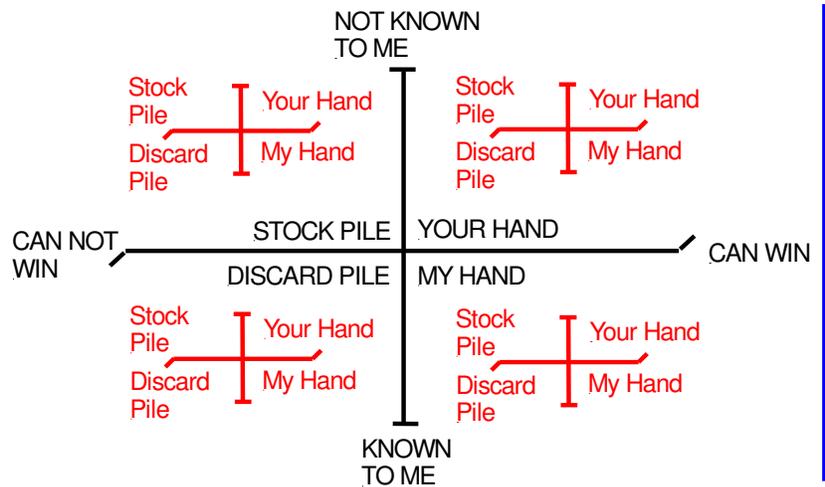


The entire point of our competition is to bring one's hand to completion, to "meld" the cards of one's hand prior to that of the opponent. Noting this distinction, a set of two dichotomies (CAN WIN / CAN NOT WIN; UNKNOWN TO ME / KNOWN TO ME) have rendered four groups of relationships.

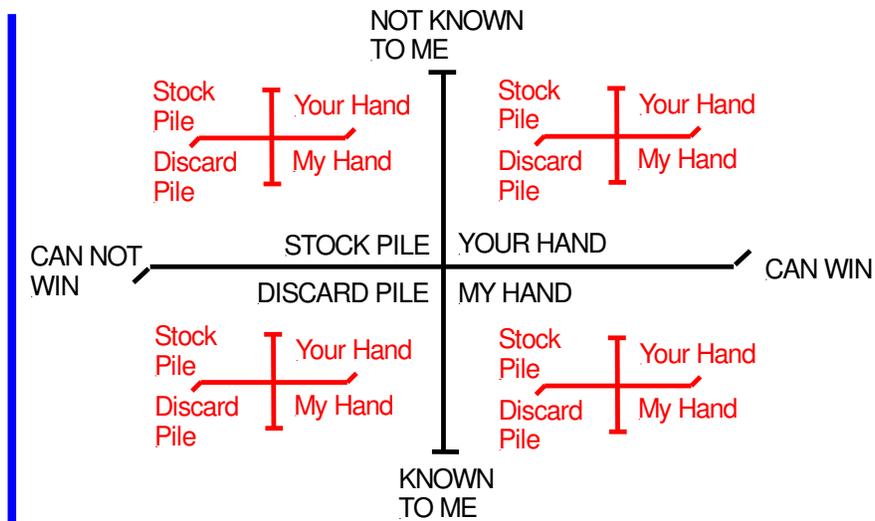
At this point we have simply squared the number of considerations of the card game based the "relationships" of the game as superimposed upon the original four categories of cards "defined" by the game.



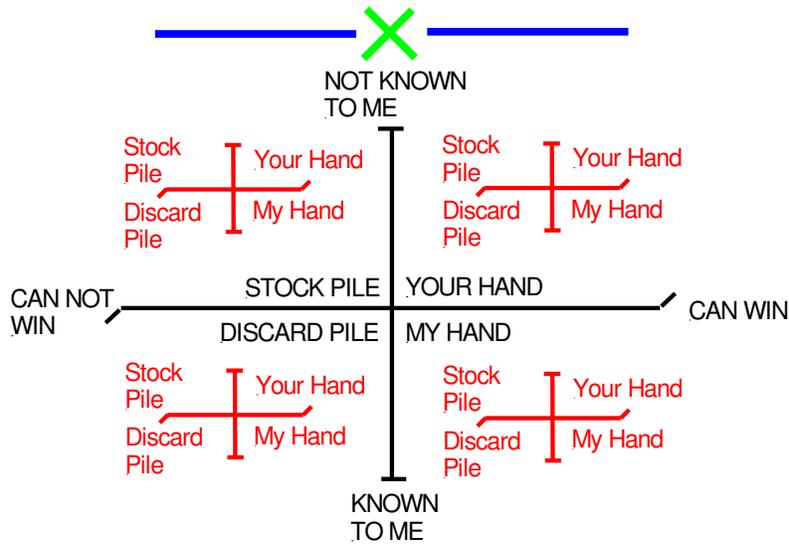
Regarding the distinction between “Primary Opposition” and “Secondary Opposition,” first note that the two categories on the right are directly related to each other in that they are in competition with each other. The direct relationship provided by the Secondary Opposition is given as a solid blue line. Two categories of cards - Your Hand, My Hand - are in competition with each other. Either CAN WIN THE GAME. They interplay with one another to out-manuever or outplay the other.



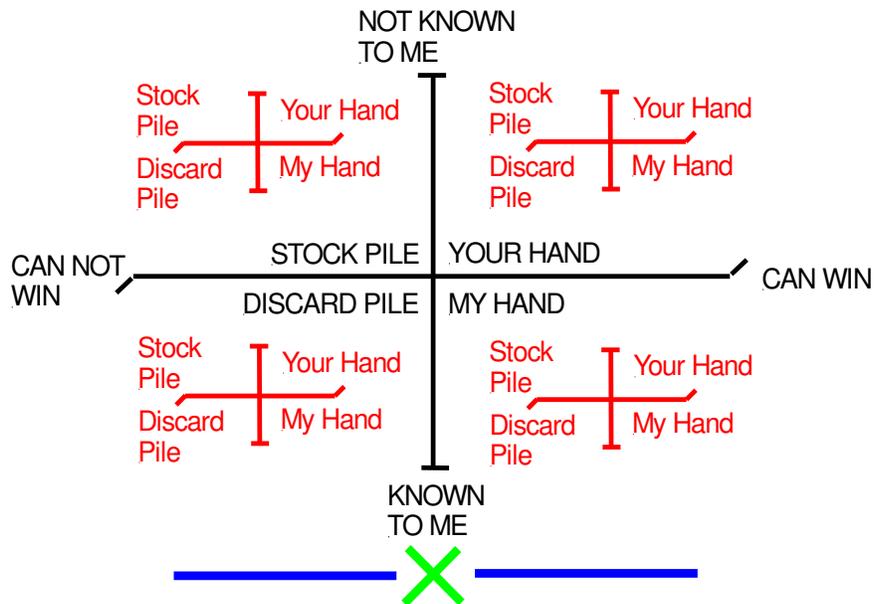
Two categories of cards to the left – the Stock Pile, Discard Pile - are similar in that they CAN NOT WIN the game. They exist as separate entities to be manipulated in the game. They serve different purposes, and neither can win.



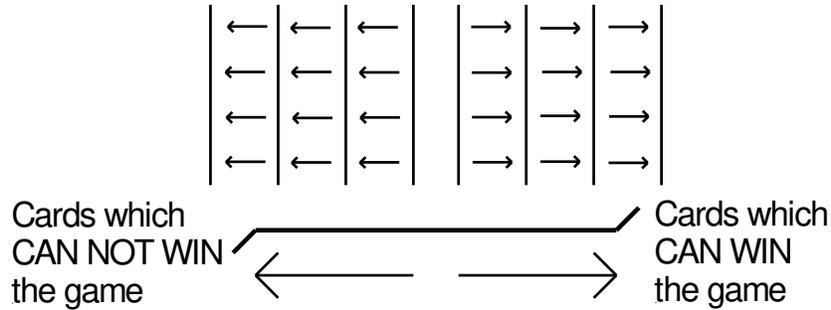
On the other hand, the two upper sets of cards - Your Hand, Stock Pile - are separated by the Primary Opposition, a separation of kind, not of gradation, given here by a broken blue line. They are similar only in that their basic nature is to be hidden from me.



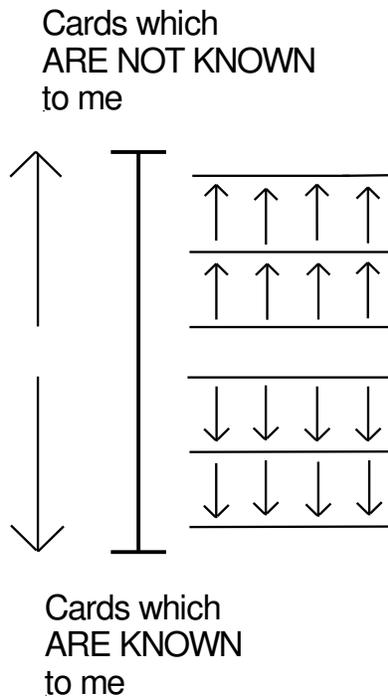
In a similar fashion the two lower sets of cards - My Hand, Discard Pile - are separated by a difference in kind. My Hand may win, and the Discard Pile can never win. This is sufficient to ensure that these two categories will never be in competition against one another, although the Discard Pile may influence greatly my own ability to win the game.



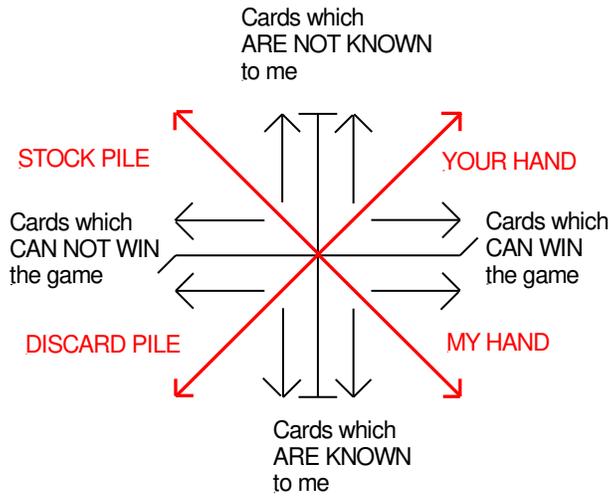
We deal here with two fundamentally different types of oppositions. These create four separate categories within each system. Let us imagine that the Primary Opposition, the opposition between “Can Win The Game” and “Can Not Win The Game,” sets off a straight wave something akin to a rod striking a calm pool of water.



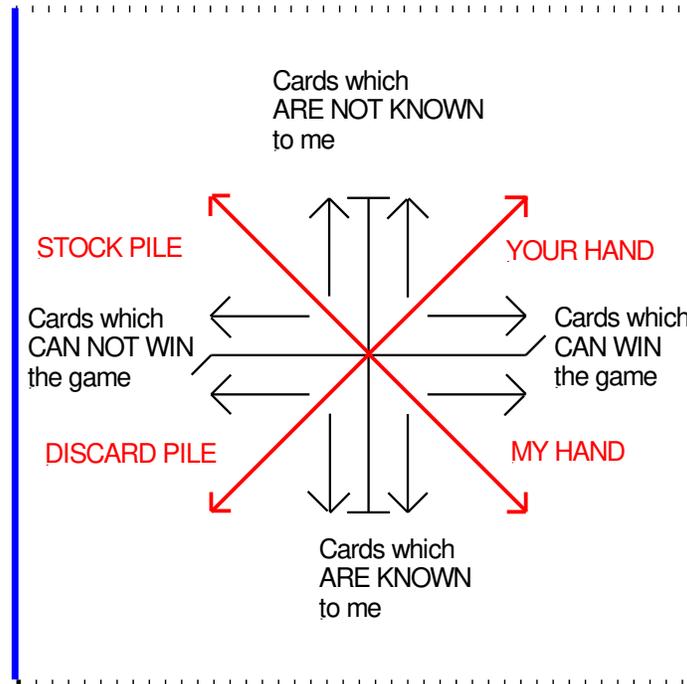
The Secondary Opposition between “Not Known To Me” and “Known To Me” may be imagined as a second, similar wave caused by a rod striking the same pool of water but perpendicular to the first.



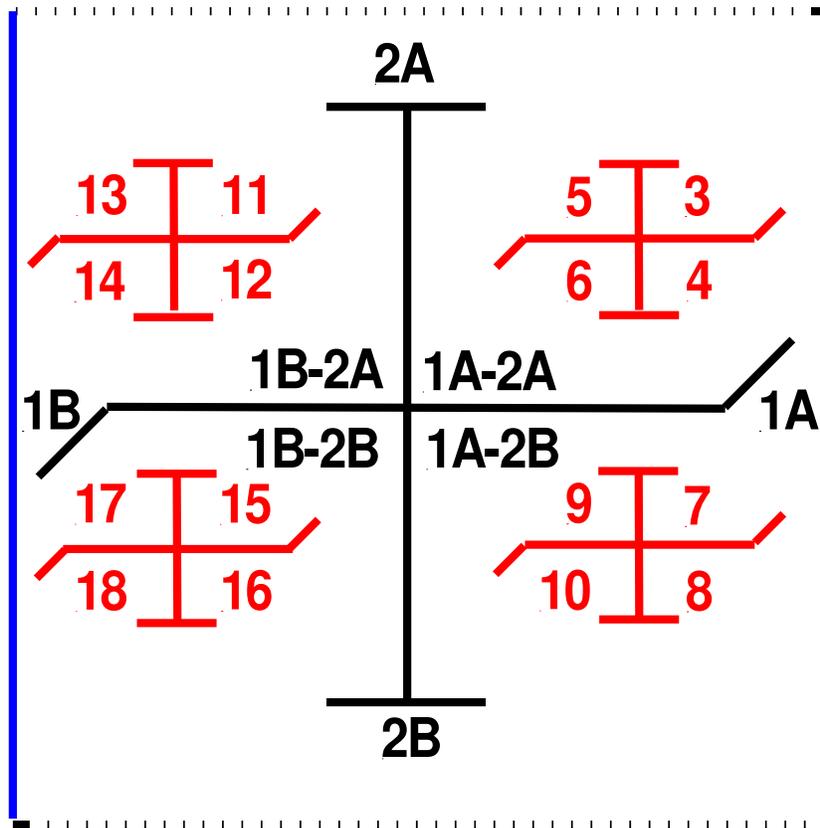
With these combined waves, four “vectors” come into existence, i.e. the intersections of the waves themselves. In the game of Gin Rummy, these vectors are “Your Hand,” “My Hand,” “The Stock Pile,” and the “Discard Pile.” In other words, the desire to “Win The Game” motivates the game itself, and brings into being four opposing but related categories, Your Hand, My Hand, the Stock Pile and the Discard Pile.



If we see that these opposing vectors are equally necessary to the game and therefore of equivalent length, we create a “square of tension” as these sets of cards relate to one another. Let a solid blue line represent the effect of the Secondary Opposition, and a broken black line represent the effect of the Primary Opposition.



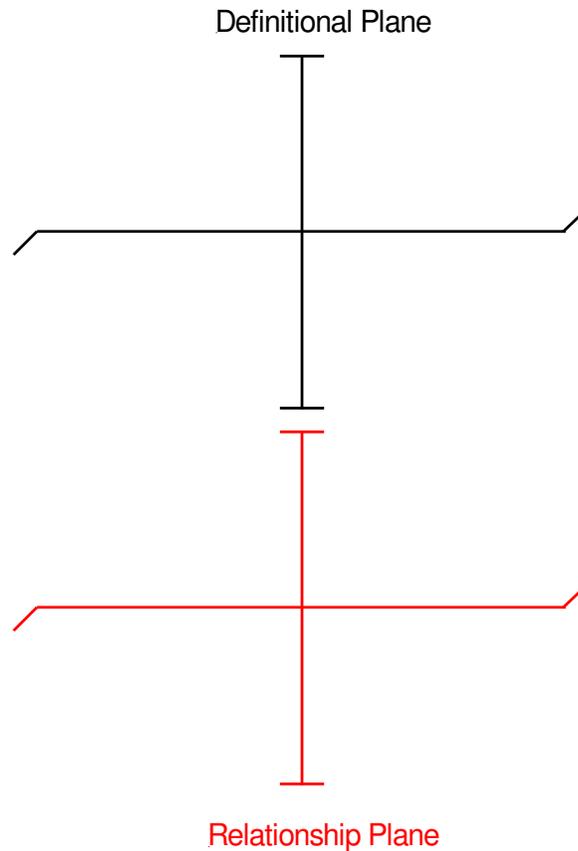
If we number these quadrants in order of appearance in the square previously described, we have the following:



This numbering system permits us to refer quickly refer to the model given in any context.

4.3 The Plane of Conclusion

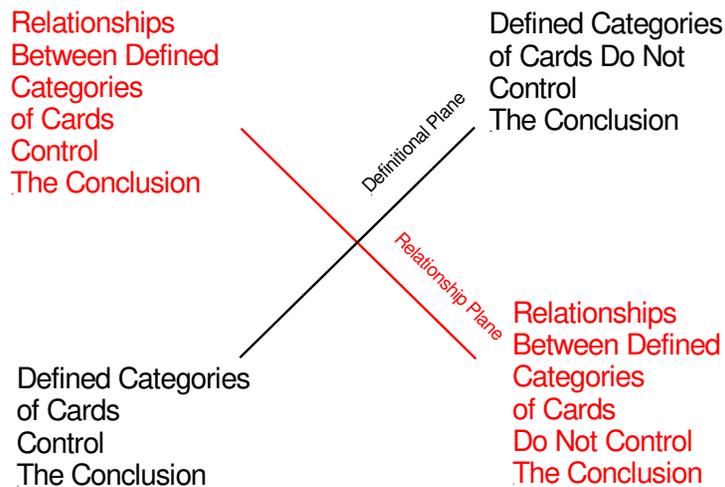
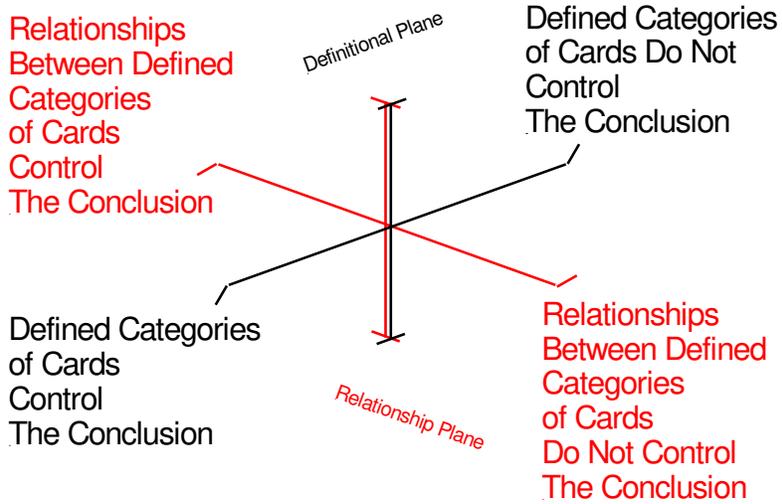
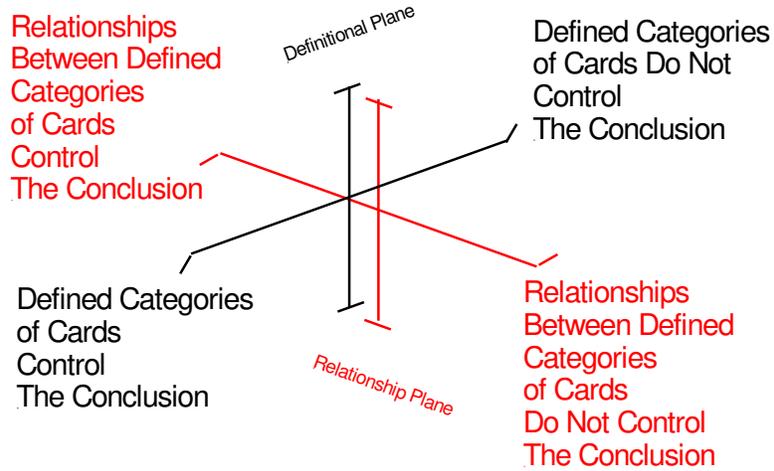
The two planes which we have described so far are the:



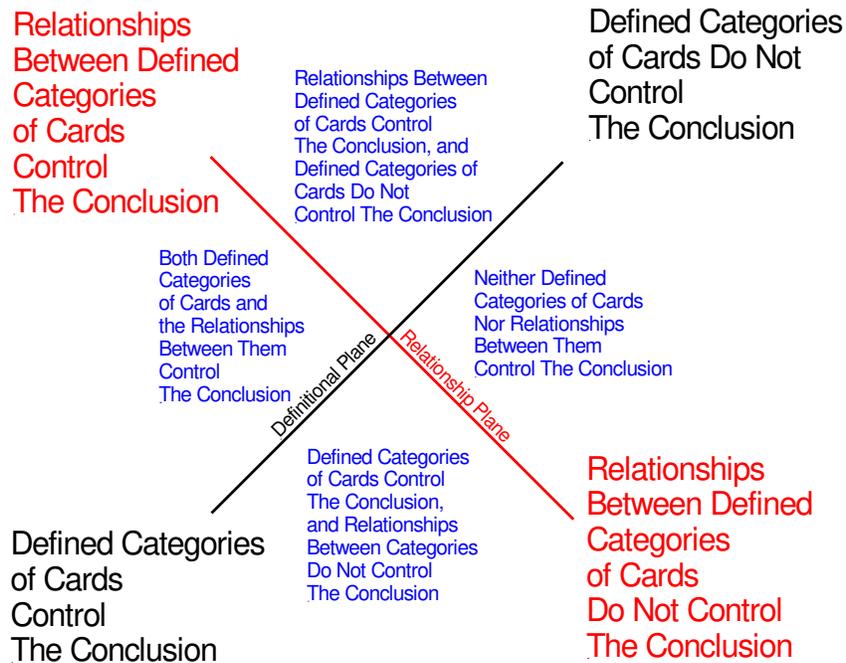
If we add to this analysis the possibility of “conclusions,” we find that the symmetry of the arrangement is broken, in part. *This comes about because the game itself is based upon simple dichotomies which render categories which are themselves not truly symmetrical.* The categories of Stock Pile, Your Hand, My Hand, and the Discard Pile embody types of knowledge which quite deliberately are neither similar, uniform nor equal. The Stock Pile, by definition, is *unknown* to both you and me. The Discard Pile is *known* to both you and me. My Hand and Your Hand are *known to ourselves* but more or less *unknown to each other*. These differences, which are brought on by the nature of the game itself, affect my ability to control my destiny in the game.

To imagine a “Plane of Conclusion,” we might treat the concept of "defining" in Gin Rummy, and of interpreting "relationships" between defined categories of cards, as two separate aspects which "control" our “conclusion” to any question.

For example, if we ask which set of cards is known to me and which can win the game, the answer is My Hand, *by definition*. If we ask whether we might know for certain which card is on top of the stock pile, the answer is “No,” again by definition. If we ask how many cards are in Your Hand, the answer is ten, by definition. If we ask how many cards are in the Stock Pile at the beginning of the game, the answer is 31, by definition.



The card player now is expected to come to conclusions regarding the interplay between the definitions proposed and the interrelationships inherent in the definitions proposed. We should treat the concept of "defining" in Gin Rummy, and of interpreting "relationships" between defined entities, as two separate aspects which "control" our answer to any decision in the game. As this pertains to Gin Rummy, we would then have the following "conclusion" plane:



A fundamental expectation of every game is that one of these quadrants will render an appropriate answer.

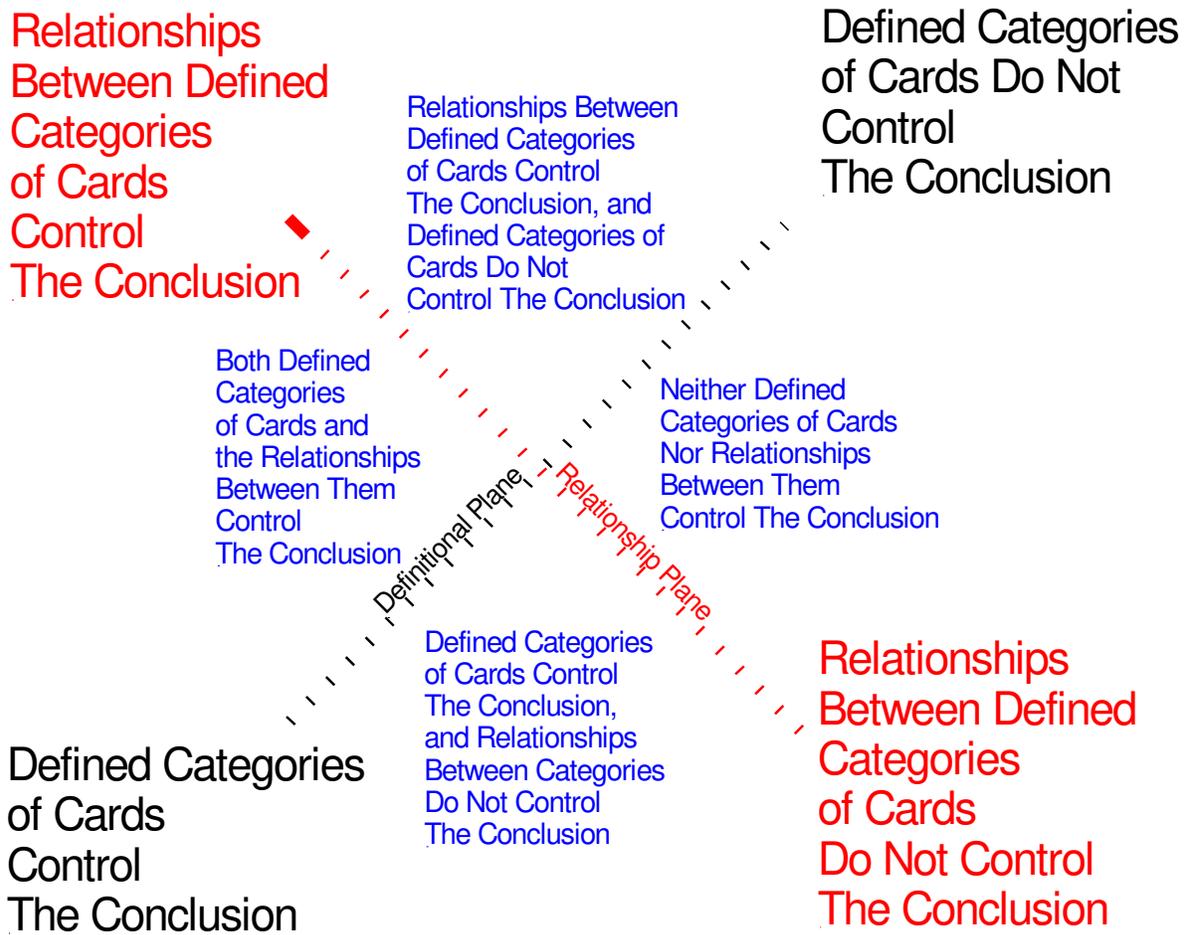
4.3.1. Conclusions regarding the Stock Pile

If I ask myself whether or not I should draw a card from the top of the Stock Pile, one fundamental point becomes obvious: *Under no circumstances are we, the players, permitted to know the identity of this card.* By definition this card is always unknown to both players. Even if I suspect that a card which I seek is in the Stock Pile, I can not be sure *where* in the Stock Pile, or whether eventually I will be lucky enough to choose it. Moreover the particular card I seek may be hidden from my view in Your Hand and *not* located in the Stock Pile at all.

There is a logical contradiction to this situation which should be considered. If I *violate* the rules and "peek" at the top card of the Stock Pile I have cheated. In effect I am no longer *playing* the game because I have violated the rules which form the basis of the game itself.

On the other hand if I do *not* violate the rules and "peek," I am forever uncertain as to the exact identity of the top card in the Stock Pile; in consequence I may *lose* the game. If I *refuse* to peek at the identity of the top card in the Stock Pile, I may end up choosing a card *which does not help me.* Or I may select a card from the Discard Pile instead, and thereby *miss* the very card (albeit unknown to me) which might have helped me as it was available as the top card of the Stock Pile.

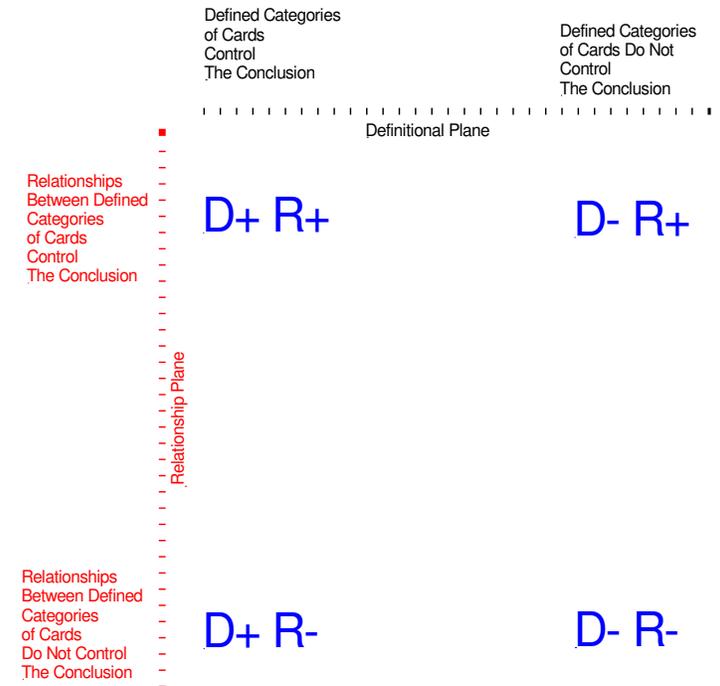
Nevertheless, despite this uncertainty I am required to choose this card for my hand, or decline to take this card into my hand, *never knowing with certainty whether it will – or will not – help me*. As this uncertainty affects the game my understanding of the “Definition” of the categories of cards, and the “Relationships” between cards in the game, can never fully answer my question as to whether I should - or should not - choose the top card in the Stock Pile. The uncertain usefulness of “Definitions” and “Relationships” in the game might be drawn with a series of dashes - rather than a solid straight line – to indicate the questionable utility of these concepts in determining whether I should – or should not – choose the top draw card from the Stock Pile.



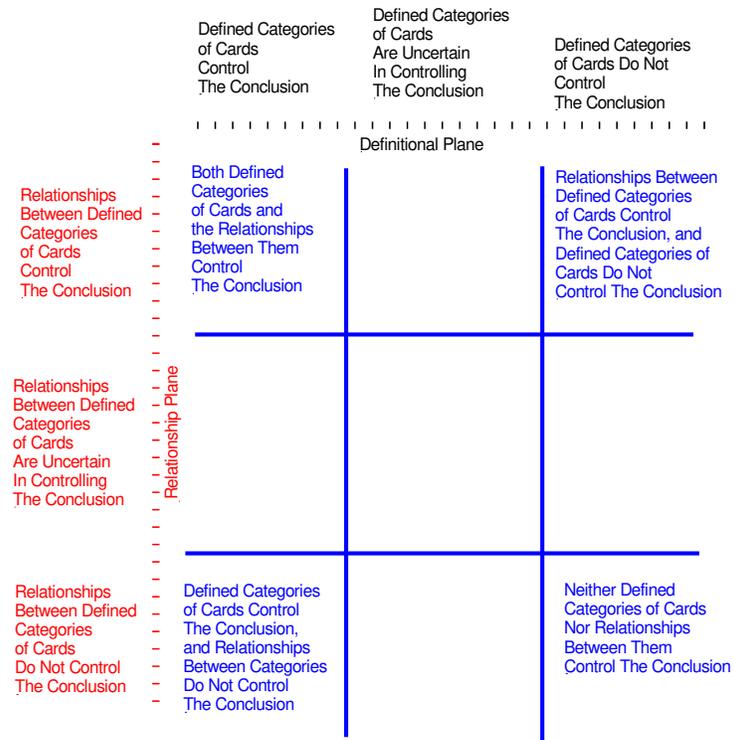
This could be pictured slightly differently as follows:



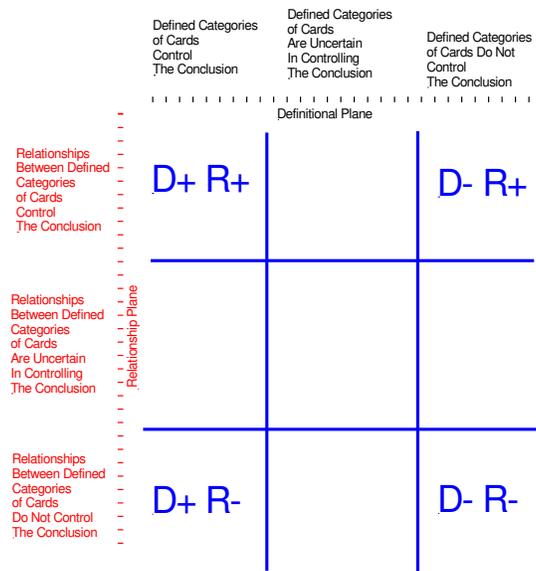
A short-hand method of referring to this arrangement is the following:



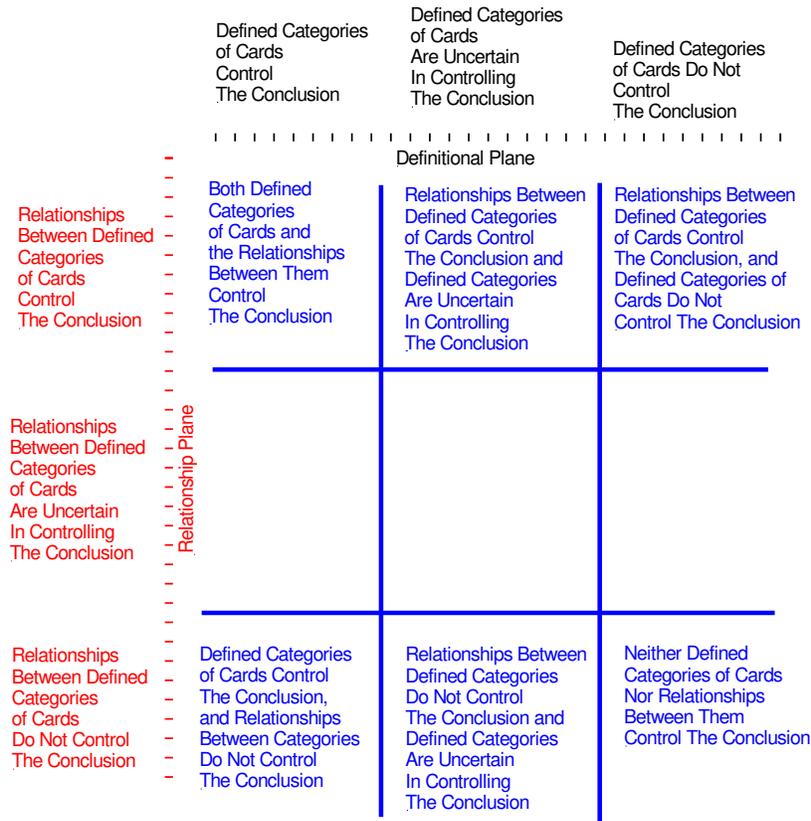
The uncertainty created by the unknown identity of the top card in the Stock Pile creates a new and unavoidable variable in the matter. This variable is the extent to which the “Definitions Are Uncertain In Controlling The Conclusion,” and the extent to which “Relationships Are Uncertain In Controlling The Conclusion.”



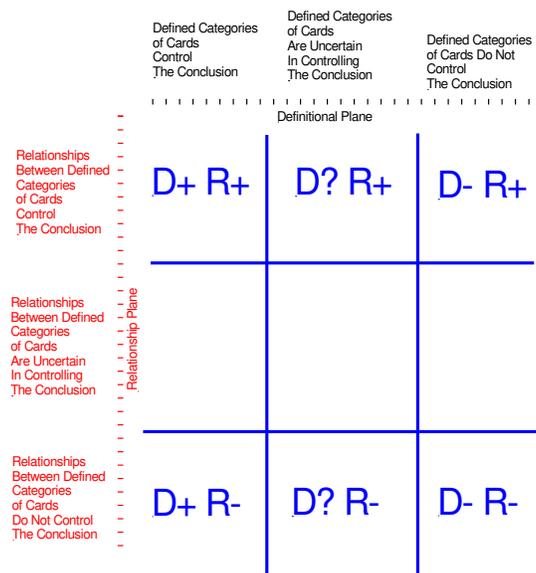
This checkerboard pattern, as simplified is as follows:



When we deal with the unknown identity of the top card in the Stock Pile the uncertain usefulness of our Definitions renders the following two new possibilities.



A question mark - “D?” - will be used to indicate those quadrants in the checkerboard wherein the Definitions proposed are uncertain in their assistance in controlling the conclusion to a question.



Similarly when we deal with the unknown identity of the top card in the Stock Pile the uncertain usefulness of the Relationships between cards renders two more possibilities.

	Defined Categories of Cards Control The Conclusion	Defined Categories of Cards Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Do Not Control The Conclusion
	Definitional Plane		
Relationships Between Defined Categories of Cards Control The Conclusion	Both Defined Categories of Cards and the Relationships Between Them Control The Conclusion	Relationships Between Defined Categories of Cards Control The Conclusion and Defined Categories Are Uncertain In Controlling The Conclusion	Relationships Between Defined Categories of Cards Control The Conclusion, and Defined Categories of Cards Do Not Control The Conclusion
Relationships Between Defined Categories of Cards Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Control The Conclusion and Relationships Between Defined Categories Are Uncertain In Controlling The Conclusion		Defined Categories of Cards Do Not Control The Conclusion and Relationships Between Defined Categories of Cards Are Uncertain In Controlling The Conclusion
Relationships Between Defined Categories of Cards Do Not Control The Conclusion	Defined Categories of Cards Control The Conclusion, and Relationships Between Categories Do Not Control The Conclusion	Relationships Between Defined Categories Do Not Control The Conclusion and Defined Categories Are Uncertain In Controlling The Conclusion	Neither Defined Categories of Cards Nor Relationships Between Them Control The Conclusion

A question mark - “R?” - will be used to indicate those quadrants in the checkerboard wherein the Relationships proposed are uncertain in their assistance in controlling the conclusion to a question.

	Defined Categories of Cards Control The Conclusion	Defined Categories of Cards Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Do Not Control The Conclusion
	Definitional Plane		
Relationships Between Defined Categories of Cards Control The Conclusion	D+ R+	D? R+	D- R+
Relationships Between Defined Categories of Cards Are Uncertain In Controlling The Conclusion	D+ R?		D- R?
Relationships Between Defined Categories of Cards Do Not Control The Conclusion	D+ R-	D? R-	D- R-

The uncertain usefulness of *both* Definitions and Relationships together renders one final possibility for a Conclusion. The checkerboard of possibilities below represents the uncertainty *inherent* in the unknown identity of the top card in the Stock Pile. To determine whether the top stock pile card should be chosen I face nine separate possibilities:

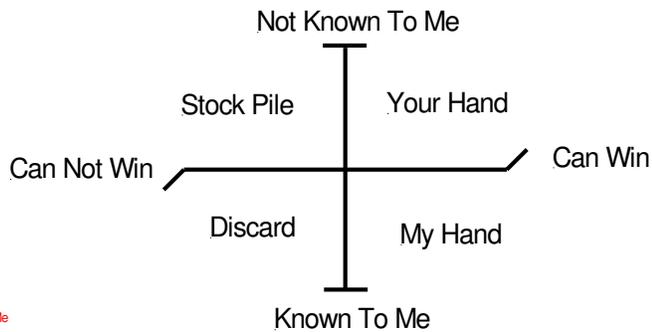
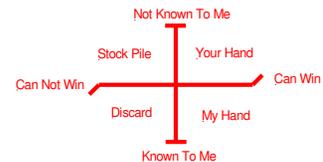
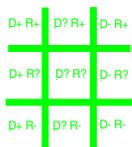
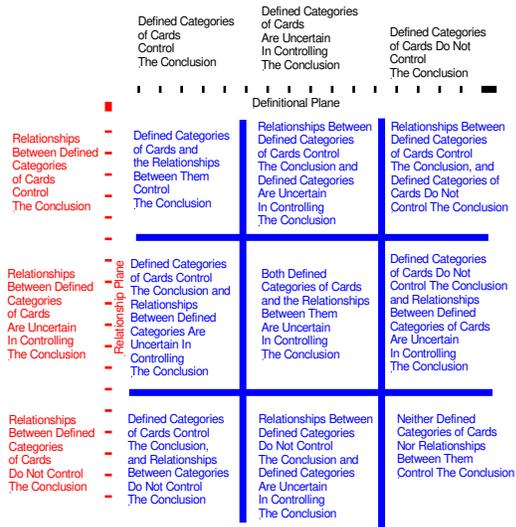
	Defined Categories of Cards Control The Conclusion	Defined Categories of Cards Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Do Not Control The Conclusion
Relationships Between Defined Categories of Cards Control The Conclusion	Both Defined Categories of Cards and the Relationships Between Them Control The Conclusion	Relationships Between Defined Categories of Cards Control The Conclusion and Defined Categories Are Uncertain In Controlling The Conclusion	Relationships Between Defined Categories of Cards Control The Conclusion, and Defined Categories of Cards Do Not Control The Conclusion
Relationships Between Defined Categories of Cards Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Control The Conclusion and Relationships Between Defined Categories Are Uncertain In Controlling The Conclusion	Both Defined Categories of Cards and the Relationships Between Them Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Do Not Control The Conclusion and Relationships Between Defined Categories of Cards Are Uncertain In Controlling The Conclusion
Relationships Between Defined Categories of Cards Do Not Control The Conclusion	Defined Categories of Cards Control The Conclusion, and Relationships Between Categories Do Not Control The Conclusion	Relationships Between Defined Categories Do Not Control The Conclusion and Defined Categories Are Uncertain In Controlling The Conclusion	Neither Defined Categories of Cards Nor Relationships Between Them Control The Conclusion

... or in simplified notation:

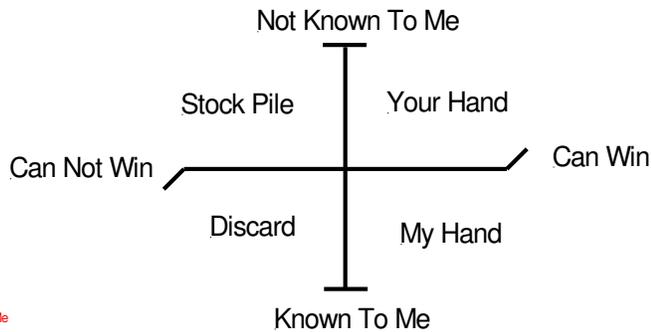
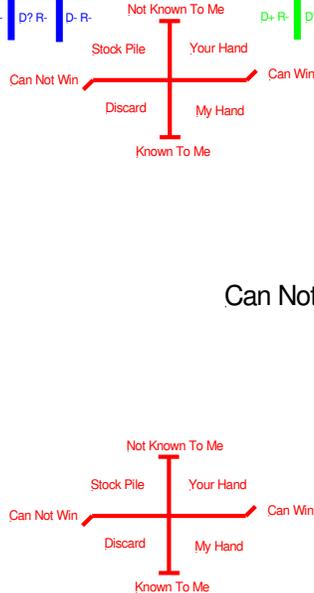
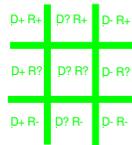
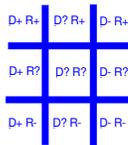
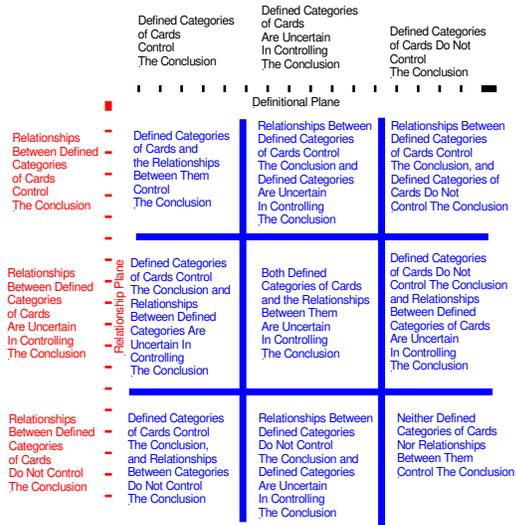
	Defined Categories of Cards Control The Conclusion	Defined Categories of Cards Are Uncertain In Controlling The Conclusion	Defined Categories of Cards Do Not Control The Conclusion
Relationships Between Defined Categories of Cards Control The Conclusion	D+ R+	D? R+	D- R+
Relationships Between Defined Categories of Cards Are Uncertain In Controlling The Conclusion	D+ R?	D? R?	D- R?
Relationships Between Defined Categories of Cards Do Not Control The Conclusion	D+ R-	D? R-	D- R-

That is to say, in attempting to align the concepts of definition and relationship to answer whether the top card in the Stock Pile should be chosen, we have nine possible answers, none of which takes precedence over the others.

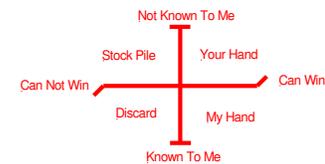
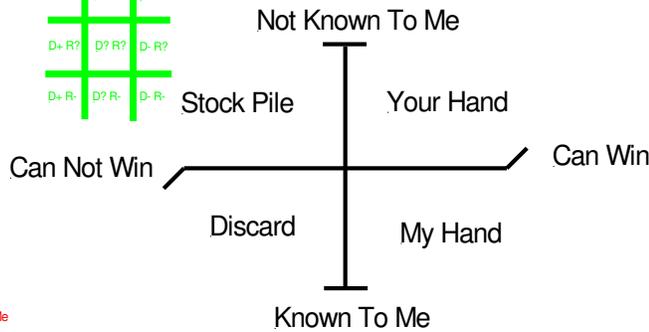
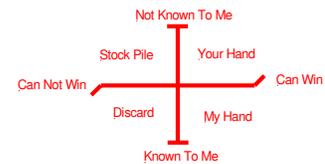
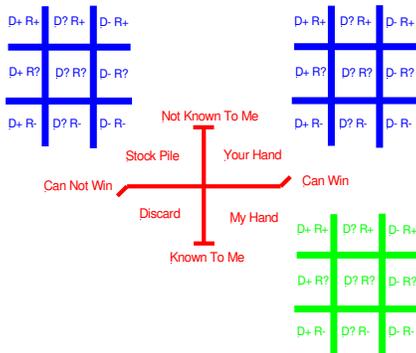
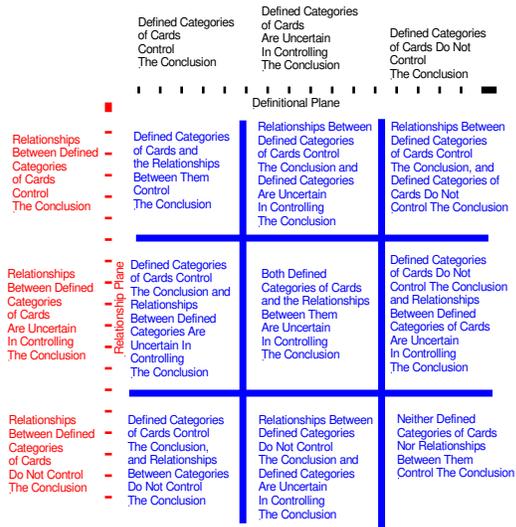
The unknown identity of the top card in the Stock Pile is directly related to the nature of the Stock Pile itself. I am completely unsure *which* card lies *where* in the Stock Pile. The Defined Categories of Cards, and the Relationships Between These Categories, may be completely unable to answer my question as to whether I should choose from the Stock Pile with any certainty at all.



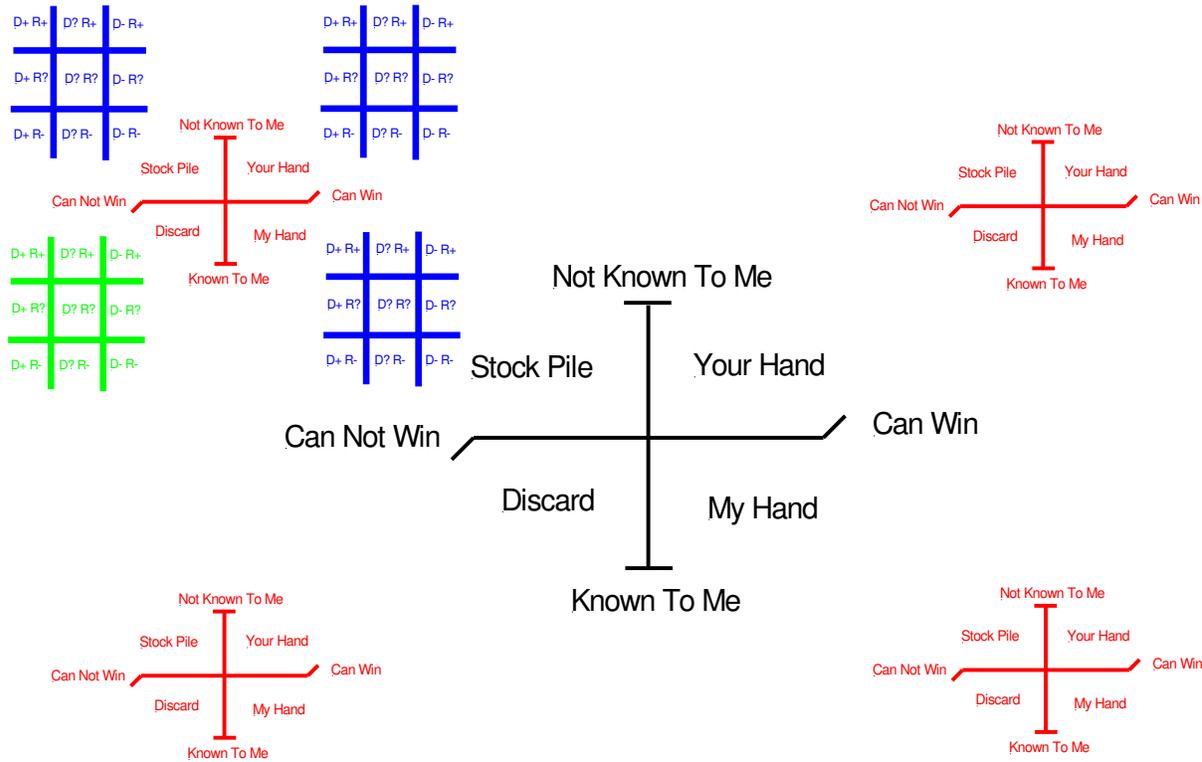
What Conclusion should we draw as to *any* relationship which the top card in the Stock Pile has as to the cards in Your Hand? If I am unable to state clearly *which* cards are within the Stock Pile, or *where* they are within the Stock Pile, or which card is the *next to be drawn*, I am also unable to state with certainty the relationship of the top card in the Stock Pile to Your Hand. The nine-part uncertainty arises again.



What Conclusion should we draw as to any relationship which the top card in the Stock Pile has as to the cards in My Hand? Once again, if I am unable to state clearly *which* cards are within the Stock Pile, or *where* they are located in the Stock Pile, or which one is the *next to be drawn*, an *inherent* uncertainty exists, one which prohibits my ability to state with certainty a relationship between the top card of the Stock Pile and My Hand. The nine-part uncertainty is stated once again.



Finally what Conclusion should we draw as to the relationship between the top card of the Stock Pile and the cards in the Discard Pile? Once again if I am unable to state clearly *which* cards are within the Stock Pile, or *where* they are located in the Stock Pile, or which one is the *next to be drawn*, an *inherent* uncertainty exists, one which prohibits my ability to state with certainty a relationship between the top card of the Stock Pile and the Discard Pile. Once again the nine-part uncertainty must be repeated.

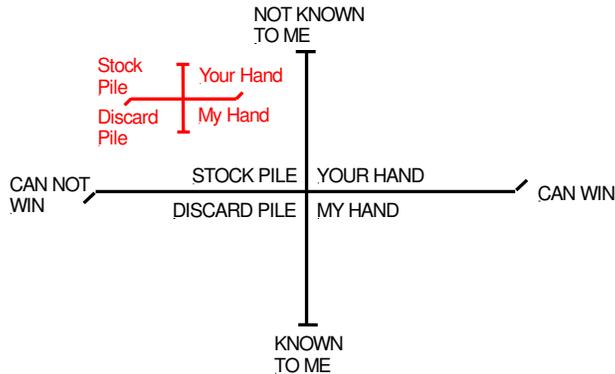


The essential ambiguity of the identity of the cards in the Stock Pile, their placement within the Stock Pile, and the identity of the top card creates an uncertainty as to the utility of “Defined” categories or “Relationships” between them in answering whether I should – or should not – choose a card from the Stock Pile. We then are unable to establish clear Conclusions for the top card in the Stock Pile as to the other cards in the Stock Pile, Your Hand, My Hand and with the Discard Pile.

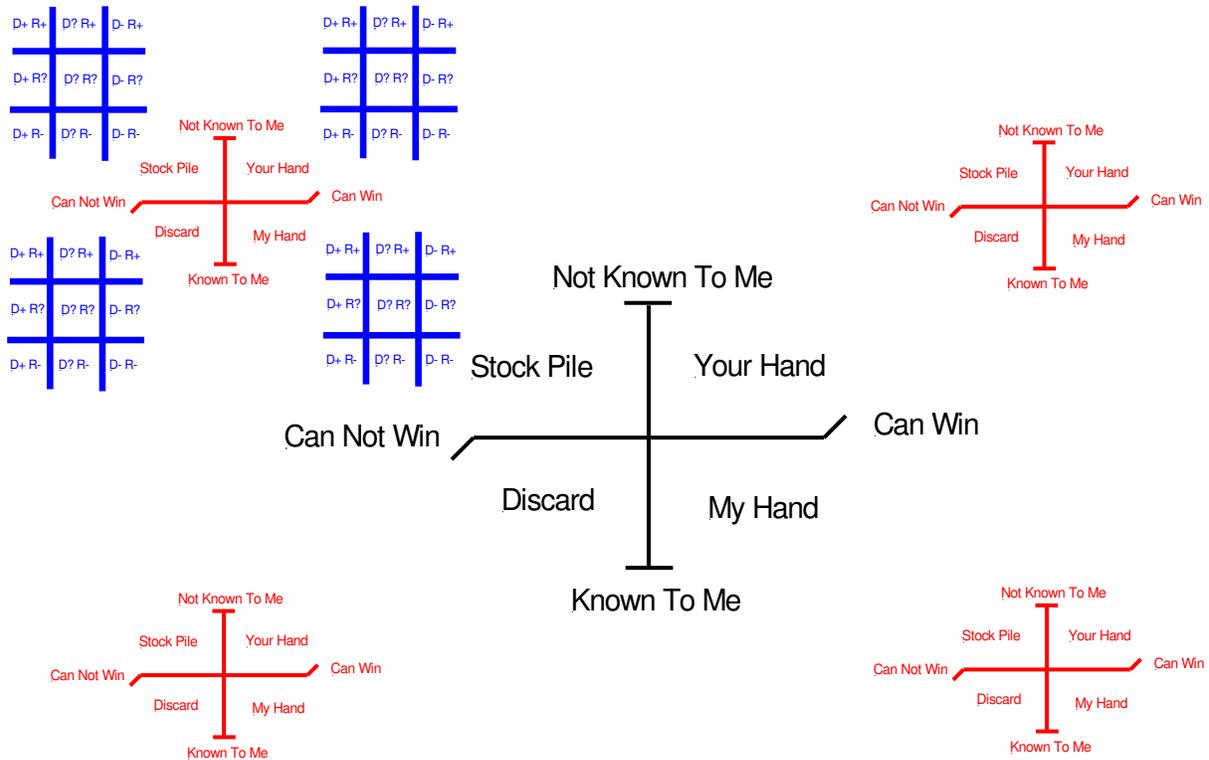
This pattern is one of necessity, created by the terms of the game. The logical impossibility *inherent* in identifying the top card of the Stock Pile makes impossible further description of its relationship with other categories of cards. If we are unable to identify the top card in the Stock Pile we cannot discuss with certainty its relationships with Your Hand, My Hand, and the Discard Pile.

This uncertainty is the basis for the game, its challenge and its good or bad fortune. This situation arises in no other place in the game of Gin Rummy.

In other words, while the top card in the Stock Pile obviously has *relationships* with the groups of cards *defined* by the game ...



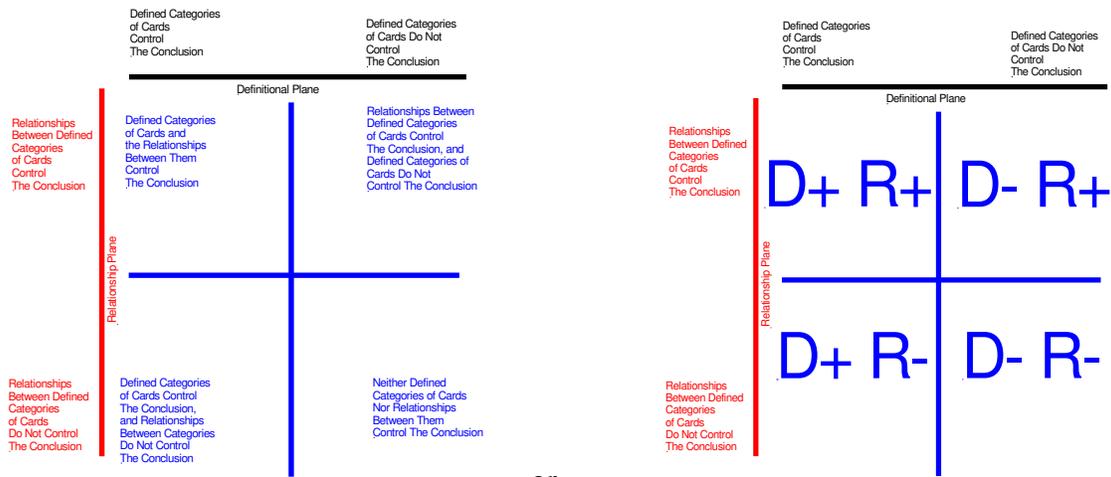
... the *utility* of these definitions and relationships, the ability to use the definitions and relationships to reach *conclusions* about whether or not to choose the top card of the Stock Pile and incorporate it into one's hand of cards, must remain an *inherently* uncertain part of the game itself.



4.3.2 Conclusions Regarding Categories of Cards Which CAN WIN the Game (Your Hand, My Hand)

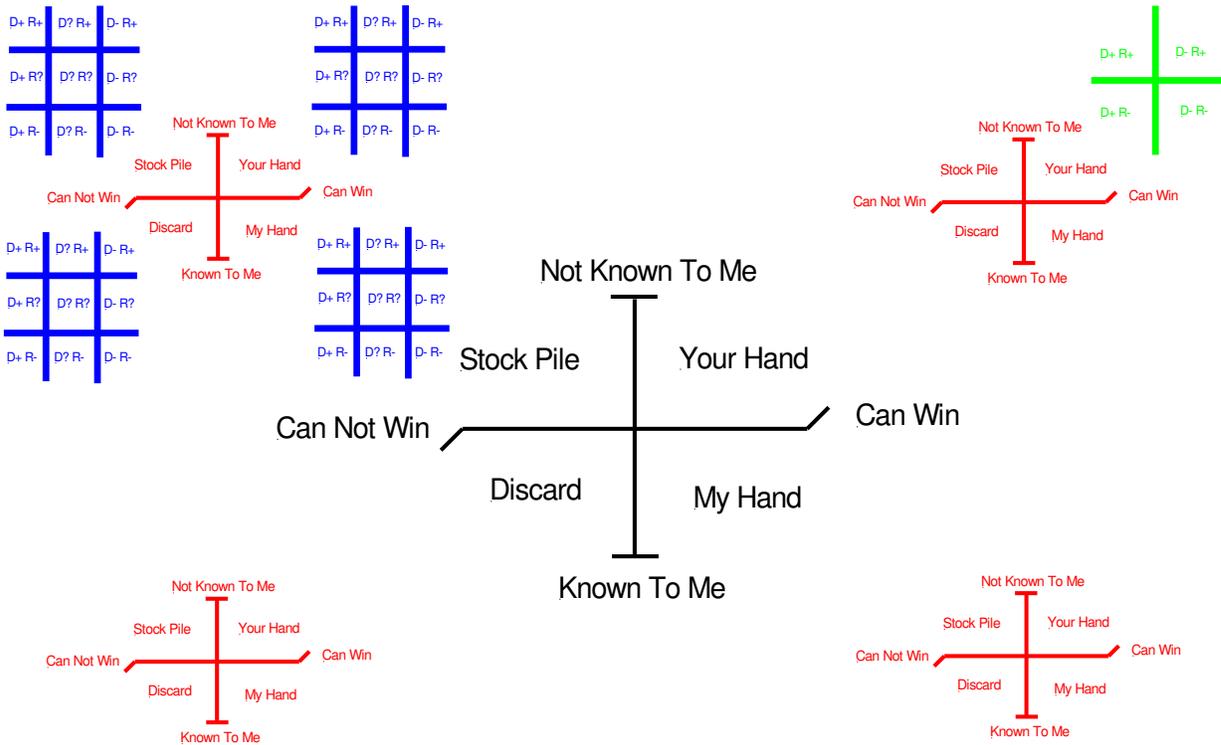
We might expect that this same uncertainty would ruin any chance of a decent card game. We might expect that these same nine quadrants of uncertainty would “infect” every other category of cards – Your Hand, My Hand, the Discard Pile.

This, however, is not the case. If I ask you to reveal the identity of the cards in Your Hand, you could tell me. This would assist me greatly in my effort to win the game. The identity of the cards in Your Hand are not in question, nor are they inherently unknown; they are simply unknown to me. For this reason *neither* the Definitions nor the Relationships are *inherently* uncertain when it comes to Conclusions regarding Your Hand. Because we have no *inherent* uncertainty or contradiction in Your Hand, we may return to a simple and straightforward placement of planes. This simple blue cross indicates that only four possibilities of conclusion are possible. Once again, these are:



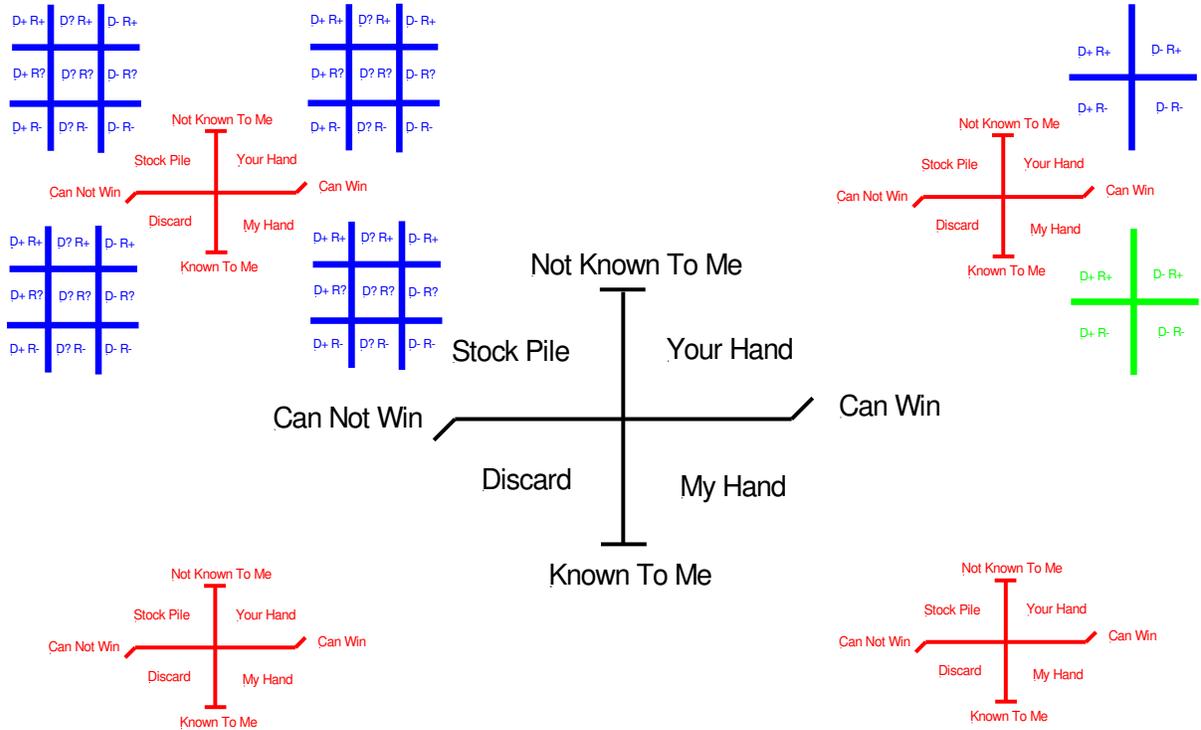
OR,...

Regarding the relationship which the cards in Your Hand have to each other, we have:

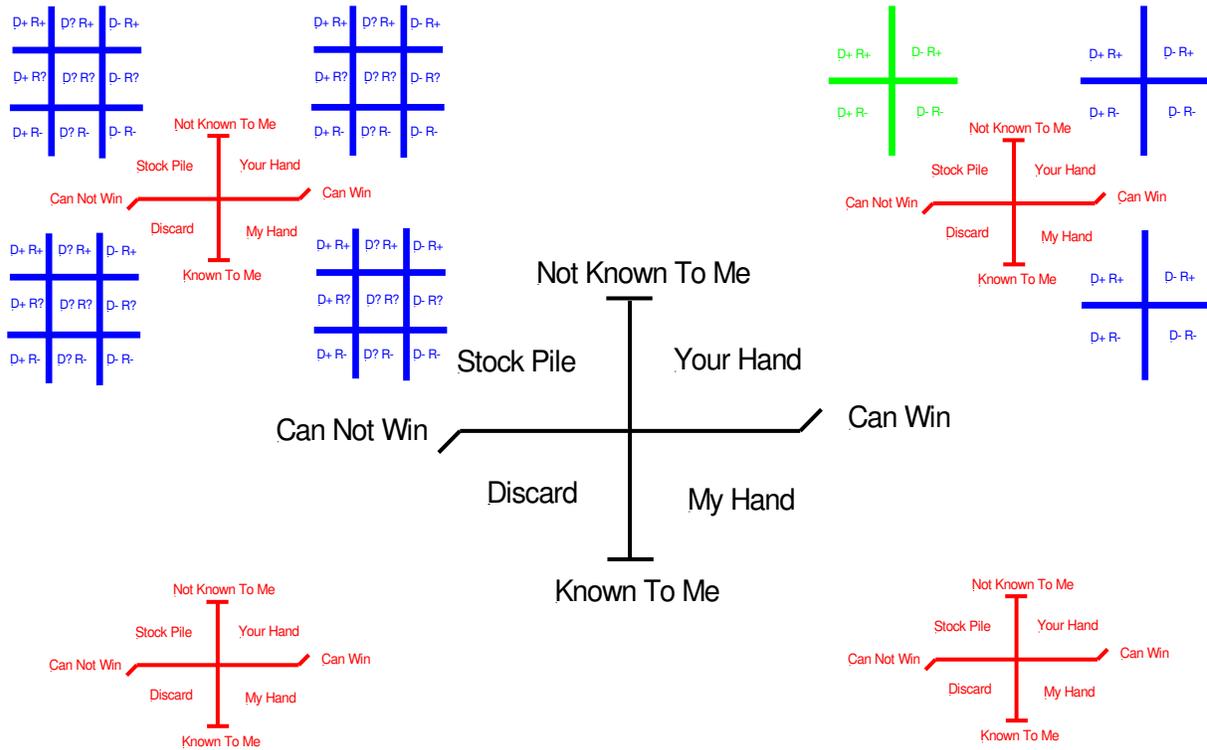


When dealing with cards in Your Hand the identity of these cards are – *by definition* – known and the *relationships* which they have to each other must be clear to you. Although these cards may not be known to me, they are not *inherently* uncertain. As mentioned in the Introduction it is important to bear in mind that the Conclusion Plane seeks to relate the Definitions (either helpful or not) with Relationships (either helpful or not) as abstract possibilities. The question is whether the Definitions and Relationships described aid in the understanding of something, or whether they do not. In the above the possibility of a Conclusion made without inherent uncertainty is simply noted, and we move on.

If I ask what Conclusions can be drawn between the cards in Your Hand to the cards in My Hand, we again deal with cards which are known to you and controlled by you. There is no *inherent* ambiguity or uncertainty.



Considering what Conclusions may be drawn between the cards in Your Hand and those in the Stock Pile, there is an element of uncertainty in knowing the identity of the top card in the Stock Pile. Nevertheless the cards in Your Hand must be played with this uncertainty taken into account for the best possible move. *This uncertainty does not eliminate the game; it creates the game.*

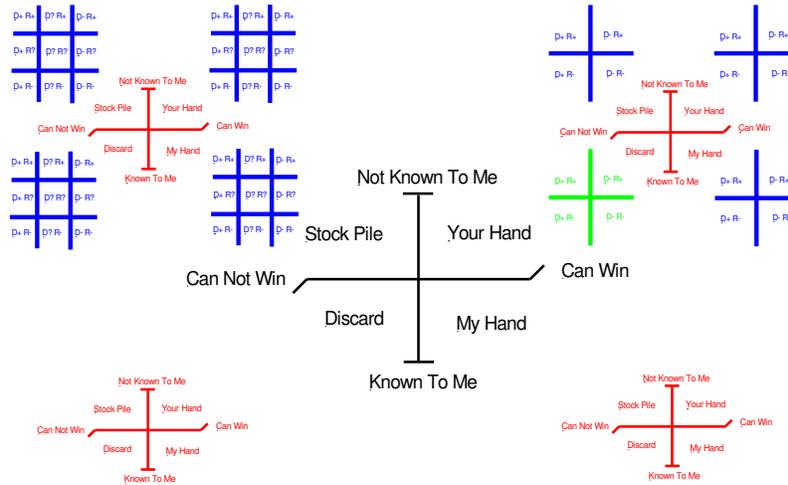


Regarding our previous discussion of the impossibility of determining the identity of the top card in the Stock Pile, we may notice that this uncertainty is non-commutative. In other words, in this instance the statement “ $A + B = B + A$ ” is not necessarily a true statement. Put another way: “My relationship with Elizabeth Taylor is not the same as Elizabeth Taylor’s relationship with me.”

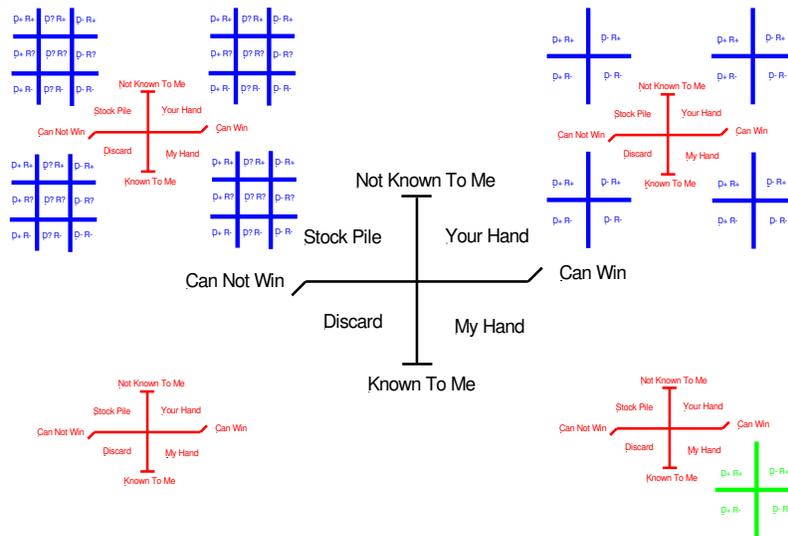
From the point of view of the identity of the cards in Your Hand, there is no particular problem in seeing that they must take into account the cards still undiscovered in the Stock Pile and in particular the top card in the Stock Pile.

From the standpoint of the Stock Pile however, and in particular from the point of view of the top card in the Stock Pile, any attempt to draw relationships between the Stock Pile and the rest of the game is plagued by an *inherent* uncertainty, an *inherent* uncertainty which is absolutely essential to the progress of the game.

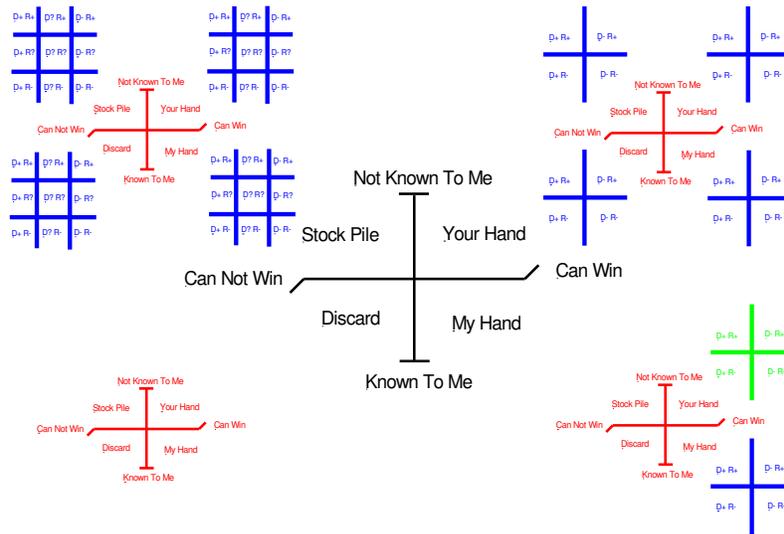
If we ask what Conclusions may be drawn between the cards in Your Hand and those in the Discard Pile, we see that there is no uncertainty at all. The cards in the Discard Pile are known to both of us and Your Hand is known to you. Although I may not know the identity of the cards in Your Hand, there is no *inherent* uncertainty about them or their relationship to the top card of the Discard Pile.



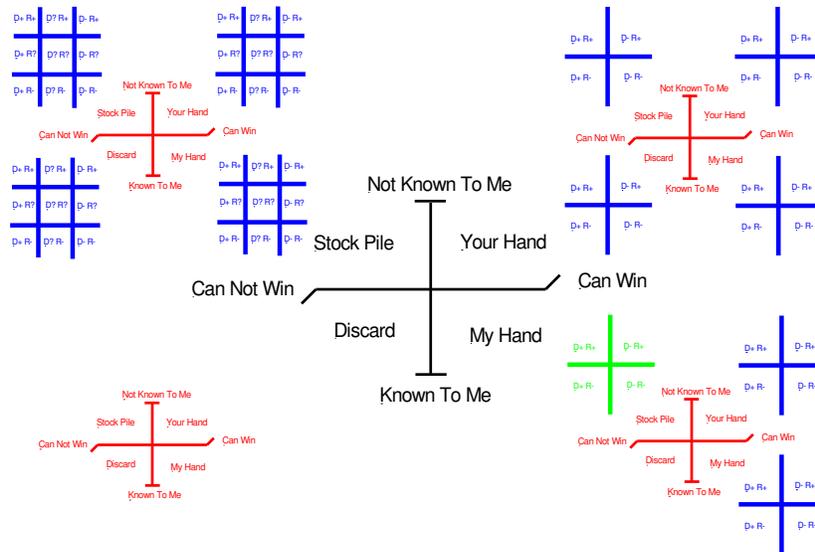
If we ask what Conclusions may be drawn between the cards in My Hand amongst themselves, we see that there is no uncertainty at all. The cards in My Hand are seen clearly by me, without ambiguity. Upon their relationships I will win or lose the game.



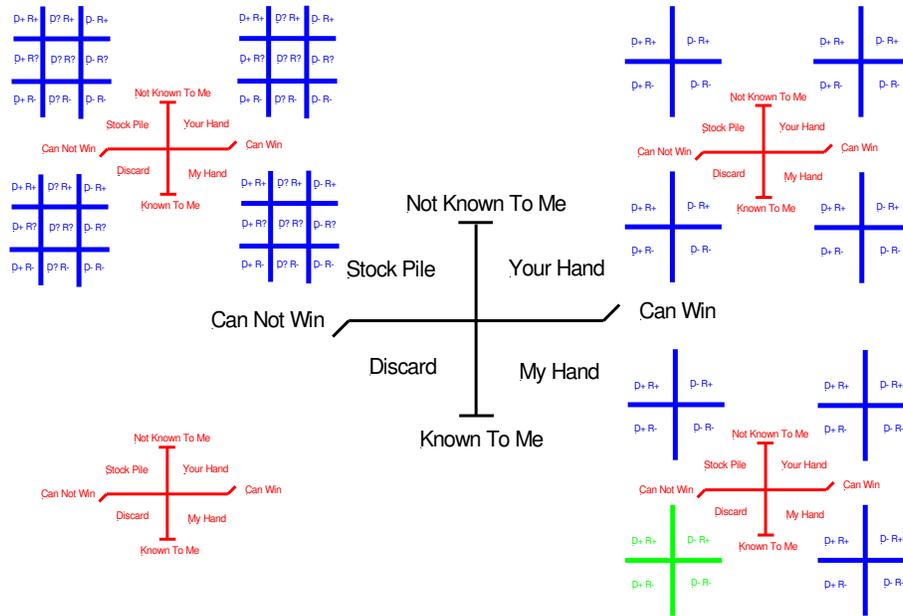
If we ask what Conclusions may be drawn between the cards in My Hand and the cards in Your Hand, we see that there is no *inherent* uncertainty. You can see each card in Your Hand and you could show them to me if you wish. Independently I know the cards in Your Hand which you have drawn from the Discard Pile. I may not be fully informed of the identity of *all* the cards in Your Hand, but Your Hand is known at least to you. Therefore it is not *inherently* uncertain.



If we ask what Conclusions may be drawn between the cards in My Hand and the cards in the Stock Pile, and in particular to the top card in the Stock Pile, there is no *inherent* uncertainty. I must develop my strategy using the knowledge I have of the cards in My Hand with the uncertainty of the top card in the Stock Pile born in mind.



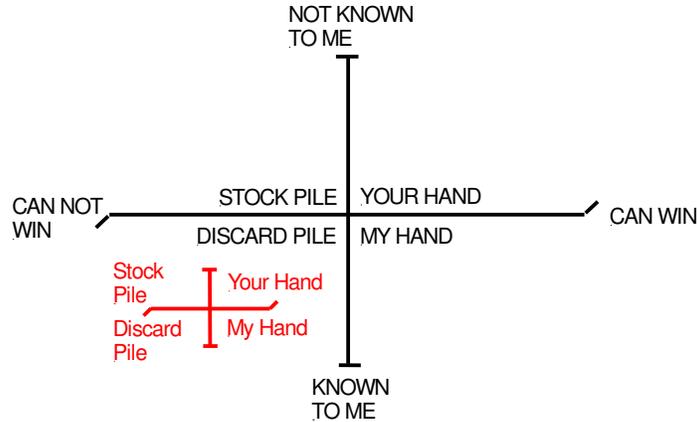
If we ask what Conclusions may be drawn between the cards in My Hand and the cards in the Discard Pile, there is no *inherent* uncertainty. I see all of these cards and develop my strategy accordingly.



The definitions and relationships specified for both quadrants of the right hand side - Your Hand, My Hand, categories of cards which “CAN win” - are clear. There is no *inherent* contradiction in dealing with these sets because each is a part of the game which CAN win. Both Your Hand and My Hand are the focus of a personal intellect which arranges the cards, oversees them, and controls them. There is no *inherent* uncertainty in their identity, although this identity may be withheld from the opposing player for the purposes of advancing the game.

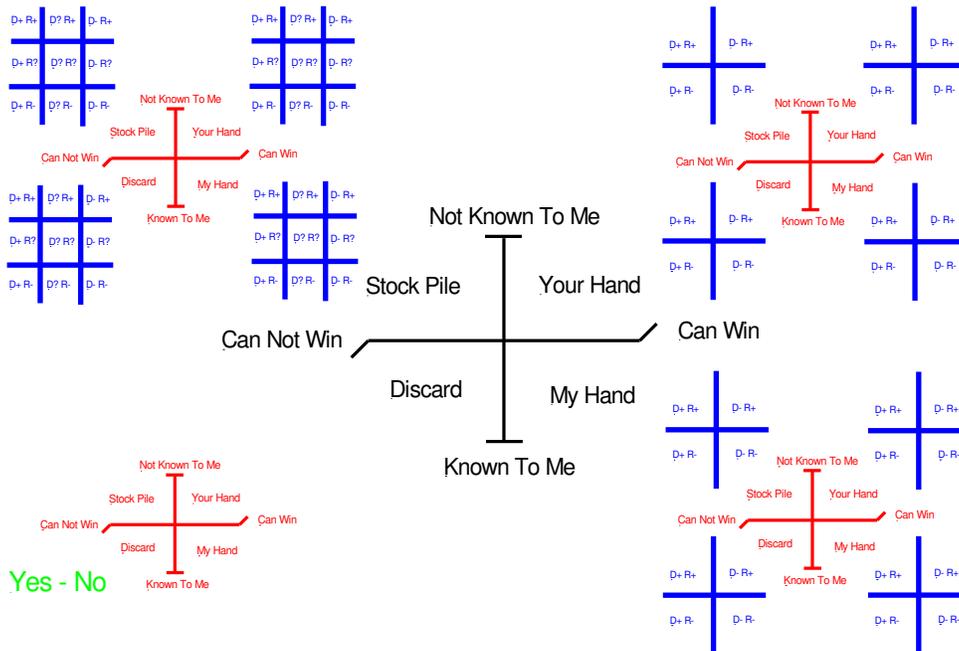
4.3.3 Conclusions regarding Discard Pile

We have already specified that there exist “relationships” between the cards in the Discard Pile.



When we move to the Plane of Conclusion however the issue is no longer what “relationship” exists between the cards of the Discard Pile. Rather the question becomes “Do I want the card?” The identity of the card is known, there is no uncertainty about the card itself nor in its relationship to the rest of the cards. We may answer this question simply, Yes or No.

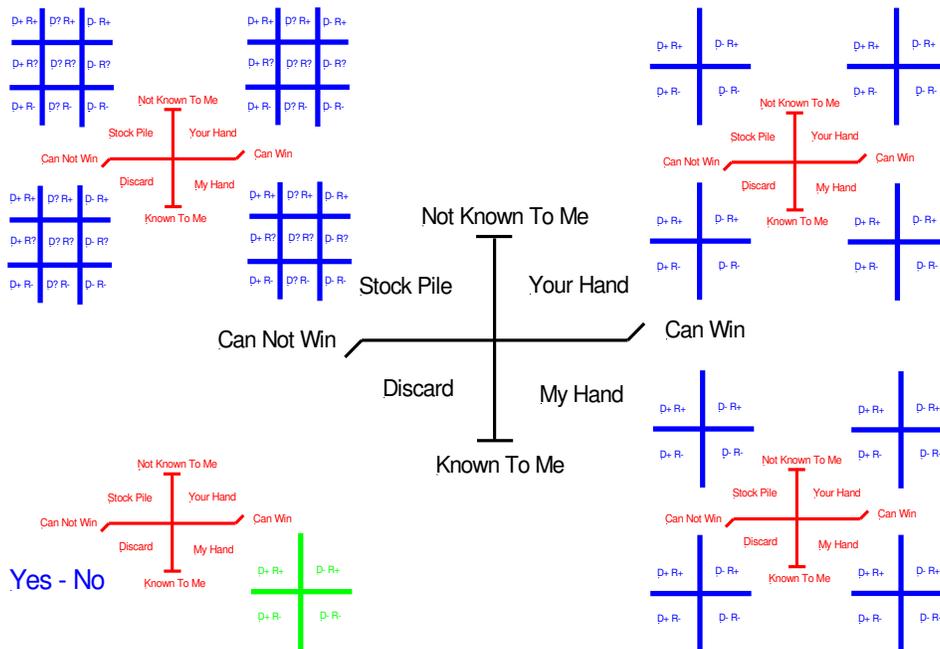
In this case, unlike the top card of the Stock Pile, the top card of the Discard Pile is not inherently uncertain. Here the answer must be “Yes-or-No.” Although there may be a strategic choice involved based upon the alignment of the cards in the rest of the game, there is no built-in preference either way. Let us simply mark this card as a Yes-No choice.



If we ask what Conclusions may be drawn between the top card in the Discard Pile and the cards in My Hand, there is no uncertainty in the identity of the top card of the Discard Pile nor in the relationship of this card to the cards in My Hand.

If we have given a "Yes" to the first question ("Yes, I want the card.") the top card of the Discard Pile is taken into my hand, and another card is discarded by me. On the other hand, if we have answered "No" ("No, I do not want the card.") the card remains in the Discard Pile, and I draw from the Stock Pile. I then discard a new card, and the top card of the Discard Pile possesses a new identity.

The "conclusion" reached in this quadrant is not subject to any *inherent* uncertainty or contradiction. The simple blue cross is in tact, although the specific answer given relies entirely on the issue presented in the previous "Yes or No" quadrant.

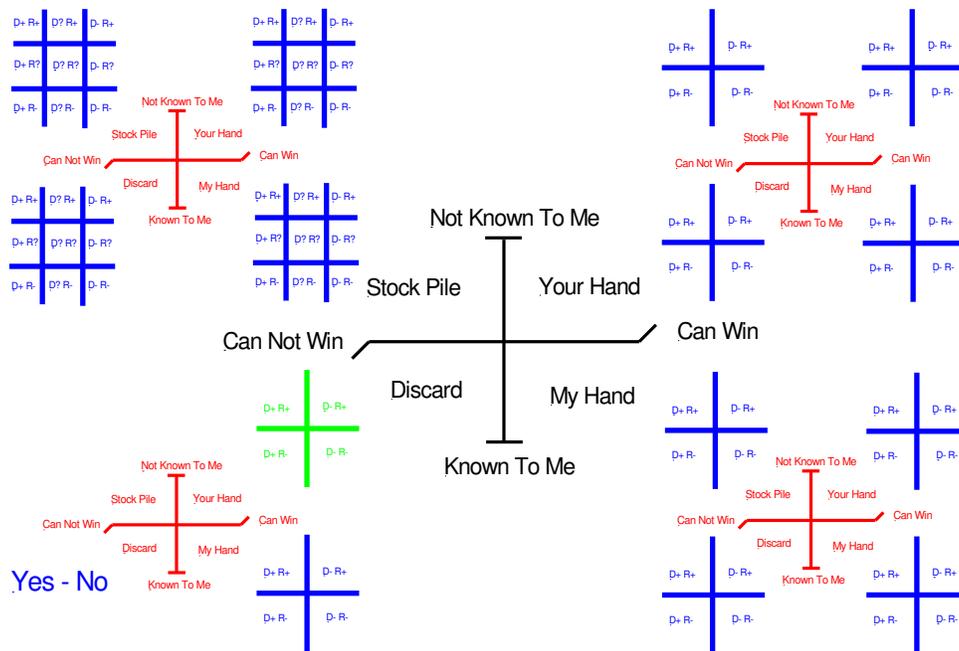


If we ask what Conclusions may be drawn between the top card in the Discard Pile and the cards in Your Hand, there is again no *inherent* uncertainty in the identity of the top card itself nor in its relationship to Your Hand.

If I have answered "Yes" ("Yes, I want the card.") the top card of the Discard Pile is taken into My Hand and you are not permitted to obtain it for yourself. I then discard another card which you may or may not want for your hand.

On the other hand if I have answered "No" to the first question ("No, I do not want the card.") the top card remains in the Discard Pile, I draw from the Stock Pile, I discard a new card, and the top card of the Discard Pile possesses a new identity. This new card is then subject to the same "Yes-No" choice which you put in place for me.

Once the answer is determined, the conclusion reached is not subject to any *inherent* uncertainty or contradiction. The simple blue cross remains in tact although the specific answer given relies entirely on the issue presented in the first "Yes – No" choice.

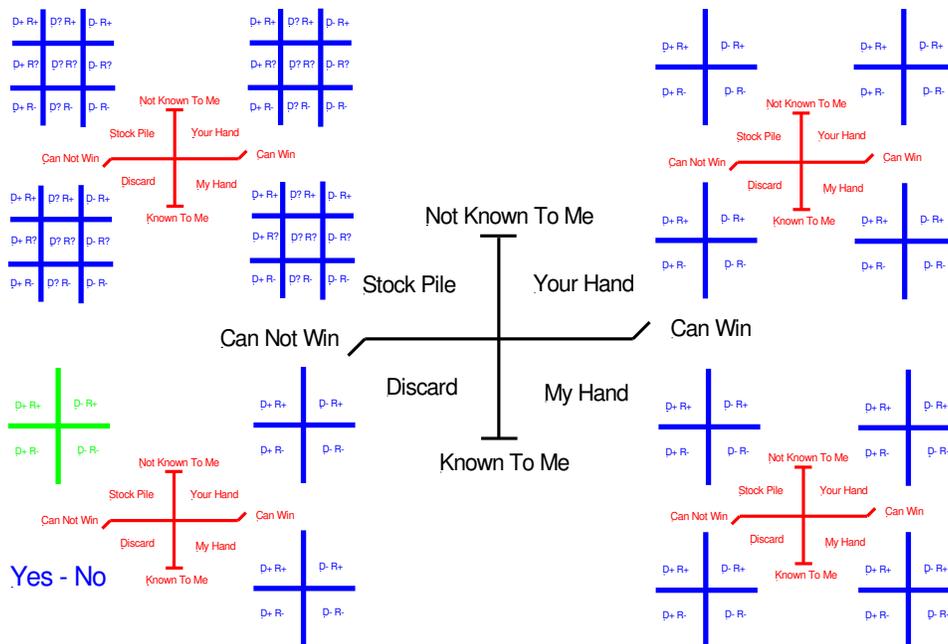


If we ask what Conclusions may be drawn between the top card in the Discard Pile and the cards in the Stock Pile, there is again no uncertainty in the identity of the top card in the Discard Pile itself.

If we have given a "Yes" to the first question ("Yes, I want the card.") the top discard is taken into My Hand and the top card in the Stock Pile is left for you to choose if you want it. I then discard another card which you may or may not want for your hand.

On the other hand, if I have answered "No" to the first question ("No, I do not want the top card of the Discard Pile.") the card remains in the discard pile, I draw from the Stock Pile, discard a new card and the Discard Pile possesses a new identity in its top card. This new card is then subject to the same "Yes-No" choice which you gave to me by your previous discard.

Once the answer is determined, the conclusion reached in this question is not subject to any *inherent* uncertainty or contradiction. The simple blue cross is in fact, although the specific answer given relies entirely on the issue presented in the first question.



CONCLUSION

This pattern – “A System of Movement” – will be used in the remaining essays to explore similarities between levels of reality. It is presented here as the first essay of this second set to serve as a brief reference for later ideas of far greater abstraction.

Theoretical Foundations of the Economic and Social History of the United States

Essay Two: The Prohibition Against Hearsay

A clear fire, a clean hearth, and the rigour of the game.

Inscription in the fireplace mantel of the
University of Missouri at Columbia School of Law

ABSTRACT

Aims: To use the pattern developed previously at the level of law.

Study design: Philosophic / Mathematic discussion of the Prohibition Against Hearsay.

Place and Duration of Study: Library research.

Methodology: In this essay we dissect one of the most complicated and abstract rules of law, the Prohibition Against Hearsay.

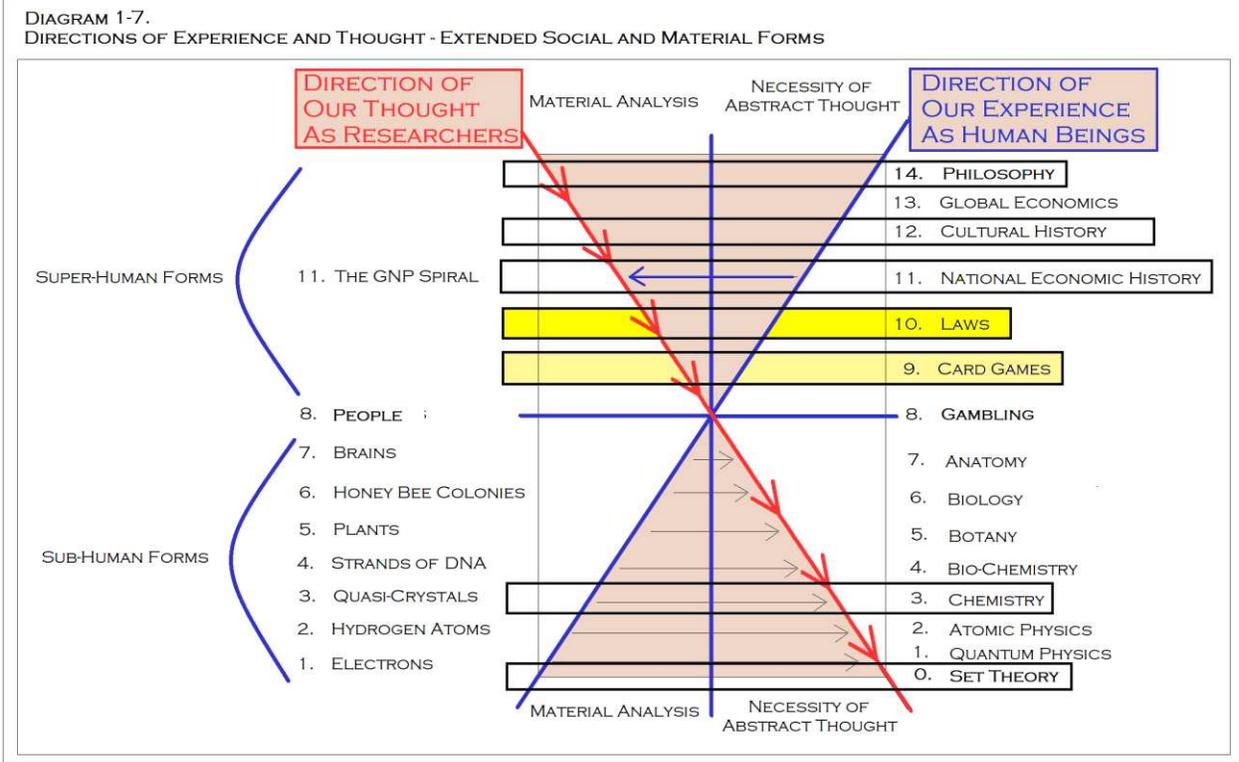
Conclusions: We suggest that just as the evidence comes into court proceedings according to the “map” we have devised of consciousness, so does society “think” through its problems.

JEL classification: B41, B5, C01, C02, C50, C63, E00, E01, E10, E19, E30, N00, N01, N11, Z10, Z13

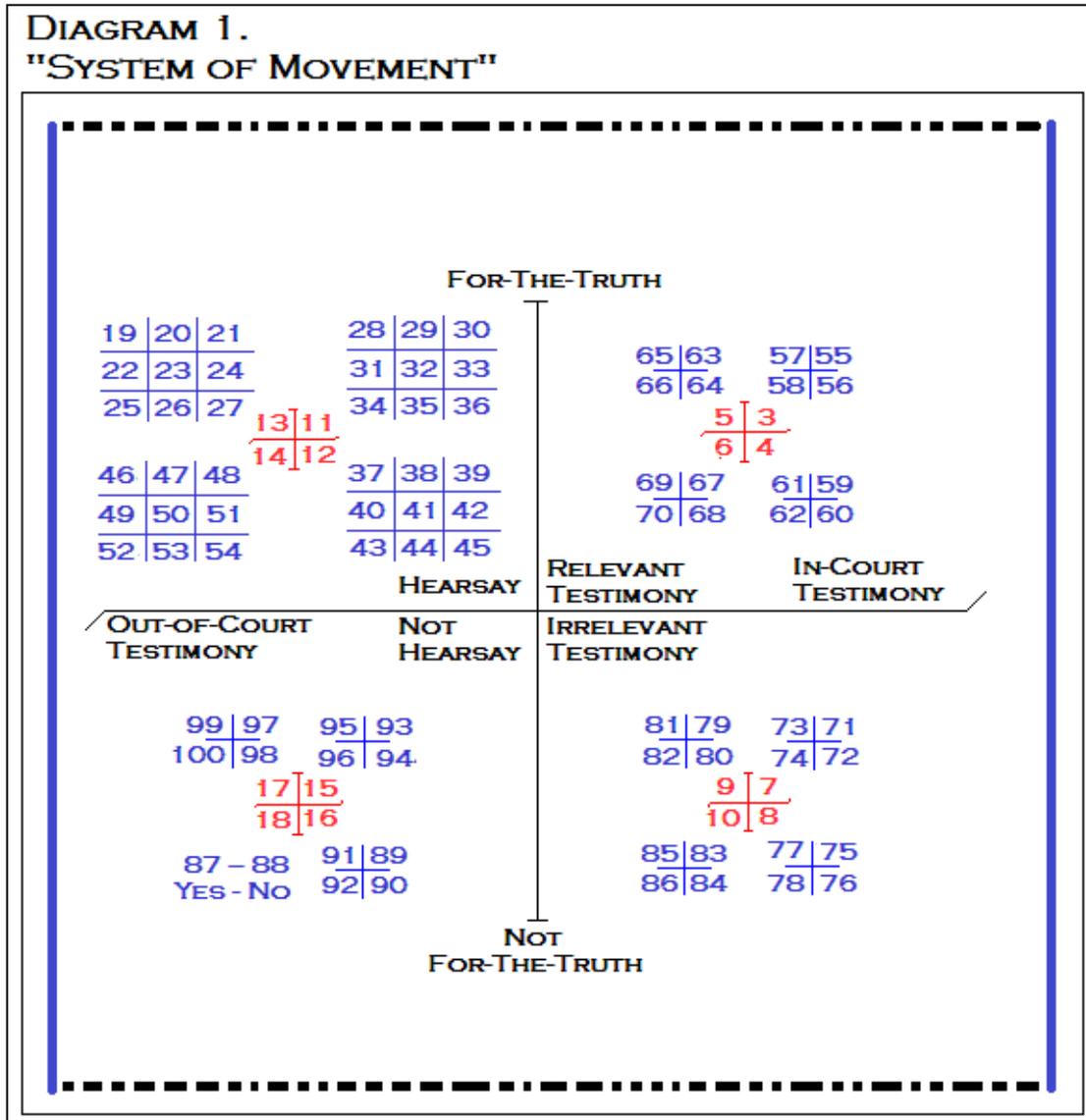
Keywords: Real GNP, Kondratiev Wave, Golden Mean, American Economic History, Steady-State Rate of Growth, Musical Octave

INTRODUCTION

We turn in this essay to the field of law, to investigate whether the System of Movement pattern may be found therein.



This essay proposes that the common law of England and of the United States, as it has evolved over the course of centuries, has created within the Law of Evidence a set of rules for understanding which, when applied to other levels of reality, resolve a number of problems and conflicts. The pattern has been explored in previous essays and is described herein as a “system of movement,” as follows:



I propose that the position of law as “superior” to the individual human mind is merely the subordinate human mind “writ large.” I suggest also that this same human mind is itself superior to a number of physical phenomena, including mathematic constructions which are, in turn, subordinate to the human mind.

If these propositions are true, then it is possible that these levels of intellectual endeavor are “fractals” of one another, i.e. geometric configurations which repeat themselves at different levels of our experience.

METHODOLOGY

1. Hypothesis

I propose that the “System of Movement” presented in the previous essay may be useful in understanding the law, specifically the “law of evidence” of the English common law and its Prohibition Against Hearsay. Understanding the significance of the law of evidence in relation to American social development provides an opportunity to understand this development as a “fractal” whereby the personal insights of jurors serve as the foundation for American legal development. I highlight in yellow the position of this current essay, and place in beige the position of the former essay.

2. Methods

The dichotomies introduced previously are used to explain the introduction of evidence in a jury trial.

3. Data

Review of the literature regarding the Prohibition Against Hearsay used routinely in the courts of the United States.

4. Procedure

4.0 What is Hearsay?

A poetic description of hearsay – synonyms for which are “gossip” and “rumor” – is found in Shakespeare’s *Henry IV Part Two* as prologue:

Enter RUMOUR painted full of tongues.

Open your ears; for which of you will stop
The vent of hearing when loud Rumour speaks?
I, from the orient to the drooping west,
Making the wind my post-horse, still unfold
The acts commenced on this ball of earth:
Upon my tongues continual slanders ride,
The which in every language I pronounce,
Stuffing the ears of men with false reports.
I speak of peace, while covert enmity
Under the smile of safety wounds the world:
And who but Rumour, who but only I,
Make fearful musters and prepared defence,
Whiles the big year, swoln with some other grief,
Is thought with child by the stern tyrant war,
And no such matter? Rumour is a pipe
Blown by surmises, jealousies, conjectures
And of so easy and so plain a stop
That the blunt monster with uncounted heads,
The still-discordant wavering multitude,
Can play upon it.

The Prohibition Against Hearsay is a rule of evidence which seeks to keep rumor, gossip – hearsay – from introduction into evidence at trial. Therefore our analysis begins with a description of “going to court.”

4.0.1 The Jury Trial in the American Experience

It is worth considering at the outset the almost unbelievable social power given to a jury in the United States. In an enormous circuit of social power, the same “common” people who voted for the legislative representatives to make the laws, voted for the executives to enforce the laws, and voted for the judges (directly or indirectly) to decide cases arising under the laws, retain for themselves ultimate power to decide - as jurors - the cases before the courts.

Although the democratic populace of the United States is not trained in law as such, the American court system operates to make these persons the ultimate and generally final arbiters of fact. “The People” thereby decide the verdicts in cases wherein life, lives, reputation, billions of dollars and thousands of jobs might be at stake. International corporations must fear the anger of juries, and persons of great social power can not be assured that a jury will act in their favor or against their opponents.

Jury service is one of the main socializing factors of the United States. For example, in *Thiel v. Southern Pacific Company*, 328 U.S. 217, 223-225 (1946), the clerk of court excluded daily wage earners from the panel of prospective jurors. The United States Supreme Court reversed the ultimate verdict, holding as follows:

... Jury service is a duty as well as a privilege of citizenship; it is a duty that cannot be shirked on a plea of inconvenience or decreased earning power. Only when the financial embarrassment is such as to impose a real burden and hardship does a valid excuse of this nature appear. Thus a blanket exclusion of all daily wage earners, however well-intentioned and however justified by prior actions of the trial judges, must be counted among those tendencies which undermine and weaken the institution of jury trial. ‘That the motives influencing such tendencies may be of the best must not blind us to the dangers of allowing any encroachment whatsoever on this essential right. Steps innocently taken may one by one lead to the irretrievable impairment of substantial liberties.’

This rule was expanded in *Batson v. Kentucky*, 476 U.S. 79, 86-88 (1986). In *Batson* the race-based exclusion of a potential juror through the use of a peremptory challenge - a challenge “by right” given to either side of a trial regardless of the juror’s qualifications - was found to violate the right to equal protection, not only of the defendant, but *of the potential juror*.

Racial discrimination in selection of jurors harms not only the accused whose life or liberty they are summoned to try. Competence to serve as a juror ultimately depends on an assessment of individual qualifications and ability impartially to consider evidence presented at a trial. ... A person’s race simply “is unrelated to his fitness as a juror.” ... As long ago as *Strauder (vs. West Virginia)*, 1880), ... the Court recognized that by denying a person participation in jury service on account of his race, the State unconstitutionally discriminated against the excluded juror.

The American jury plays an essential role in evaluating the claims and the rights of the parties which come before it. This fact has profound implications for American society.

4.0.2 The Prohibition Against Hearsay

If the jury is to be given such social authority, it must be protected from information which is not germane to its decision or which is unreliable. In particular, the ability of witnesses and parties to “create” testimony through malicious gossip and rumor, spoken in secret and then repeated to the jury, might well deprive the opposing party of the opportunity of a fair trial. The American jury is entitled to hear testimony first hand and the Prohibition Against Hearsay ensures this. But such a Prohibition must consider many things and many situations.

Approximately one-half of the typical law school course on evidence is dedicated to an understanding of the prohibition against “hearsay” entering into the trial; the remainder of the course covers everything else in the law of evidence. There are three definitions for the term “Hearsay” which cover the waterfront of a frequently confusing and abstract topic.

As prohibited throughout the trial, hearsay is:

- 1) An out-of-court statement offered for the truth of the matter asserted.
Federal Rules of Evidence, Rule 110
- 2) A statement unable to be cross-examined.
Wigmore
- 3) A statement in which the jury is forced to reason from the witness' belief of a statement or even to the truth of that event, via an understanding of the ambiguity, sincerity, perception or memory of the witness.
Morgan, Tribe, Hunvald, et al.

In effect, the Law of Evidence is the pattern or map of social “consciousness” for all trial attorneys in the United States. This branch of law will bring before us the three separate “planes” of judge (“Definition”), lawyer (“Relationship”) and jury (“Conclusion”).

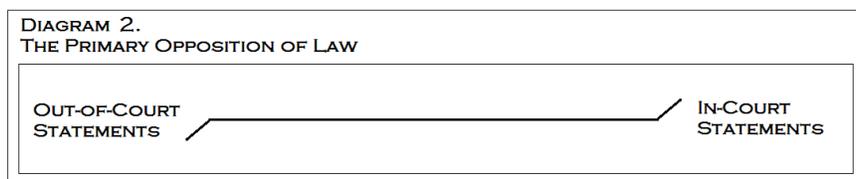
4.1.0 The Court's Point of View

The first and most oft-used definition of "Hearsay" is:

An out-of-court statement offered for the truth of the matter asserted.
Federal Rules of Evidence, Rule 110. (Judge's Point Of View)

The standard definition of hearsay stated above reveals two essential dichotomies inherent in the law of evidence. The first dichotomy is between the believability of statements which are made "*in court*" as opposed to statements made "*out of court*" and then repeated by a witness at the time of trial.

This dichotomy between statements which are made "in-court" and statements which are made "out-of-court" is the Primary Opposition of the Law of Evidence. The Primary Opposition represents a *difference in kind*, a difference in the basic nature of two things. By the term "Primary Opposition" we mean an absolute dichotomy, separation, gulf or chasm between two opposing things, akin to the philosophic principle of non-contradiction, the philosophic axiom that "a thing can not 'be' and 'not be' at the same time in the same way."



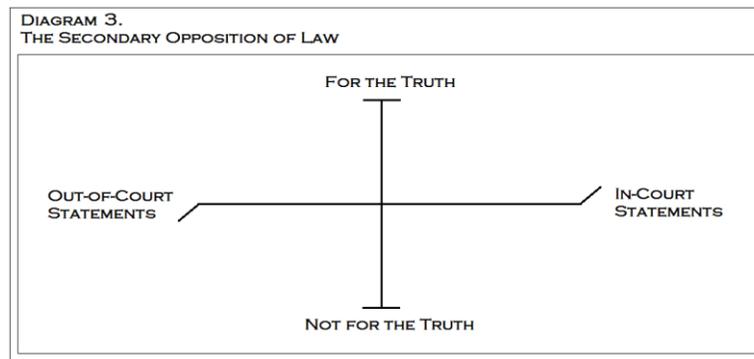
For example a witness' description of the weather *which she experienced* at a particular time, if told to the jury, is an "*in court* statement." The witness is available for cross-examination on any part of her experience. The jury may take none / part / all of her testimony to be true depending upon their view of the facts of the case.

On the other hand the witness' description of the weather report by a television weatherman does not present *her* observations of the weather. The weather report is an "*out-of-court* statement." In some cases the witness' description of the televised weather reporter may be subject to the prohibition against hearsay. In other cases circumstances may permit this testimony to come before the jury despite the fact that the statements were made "out-of-court."

The definition given for Hearsay presents a second dichotomy between statements which are presented to the court "*for the truth* of the matter asserted" and statements which are submitted to the court for some reason *other than the literal truth* of the statement itself.

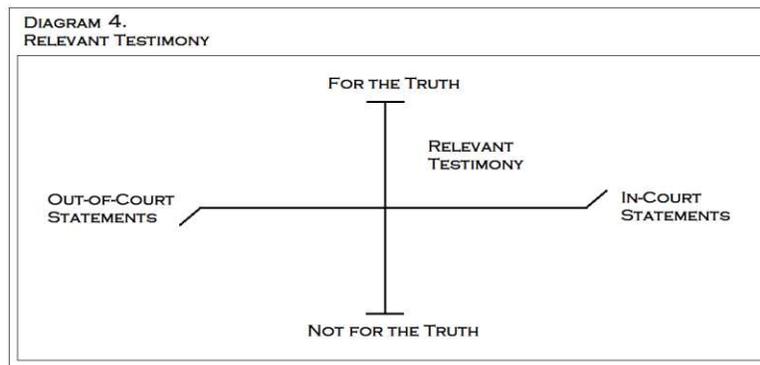
This dichotomy represents the Secondary Opposition of the Law of Evidence, an opposition which suggests degrees of separation or shades of gradation between two things which have something in common.

Judges are called upon frequently during the trial to limit the scope of an otherwise important inquiry. Judicial discretion is called upon to decide when "far enough" has "gone too far." The ability to distinguish when testimony is being offered "for the truth" as opposed to gratuitously and therefore "not for the truth" is a uniquely judicial role.



These two dichotomies create four quadrants of possibility. These are as follows.

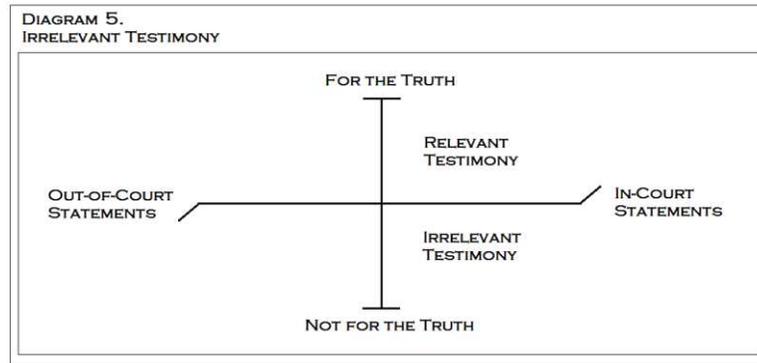
4.1.1 Relevant Testimony



As indicated above, the first quadrant "relevant testimony" is in-court testimony offered for the truth of the matter asserted. "Relevant evidence" means evidence having a tendency "*to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.*" Federal Rule of Evidence 401

When dealing with "Relevant Evidence," the advocate will be expected to show that the questions asked and the answer sought is relevant to the lawsuit, that the truth of the answer given in some fashion has a bearing on the ultimate determination of the suit.

4.1.2 Irrelevant Testimony



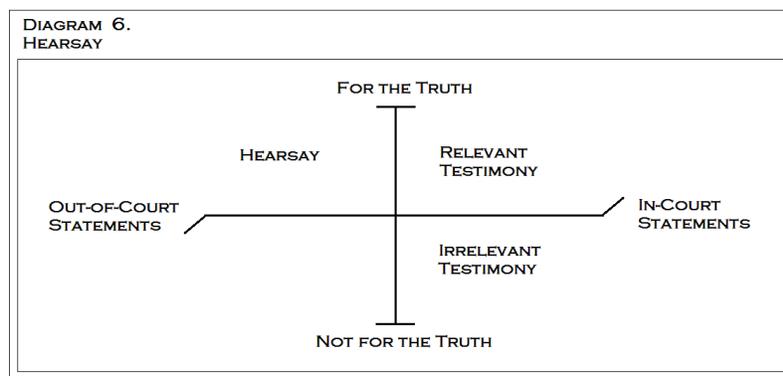
"Irrelevant testimony" is testimony which does *not* have a tendency "to make the existence of any fact that is of consequence to the determination of the law suit more or less probable than it would be without the evidence." The second quadrant "irrelevant testimony" is common in every trial.

For example, every advocate at some point asks a witness if he or she understands that these questions are not meant to embarrass or harass, and etc. These comments are not made because they are true or because they have a bearing on the case; they are simply pleasantries.

It might also be mentioned that advocates specialize in asserting as "irrelevant" that which is, indeed, extraordinarily relevant, however harmful to their cause it might be.

Nevertheless, much material entering a trial is, technically, irrelevant and when someone objects such statements or documents may be excluded from evidence. However irrelevant testimony is a normal part of every trial, excluded or not.

4.1.3 Hearsay



The third quadrant "hearsay" is "an out-of-court statement offered for the truth of the matter asserted." Federal Rule of Evidence 801. Hearsay is *prohibited* from introduction at trial. American law provides that only sworn testimony should be provided to the jury. The fundamental point is that no person should be permitted to swear as being true the observations or statements of someone else.

For example, in a case concerning an auto collision at a street corner, Paul's out-of-court comment to Mary that "the light was red" is inadmissible under the Rule Against Hearsay. Under the Rule Against Hearsay, neither Paul nor Mary would be allowed to discuss Paul's comment to Mary about the color of the light at any given time. Paul could tell the jury personally that *he saw* the light was red, and Mary could tell the jury personally that *she saw* the light was red. But Paul's out-of-court statement to Mary that the light was red is prohibited hearsay if offered to prove that the light was red.

Hearsay evidence is excluded because the safeguards which are present when a witness testifies in person and on the basis of his own knowledge are lacking. The absent person, whose statement is offered in court, may not have been under oath when he made the statement; there is no opportunity for the opposing party at the present trial to cross-examine the absent person as to the accuracy of the statement, his ability to know the facts to which the statement relates and the existence of bias, prejudice, error, misstatement, or any of the other factors that would impeach the statement if made in court; and the jury is unable to observe the appearance, demeanor, and conduct of the absent witness as he makes his statement. Moreover, there is danger that the present witness himself may falsely state what he was told by the third person. It is difficult to show that the present witness was not truthful where the claimed author of the statement is not available for examination or is not even identifiable, as in the case of the writer of business records. Even if the statement is alleged to have been made by the absent person is shown to be false, the perjuring witness may conveniently claim that all he knows is what the absent person told him, thereby shifting the blame for the falsity upon the absent person. Further, in the case of an oral statement, it is probable that the present witness is not restating it exactly as it was stated to him.

Because of a faulty memory or some other reason, a conscious or unconscious rearranging of the words of the absent person may give the repeated statement a significantly different meaning. It is because of these dangers of error, perjury and distortion that the law excludes hearsay evidence.⁷

It may seem odd that more than one definition would be necessary to define and exclude hearsay. However conduct can also be considered as a form of out-of-court statement.

For example, a witness' observation of someone waving their arms at a passing motorist may be offered in court as a sign of distress. But is this gesture really one indicating trouble or need for help? Was this gesture one of merely wishing a ride? Was this gesture aimed at a particular vehicle? Was it really a gesture at all? Another example might be that of a witness who views the defendant walking down the street whistling merrily. This testimony might be offered as evidence of a person's innocent frame of mind shortly after a tragic event. But does this whistling convey an innocent frame of mind or rather an intention to deceive? To what extent could the witness truly perceive the emotional outlook of the person walking down the street? Is the witness truly capable of explaining what they saw, or are they exaggerating?

⁷ *Wharton's Criminal Evidence*, 14th Edition, Volume 2, Clark, Boardman Callaghan, Deerfield, Il., cc. 1986 by Lawyers Cooperative Publishing Company, Section 257, pp 121-122.

Contrast these forms of conduct with the up-and-down nod of a person's head in response to a question, or the left-right shake a person's head in apparent response to the same question. These actions generally are taken to mean "yes" and "no" respectively. Should a contract dispute between two parties permit this evidence before the court even though technically no "statement" has been made? What about the smile and wink of one person and the immediate reaction of others at the time? In what way should the court understand the Rule Against Hearsay as applied to these and other unanticipated acts?

If testimony is offered about out-of-court conduct which is intended to convey some form of out-of-court and unsworn statement, additional definitions of hearsay help to clarify the legal situation and exclude "hearsay conduct." These additional definitions are framed around the point-of-view of (2) The Advocate (on either side of a given proposition), and (3) The Jury, the Trier of Fact.

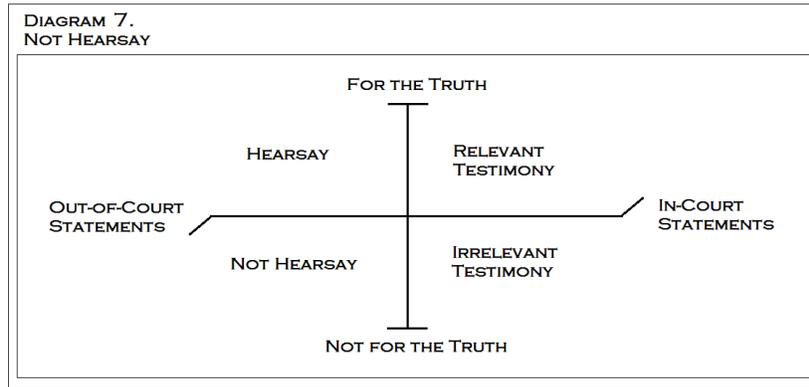
Advocate: Hearsay is a statement unable to be cross-examined.

Jury: Hearsay is a statement in which the jury is forced to reason from the witness' belief of a statement or even to the truth of that event, via an understanding of the ambiguity, sincerity, perception or memory of the witness.

Under each of these definitions the above examples of hearsay conduct may be excluded by the court as hearsay, even though technically no "statement" out-of-court has been offered. In this area courts look particularly at the evidence which might suggest that a statement was intended to be made through the gesture. Once such an intent is located, the conduct is treated as an out-of-court statement subject to the parameters and exceptions of the Rule Against Hearsay.

When courts do not find indications of an intent to make a statement through a particular act, the law is in conflict as to whether such acts should be excluded as hearsay. Simply put, some courts will exclude as hearsay evidence of such conduct because of the danger of allowing parties to fabricate "statements" from ambiguous evidence of conduct. Other courts will find that the lack of the intent to convey a statement makes the Rule Against Hearsay inapplicable and permit the evidence to come before the jury.

4.1.4 Not Hearsay



The fourth quadrant of "not hearsay" is a specific type of testimony and when relevant to the proceedings is admissible in evidence. These are out-of-court statements offered not for their truth, but for some other reason.

There are three common nonhearsay uses of evidence. First, the proponent may argue that the statement is circumstantial evidence of the declarant's state of mind. If the declarant's state of mind is logically relevant in the case, the proponent may use the declarant's statements as circumstantial proof of such states of mind as malice, hatred, premeditation, and love. Sometimes the mere fact that a person makes a certain statement gives us insight into that person's frame of mind.

Second, the statement may be an operative fact or verbal act in the case. In some situations, legal consequences flow directly from the use of certain words such as the offer in a contract suit or the slander in a tort action. Again the mere fact that the declarant uttered the words is logically relevant; the words themselves have legal consequences.

Finally, the proponent can prove the statement to show its effect on the state of mind of the hearer or reader. For example, if it is disputed whether the defendant knew of a certain dangerous condition, it is logically relevant to prove that someone told him of the condition. Quite apart from the truth of the third party's statement, the statement puts the defendant on notice.⁸

The above situations are examples of statements out-of-court which are admissible - not because they are true or even alleged to be true - but rather because they shed light on the circumstances of the case regardless of whether the statement in and of itself is true.

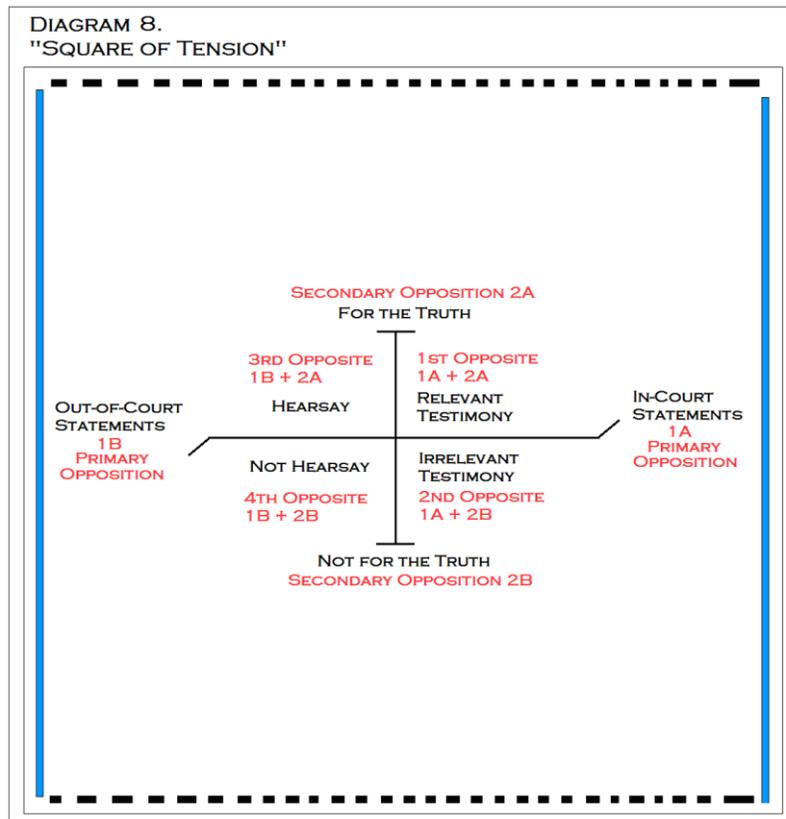
⁸ Edward J. Imwinkelried, *Evidentiary Foundations*, Michie Co., 1995, p. 266.

Let us imagine the opposition between *in court* and *out-of-court* testimony as a “force” or “wave” in the law, in the collective mind of society, separating in court testimony from out-of-court testimony by an enormous logical gulf or chasm. One might imagine a rod striking the water, sending up a series of waves moving in opposite directions from one another.

Second, the opposition between the purposes of the testimony itself can be pictured as a separate force, or a separate wave, in law. To offer testimony *for the truth* of the matter sworn to by the witness is often wholly different from offering testimony *for some purpose other than the literal truth* of the statement. Our first definition of hearsay makes this distinction clearly.

Third, we might imagine that the combination of these two different oppositions creates four “vectors,” four logical outcomes which must play out through the rest of the discussion.

These four vectors, or logical outcomes, are the four corners of this “map” of the law of evidence. These corners represent the four forms of evidence which the jury can hear, to wit: “Relevant Evidence,” “Irrelevant Evidence,” “Hearsay,” and “Not Hearsay.” The following square of tension can be understood to lie at the root of the law of evidence.



The dotted lines indicate the chasm between evidence which is received “in court” and the mass of potential evidence which lies outside the courtroom itself.

Statements made "In Court" are those made by witnesses taking the stand before a judge and jury after being sworn to tell the truth. Statements made "Out of Court" are statements made without the forgoing formalities and then repeated in court at a later time. A statement can not simultaneously be offered "in-court" for the truth of the matter asserted, and "out-of-court" for the truth of the matter asserted. Such an event simply is impossible to imagine.

Varying degrees of judicial discretion are noted by the vertical blue lines below in our model.

Note that the definitions of relevant and irrelevant testimony – “in court testimony” – allow for a great deal of latitude for the court to determine whether the proposed testimony is in fact relevant or irrelevant. The delineation of "relevant" and "irrelevant" frequently depends upon the interrelationship of facts brought before the jury and the claims to be decided by the court. Courts exercise a great deal of discretion in these matters, as they must.

Definitions of hearsay and not hearsay – “out-of-court testimony” – require a decision as to the nature of some out-of-court testimony. Should the matter come in as “Not Hearsay” or be excluded as “Hearsay”? This depends upon the Court’s evaluation of the arguments of the attorneys.

Is the evidence presented for some reason other than the truth of the matter asserted *really* (“Not Hearsay”), or is it *really* presented for the truth of the matter asserted (making it prohibited “Hearsay”)? The distinction calls frequently for the exercise of discretion by the judge, and often the answer is not entirely clear.

Finally, it is important to note that these four quadrants are points of tension within the trial itself. If a judge permits irrelevant material to enter the trial, the decision may be wholly impossible to correct short of ordering a new trial. Moreover these categories are ones over which attorneys sometimes fight vigorously, and with much at stake.

So begins the law of evidence as taken from the point of view of the Judge. As the definition of hearsay has been presented, the four quadrants are simply hollow categories; there is nothing within them to consider as specific facts in a case.

But this is not the only point of view impacting the law.

4.2.0 The Art of Advocacy

The importance placed upon juries and the “jury verdict” in the United States has led to the development of lawyers specialized in advocacy before such juries – trial attorneys. The comparison between the painter at work on a canvas and a trial lawyer before the jury is frequently used as a descriptive analogy. In this analogy:

The canvas of the trial lawyer is the *jury’s mental imagination*;

The colors of the canvas are *witness’ testimony* on various points, dabbed here and there throughout the trial for the purpose of “painting “ a mental picture in the jury’s imagination;

Particularly striking bits of color are provided by *physical exhibits*;

The paintbrush is the *subpoena power*, the power to compel testimony and evidence to be given in court;

The title of the piece is the lawyer’s *theme* at trial;

The physical frame stretching the canvas is the *judicial attitude* framing the trial itself, shaping the jury’s mental understanding;

The idiosyncrasies of canvas, paper, plaster, stucco, wood, etc. are the *jury’s prejudices and presumptions* peculiar to a particular locale or jury pool;

The ultimate success of the piece is representative of the lawyer’s *talent and style*; and

The effort to bring this together at a single time and place is the lawyer’s *work*.

Following upon this analogy, a criminal case begins when the State undertakes to paint its picture of the defendant's guilt in the jury's imagination with the evidence and testimony in its possession. The Defense counters on the same canvas with slightly different bits of shading, new or unexpected figures or objects here and there, a different theme and ultimately a different set of relationships between the main figures in the State's work.

Ultimately, the jury decides which of these images - State or Defense, Goya or Hogarth - is better grounded in the law and fact, the verdict is declared, and the trial is over.

4.2.1 The Lawyer's Point Of View

According to John Henry Wigmore, cross-examination - direct, face-to-face questioning of witnesses under oath by an advocate - "is beyond any doubt the greatest legal engine ever invented for the discovery of truth."⁹ This is a task peculiar to the advocate: the interrogation of witnesses. The full text of this famous quotation is worth considering thoroughly.

Sec. 1367. Cross-examination as a distinctive and vital feature of our law. For two centuries past, the policy of the Anglo-American system of evidence has been to regard the necessity of testing by cross-examination as a vital feature of the law. The belief that no safeguard for testing the value of human statements is comparable to that furnished by cross-examining, and the conviction that no statement (unless by special exception) should be used as testimony until it has been probed and sublimated by that test, has found increasing strength in lengthening experience.

Not even the abuses, the mishandlings, and the puerilities which are so often found associated with cross-examination have availed to nullify its value. It may be that in more than one sense it takes the place in our system which torture occupied in the mediaeval system of the civilians. *Nevertheless, it is beyond any doubt the greatest legal engine ever invented for the discovery of truth.* However difficult it may be for the layman, the scientist, or the foreign jurist to appreciate this its wonderful power, there has probably never been a moment's doubt upon this point in the mind of a lawyer of experience.

Following logically upon the central position which Wigmore gives to cross-examination, he provides his own definition of hearsay.

The theory of the hearsay rule is that the many possible deficiencies, suppressions, sources of error and untrustworthiness, which lie underneath the bare untested assertion of a witness, may be best brought to light and exposed by the test of cross-examination. Of its workings and its value, more is to be seen in detail (sections 1367-1394, *supra*.) It is sufficient here to note that the hearsay rule, as accepted in our law, signifies *a rule rejecting assertions, offered testimonially, which have not been in some way subjected to the test of cross-examination.*¹⁰ (emphasis in the original)

⁹ John Henry Wigmore, *Evidence in Trials at Common Law*, Vol. V, section 1367, revised by James H. Chadbourn, Little, Brown and Co., Boston, 1974.

¹⁰ *Id.*, section 1362.1.

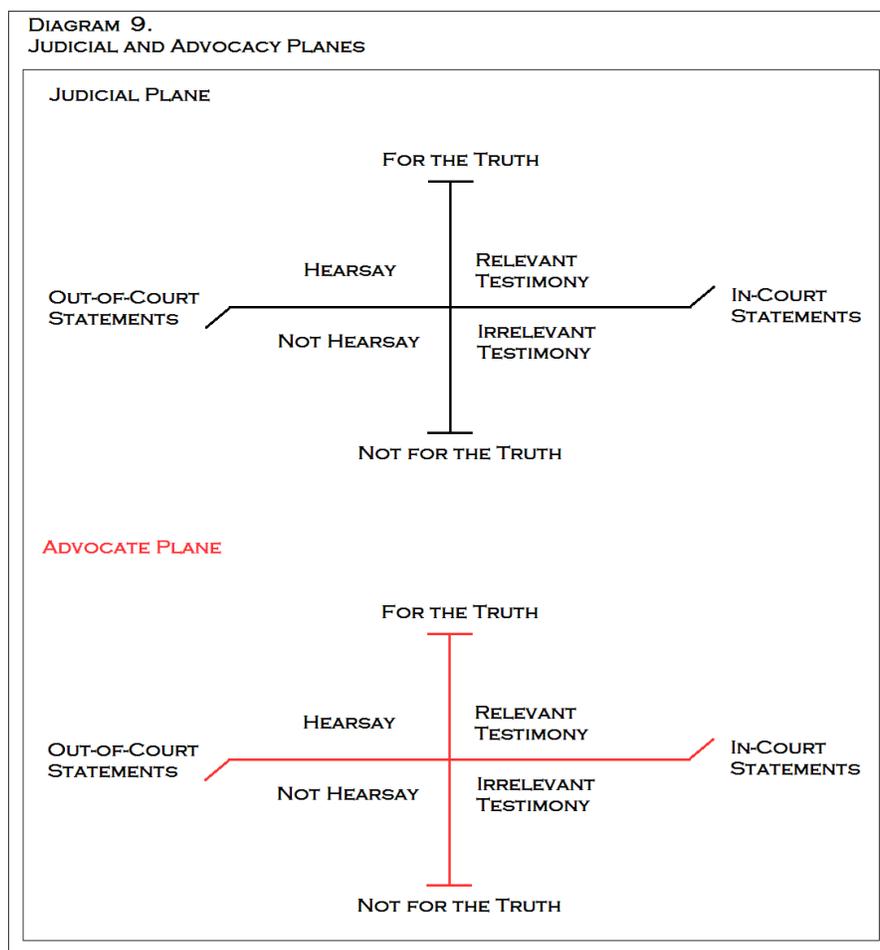
Wigmore’s definition of hearsay is also available to an advocate in case the first fails to cover the matter. According to Wigmore, hearsay is:

- 2) A statement unable to be cross-examined.
Wigmore (“Lawyer’s Point Of View”)

The importance of an adversarial system is brought forward by Wigmore’s definition of hearsay. Judges are not supposed to cross-examine witnesses; attorneys do that. Any implied condemnation or distrust suggested by a judge’s interrogation of a witness strikes at the heart of judicial impartiality. The official favoritism frequently demonstrated by judicial examination of witnesses simply has no place in American law.

The admission of evidence unable to be cross-examined challenges the right to be represented in court by an advocate, to be heard in court and to challenge his or her opponent’s evidence in court. In effect statements which are unable to be cross-examined deprive the party of the right to counsel and to a fair trial.

One might consider these points by noting that just as the court has a point of view of the evidence, so does the advocate have a point of view different from the court but based upon the same principles as the court. The manner in which these objections arise is one which assumes the reflective nature of each of these points of view on the evidence being presented.



It is important to keep in mind that the Rule Against Hearsay is an *objection* to testimony or evidence. It is a way of keeping evidence *away* from the jury's hearing that might hurt the attorney's case.

Consequently the Rule Against Hearsay comes into play only upon the *objection* of one side which seeks to exclude the evidence in question from consideration of the jury. Much of the trial preparation for both sides of any question is directed toward the discovery of the facts favorable for the other side and researching methods to exclude these facts from evidence. The arguments seeking to exclude this evidence are phrased in the following manner:

"Your honor, I object. This question calls for ..."

Here the advocate presents the arguments of hearsay, irrelevance, etc. If the court sustains the objection, the evidence is excluded. If the court overrules the objection, the evidence is presented for the jury's consideration of their verdict. The transcript dutifully records these objections and arguments, thus "preserving" them for later review by an appellate court. Failure to raise objections at trial waives any right to complain of judicial error on the matter on appeal.

Not every issue regarding evidence is preserved for appeal, sometimes for very important reasons. For example advocates frequently waive or give up objections to irrelevant evidence which is otherwise favorable to an advocate's position.

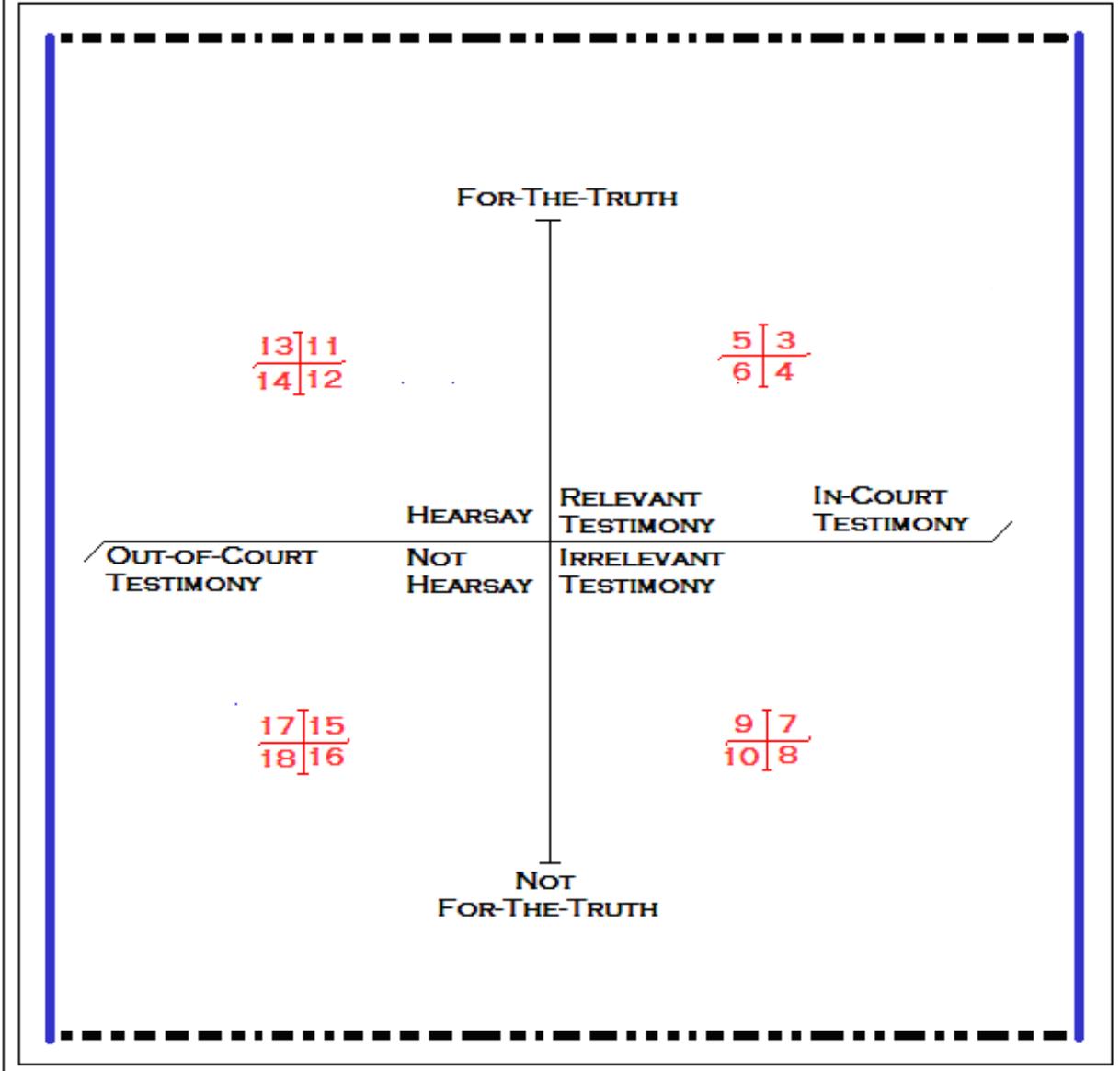
That is, as the advocate decides *whether or not* to offer an objection to evidence proposed as *relevant*, he or she must decide whether the fact truly is (3) relevant (4) or is rather irrelevant (5) is hearsay (6) or is not hearsay.

Similarly when *irrelevant* evidence is being introduced, each advocate must determine *whether or not* to offer an objection base upon whether such evidence is helpful and (7) relevant to the progress of his or her suit (8) or whether an objection should be made on grounds of relevance (9) might be subject to hearsay objections (10) or may qualify as not hearsay.

When considering information which is *hearsay*, the advocate must decide again *whether or not* to offer a hearsay objection based upon the consideration of whether such evidence is (11) relevant or helpful to his or her side, (12) or to raise an objection that the information is irrelevant, (13) to raise a hearsay objection, and (14) or to waive an objection as the information is not truly hearsay.

Finally, when information is brought forward as "*not hearsay*" the advocate must still consider *whether or not* to raise an objection based upon the perception of the (15) relevance of the testimony to the case, (16) or whether an objection as to "irrelevant" is proper. Moreover the information which is brought forward as (17) "not hearsay" may still be subject in part to hearsay objections if damaging, or (18) if not damaging may be allowed in without objection.

DIAGRAM 10.
JUDICIAL AND ADVOCACY PLANES MERGED



The superimposition of red quadrants upon the original standard cross in black is to demonstrate the role of advocacy in shaping the trial. Advocates frequently find themselves waiving good objections in hopes of obtaining stronger strategic advantages by allowing the evidence to come in. Conversely advocates frequently make numerous and highly technical objections to damaging evidence to preserve unfavorable rulings for appellate review.

As a result of the relationships which form between the various categories of testimony, advocates frequently stand at odds to one another, each attorney vying for opposing views which may be taken from the same testimony, or seeking to alter the jury's opinion by the introduction of material opposed by the other side of the law suit.

The prohibition against hearsay has been discussed from two points of view, these being:

The Court:

- 1) An out-of-court statement offered for the truth of the matter asserted.
Federal Rules of Evidence, Rule 110

The Advocate:

- 2) A statement unable to be cross-examined.
Wigmore

We have a third definition of the prohibition against hearsay yet to consider, this being taken from the point of view of the jury.

The Jury:

- 3) A statement in which the jury is forced to reason from the witness' belief of a statement or even to the truth of that event, via an understanding of the ambiguity, sincerity, perception or memory of the witness.
Morgan, Tribe, Hunvald, et al.

Before attempting to derive this definition from the analysis presented previously, it will be important to provide a model indicating the position and the importance of the jury itself.

4.3.0 The Importance of the Jury

The fascinating thing about trial work is that human beings are required to take on the essential aspects of social thought as the central purpose of their own professional standing. The Judge acts in the courtroom to ensure the proper and orderly pursuit of truth according to the basic rules of evidence. The Lawyer acts in the courtroom to present evidence, make objections, and aid the jury in seeing his or her client's point of view.

Quite distinct from the Judge and the Advocate, however, the American Jury acts in the courtroom to receive the impressions generated by the Lawyers and the Judge and to render some final judgment as to the facts of the case. The "defining" of the trial is a judicial role, the creation of "relationships" between the issues of the case is the role of an advocate, and both of these influence - but do not dictate - the jury's "conclusion" in the case, the verdict.

We have previously considered the Prohibition Against Hearsay from both a judicial point of view (hearsay is "an out-of-court statement offered for the truth of the matter asserted") and an advocate's point of view (hearsay is a "statement unable to be cross-examined").

The Jury in the American legal system, has its own, unique interest. While Wigmore has emphasized the role played by cross-examination and advocacy in shaping the American Law of Evidence, James Bradley Thayer emphasizes the role of the jury. According to Thayer, “One who would state the law of evidence truly must allow himself to grow intimately acquainted with the working of the jury system and its long history.”¹¹

At once, when a man raises his eyes from the common-law system of evidence, and looks at foreign methods, he is struck with the fact that our system is radically peculiar. Here, a great mass of evidential matter, logically important and probative, is shut out from the view of the judicial tribunals by an imperative rule, while the same matter is not thus excluded anywhere else. English-speaking countries have what we call a “Law of Evidence;” but no other country has it; we alone have generated and evolved this large, elaborate, and difficult doctrine. We have done it, not by direct legislation, but, almost wholly, by the slowly accumulated rulings of judges, made in the trying of causes during the last two or three centuries, - rulings which at first were not preserved in print but in the practice and tradition of the trial courts; and only during the last half or two-thirds of this period have they been revised, reasoned upon, and generalized by the courts in banc.

When one has come to perceive these striking facts, he is not long in finding the reason for them. ... *It is this institution of the jury which accounts for the common-law system of evidence, - an institution which English-speaking people have had and used, in one or another department of their public affairs, ever since the Conquest. Other peoples have had it only in quite recent times, unless, indeed they may belong to those who began with it centuries ago, and then allowed it to become obsolete and forgotten. England alone kept it, and, in a strange fashion, has developed it.*

Thayer points out that the purpose of the Prohibition Against Hearsay is long-standing and recurring, as it stands in opposition to the willingness of individuals to fabricate and deceive.

The true historical nature of (the Prohibition Against Hearsay) is hinted by the remark of an English court, two centuries ago and over, when they checked the attempt of a woman to testify what another woman had told her. “The court,” it was quietly remarked, “are of opinion that it will be proper for Wells to give her own evidence.”

¹¹ James Bradley Thayer, LL.D., *A Preliminary Treatise on Evidence at the Common Law*, Little, Brown and Company, Boston, 1898, p. 267, Footnote 1.

Other authors have emphasized the role of the jury in the development of the Prohibition Against Hearsay. McCormick provides the following summary.

In an oft-quoted passage, Wigmore calls the rule against hearsay “that most characteristic rule of the Anglo-American Law of Evidence – a rule which may be esteemed, next to jury trial, the greatest contribution of that eminently practical legal system to the world’s methods of procedure.” How did this rule come about?

The development of the jury was, no doubt, an important factor. In its earlier forms, the jury was in the nature of a committee or special commission of qualified persons in the neighborhood to report on facts or issues in dispute. So far as necessary, its members conducted its investigation informally among those who had special knowledge of the facts. Attesting witnesses to writings were summoned with the jurors and apparently participated in their deliberations, but the practice of calling witnesses to appear in court and testify publicly about the facts to the jury is a late development in jury trial. ... A consciousness of need for exclusionary rules of evidence did not begin to appear until this period of the emergence of witnesses testifying publicly in court. Admittedly, even early witnesses to writings were required to speak only of “what they say and heard,” and this requirement would naturally be applied to the new class of testifying witnesses.¹²

4.3.0.0 The Plane of the Jury’s Conclusion

Two definitions of the prohibition against hearsay have been considered:

The Court:

- 1) An out-of-court statement offered for the truth of the matter asserted.
Federal Rules of Evidence, Rule 110

The Advocate:

- 2) A statement unable to be cross-examined.
Wigmore

We come now to the final definition of hearsay, one which relates specifically to the jury and its role in the trial.

The Jury:

- 3) A statement in which the jury is forced to reason from the witness' belief of a statement or even to the truth of that event, via an understanding of the ambiguity, sincerity, perception or memory of the witness.
Morgan, Tribe, Hunvald, et al.

¹² John W. Strong, *McCormick on Evidence*, Volume 2, Chapter 24, section 244, West Group Publishing, 1999.

As mentioned previously, trial work compels human beings to take on the essential aspects of social thought as an object of their own professional standing. The Judge exists in the courtroom to ensure the proper and orderly pursuit of truth according to the basic rules of evidence. The Lawyer exists in the courtroom to present evidence, make objections, and aid the jury in seeing his client's point of view. The Jury exists in order to receive the impressions thereby generated and to render some final judgment as to the facts of the case. Edmund Morgan has commented extensively on the Prohibition Against Hearsay. He writes:

The exclusion of hearsay evidence is not grounded upon its lack of probative value, for if inadmissible hearsay is received without objection, it is to be weighed by the trier of fact, and may be of sufficient value to support a finding or verdict. Hearsay is excluded because of potential infirmities with respect to the *observation, memory, narration* and *veracity* of him who utters the offered words when not under oath and subject to cross-examination.¹³ (emphasis supplied)

As the embodiment of epistemologic understanding, juries do more than simply look at evidence and come to abstract conclusions. Juries evaluate and understand the evidence before them in a way which is both collective and personal. The four characteristics which every jury considers as to the witnesses before them are:

- 1) the witness' observation (sometimes referred to as "perception"),
- 2) the witness' memory,
- 3) the witness' narration and its possible meaning (sometimes referred to as "ambiguity"), and
- 4) the witness' veracity (sometimes referred to as "sincerity" or "truthfulness").

Trial lawyers understand that these evaluations are made by the jurors not only as to the witnesses who seek to relate evidence which might be hearsay. Jurors evaluate the entire proceeding in the light of their expectations and experience. The behavior of the lawyers, the parties, the judge, and the witnesses coming before the jury are not immune from the jury's wrath and censure if the occasion justifies it. The jury's evaluation of the fairness of the proceedings, the correctness or fairness of the rulings of the judge, the candor or lack thereof by the parties or their attorneys – all these actors and events move before the jury and are prone to influence the opinions of the jury as to the rights of the parties on every score.

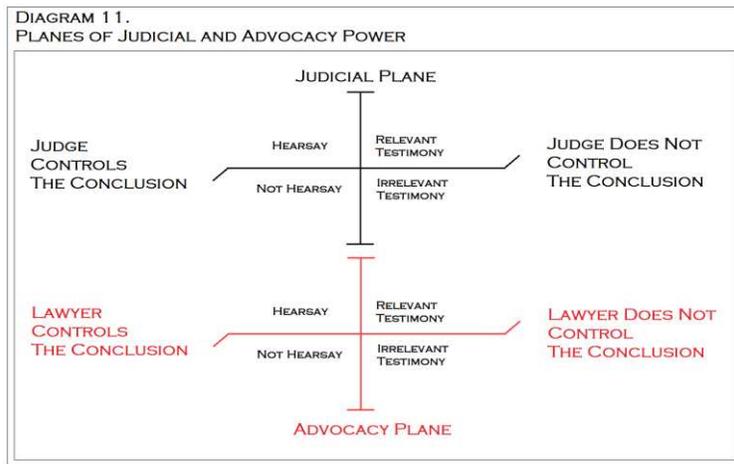
The above comments have been distilled by Professor Edward Hunvald, professor of evidence at the University of Missouri at Columbia School of Law, into a third definition of Hearsay, one which emphasizes the role of the jury. According to the above, hearsay is:

- 3) Hearsay is a statement in which the jury is forced to reason from the witness' belief of a statement or even to the truth of that event, via an understanding of the *ambiguity, sincerity, perception or memory* of the witness. Hunvald, Morgan, Tribe, et al. (Jury's Point Of View)

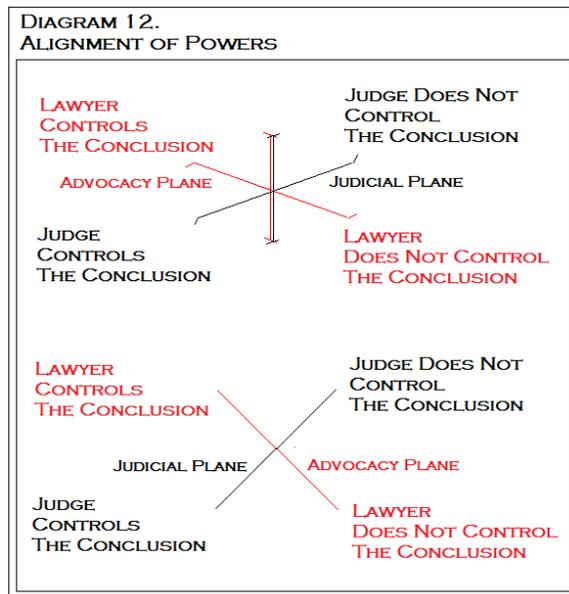
¹³ Edmund M. Morgan, "The Law of Evidence, 1941-1945" *Harvard Law Review*, April, 1946, Vol. LIX, No. 4, p. 541.

The importance of the common judgment of the people, their understanding of the witnesses which come before them, is tightly controlled by the judicial system. However when dealing with hearsay and particularly with the realm of hearsay conduct, we deal with out-of-court statements which are offered for the truth of the matter asserted. This injects an inherent uncertainty into the picture. This uncertainty simply can not be eliminated from the trial, and it is one of the key elements of any trial.

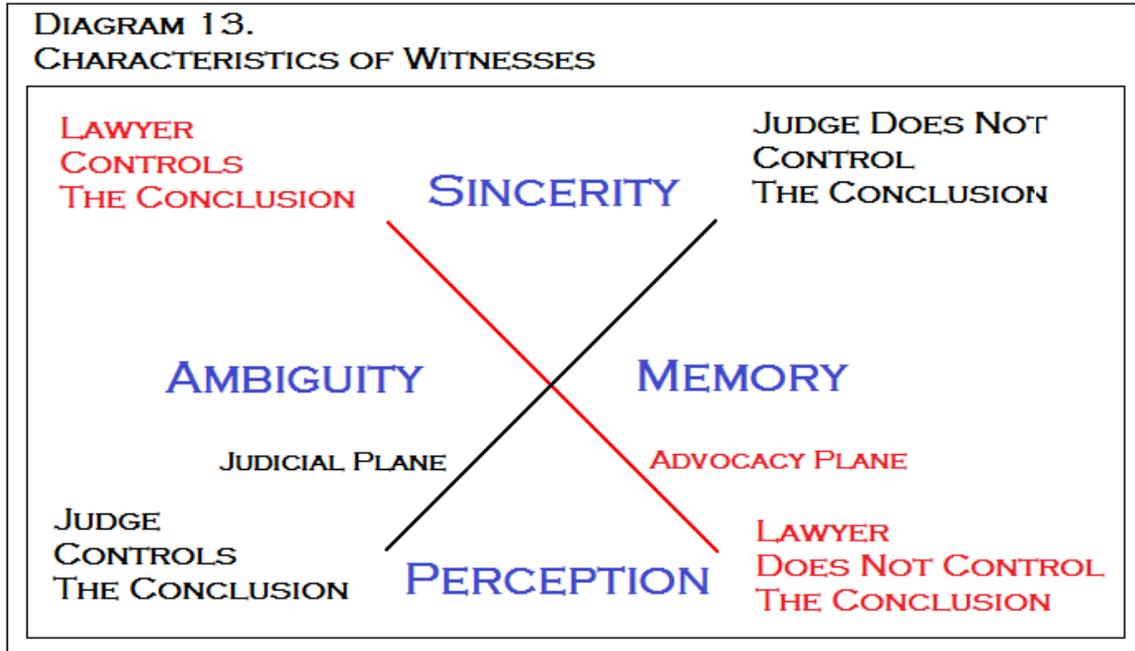
This uncertainty has profound effects on the Law of Evidence. To demonstrate this, we might treat the concept of "defining" the issues in law as a judicial role, that of establishing "relationships" between these issues as a uniquely "lawyer" role, both of these controlling - but not dictating - the jury's "conclusion" of the facts of the case and the verdict rendered.



The following pattern develops if we align the planes of judge and advocate. If we join these two viewpoints of the hearsay rule along a common axis - offered for the truth, not offered for the truth - we create a third plane, a plane of the jury's conclusion.



The process of a trial is designed to permit a tight control over the jury's consideration of any document or testimony, specifically as to (1) the perception of the witness as obtained through personal observation and experience, (2) the clarity of the witness' testimony, or its ambiguity, (3) the truthfulness of the witness, and (4) the witness' ability to remember the events in question.



This arrangement places within the court's power two essential questions: "Is the witness capable of giving testimony in court?" (perception) and "Is the witness clearly stating the facts known to them?" (ambiguity)

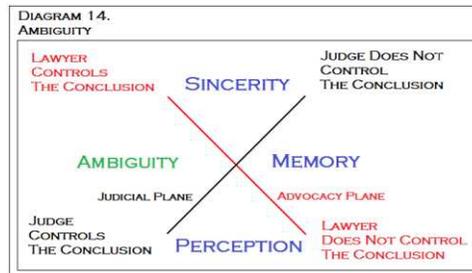
The advocate is also presented with two essential questions: "Is the witness clearly stating the information?" (ambiguity) and "Is the witness lying?" (sincerity)

Neither the court nor the advocate are capable of challenging the witness' statement "I can't remember."

A fundamental expectation of the law of evidence is that the judge and lawyers, working in conjunction, are sufficient to render to the jury a fair view of the evidence.

4.3.0.1 Narrative Ambiguity

It is important to keep in mind that the Judge and the Lawyers have different powers and roles in the trial of any case. The first, and most basic power that each possesses is a shared and common power: the right (and in the case of the Judge, the sometime obligation) to ask clarifying questions. These questions seek to eliminate the ambiguity of a witness' testimony on the stand. This narrative ambiguity of a witness sometimes confuses the jury with multiple meanings, unclear relationships, and strained interpretations and guesses. Since the jury is not permitted to ask questions of the witnesses, they must rely on others to do it for them.



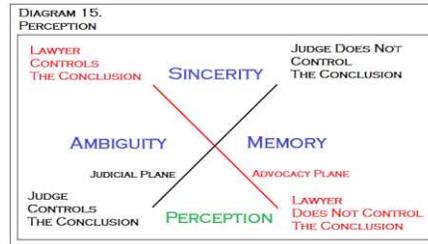
Mueller and Kirkpatrick describe the problems of Ambiguous Narrative as follows, in relation to the Prohibition Against Hearsay.

(Narrative ambiguity refers to) the risk that the declarant might misspeak or be misunderstood. There are three concerns: One is that he might say one thing but mean another (a slip of the tongue). The second is that even if he uses words well and chooses the best possible ones to convey his intended meaning, he might still be misinterpreted. Experience differs among people, so the images and meanings that words convey to most people might not be the ones that others take from them. The third is that the language, while rich in nuance and variety, may not capture the point in detail, or the qualification or limit, that lies at the heart of a litigated dispute. So even if the speaker chooses the best words and the trier understands them in the same way, the message may be misleading or incomplete.¹⁴

¹⁴ Christopher B. Mueller, Laird C. Kirkpatrick, *Modern Evidence: Doctrine and Practice*, Little, Brown and Company, Boston, pp. 1047-1051.

4.3.0.2 Perception

Perception here refers, not to an intellectual or moral point of view, but rather the physical fact of participating in - seeing, hearing, tasting, touching or smelling - the event in question. Although Attorneys in the United States are free to challenge the witness' perception of an event, the Court possesses the additional power of removing the witness from the stand when the Perception of the Witness of the events under discussion is so questionable as to be beneath the standard of credible evidence to be submitted to the jury.



The Judge's power to remove witnesses from the stand who do not contribute to the trial of the case through their personal perception of the events to be considered by the jury is absolute. An Attorney may ask for the power to be used at any time. But the Attorney must wait upon the Court's judgment on these matters. No witness may be removed from the stand without the Judge's command. Mueller and Kirkpatrick describe problems of Perception and Misperception as follows, in relation to the Prohibition Against Hearsay.

One risk is that the speaker may misperceive the condition or event in question. If Observer tells Listener that "nurse N was in the operating room during the surgery," it is possible that he mistook someone else for Nurse N. He might be nearsighted, or may only have caught fleeting or partial glimpse of the person he later described; he might not hear well or might have heard the voice of the person he identified as nurse N against a confusing jumble of background voices; he might be only slightly acquainted with nurse N, and her voice and appearance might not yet really have sunk in; he might have been distracted, paying little attention to what he saw or heard or might have erred because another nurse closely resembles N in voice or general appearance.

The focal point is the moment of observation, and there are really three concerns. One centers on the sensor capacities of the speaker, meaning mainly what we would call his physical abilities to see and hear (sometimes the other senses of touch, smell, and taste are involved in reported observations, but less often). Another centers on his mental capacity, which means mostly his judgment and ability to process and make sense of whatever he sees and hears. Both these concerns are affected by the attitudes, expectations and general psychological condition, and by the distractions and preoccupations that are part of his life at the moment. The third concern is the relevant physical circumstances, including lighting conditions, visual obstructions, noises, even weather conditions, that might bear on the opportunity to observe.¹⁵

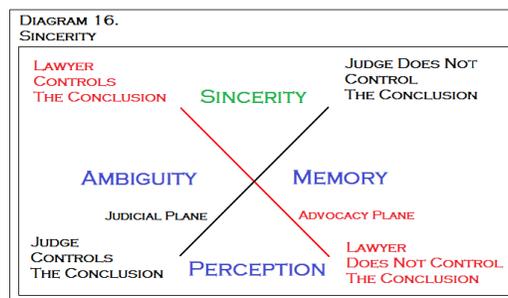
¹⁵ Id., p. 1048.

4.3.0.3 Veracity, Truthfulness, Sincerity

Attorneys, like judges, have their own unique role in the trial. Most frequently these are associated with direct and indirect challenges to the veracity - that is, the honesty and truthfulness - of the witness.

No judge should feel comfortable, or encouraged, to disparage the honesty of witnesses coming before the jury in an off-handed or disrespectful fashion. Jurors are prone to view the fairness of the proceedings in direct relationship to the their perception of the integrity and impartiality of the judge. Judges undermine this appearance when their demeanor and questioning of witnesses is designed to uncover the dishonesty of a witness.

Attorneys, on the other hand, are well suited to challenge the veracity of witnesses in court. The jurors know that the attorney has a stake in the outcome and therefore are more likely to ignore the over-zealousness of Attorneys than that of Judges. The successful questioning of a witness by an Attorney does not undermine the juror's sense of justice: often it confirms it.



Mueller and Kirkpatrick discuss problems of witness sincerity in the following excerpt, detailing the special problems of disclosing dishonesty as cloaked by hearsay.

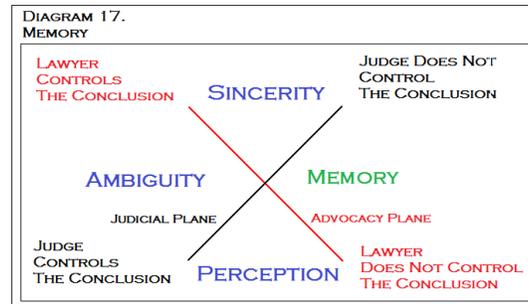
Another risk is that the speaker might shade the truth or blatantly falsify. In everyday experience, the former is more common than the latter, but both happen. And the gathering winds of litigation encourage observers to take sides, sensing the coming dispute and preferring one outcome or one side to the other, thus encouraging conscious, subconscious, or unconscious shadings of the truth.

In the example, Observer might think Nurse N was probably in surgery. Knowing he was less than certain, he might make a positive and unqualified statement anyway. Or he might know that she was there only for a few moments while the incision was closed, but he makes an unqualified statement, knowing it implies that she was present the whole time. He might even know that Nurse N was not in surgery at the time, but for reasons of his own he might say she was anyway – a blatant falsehood.¹⁶

¹⁶ Id., p. 1050.

4.3.0.4 Faulty Memory

No system of law can make a witness remember that which the witness cannot remember. The Watergate proceedings are replete with professional men “forgetting” significant dates, events, conversations, etc. The specter of so much forgotten fact might lead a jury to believe the witnesses are lying about their unexplained loss of memory. But neither the Judge nor the Attorney can do much to rectify the situation entirely. If a witness is unable to recall a fact crucial to the case, and if that fact cannot be supplied in any other manner to the jury, the case may fail for want of proof.



Mueller and Kirkpatrick discuss the problem of memory in the following comment, again as it relates to Hearsay.

Another risk is that the speaker at the very moment of utterance might err in calling to mind the events or conditions he observed. We commonly think of memory as fading over time. It is almost a commonplace to understand that memories of multiple similar events may become confused or conflated, and that memories are affected by the important things that preoccupy and concern us and absorb the bulk of our energies and attention.

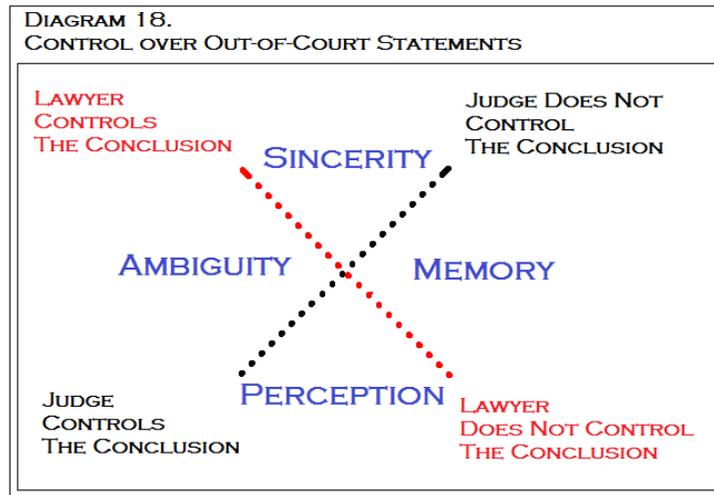
Psychologists report that human recollecting does not involve retrieving a datum stored in the mind in static condition (as it might rest in computer memory): It is better understood as creating a new mental image that is affected by – indeed partly comprised of – subsequent memories along with today’s impressions and ideas. The acuity of memory is affected by factors operating both at the time of observation such as the observer’s attentiveness, interest, emotional involvement, and nature of the experience (pleasant information is more easily recalled, and unpleasant or traumatic events are more readily repressed). It is also affected by factors that come into play when the event is later called to mind, including the type of information (visual perceptions are more easily recalled than verbal descriptions), the attitude of the observer (caution aids in recall), and the suggestively of the situation.

In our example, Observer may have paid little attention to what occurred and cared little about it. He might speak long after the event, with the intervening memory of many subsequent surgeries, perhaps under pressure to recall in a certain way. He might conflate similar occurrences (knowing he saw Nurse N at a surgery, he mistakenly thinks the occasion he recalls is the one he means to describe) or in other ways calls to mind a picture that differs significantly from the immediate impression he had of the event or condition in question.

The concern is the moment of recollecting, and the usual focus is on failed or faulty memory. But the real point is broader and less judgmental: The process of formulating ideas about the past introduces important changes and distortions, and while we speak of faults or failings (terms that are sometimes quite apt), we might just as well speak in more neutral terms of what it means to be human. Once again, being wary of this risk implies not so much skepticism as an attitude of caution and care.¹⁷

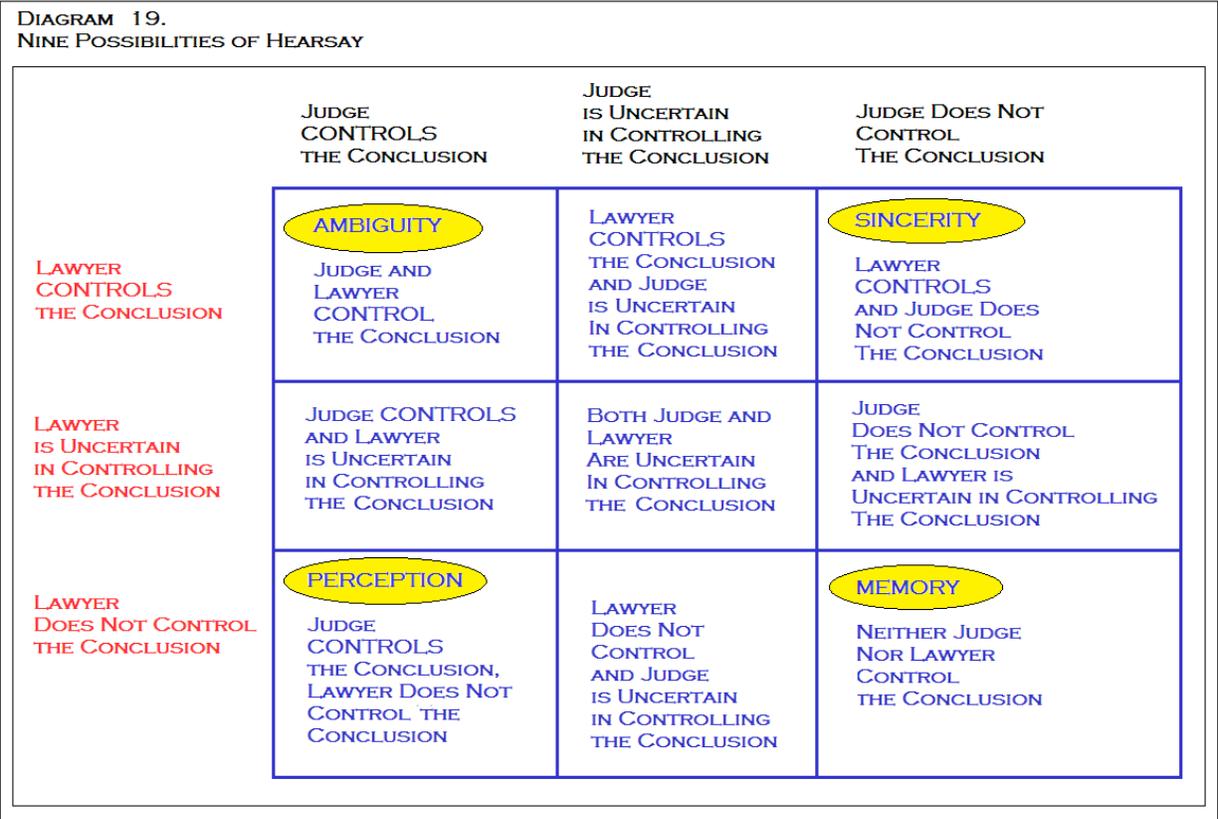
4.3.1 Conclusions as to Hearsay

As the judicial system investigates material which is “hearsay” it is obvious that the control sought by the judicial system can not be absolute in this quadrant. Although the material may be offered for its truth, it is nevertheless made out-of-court, and the initial statement in question can not be controlled or confronted by either the lawyer or the judge. If we mark this relationship as one of inherent uncertainty, we have:



¹⁷ Id., pp. 1048-1050.

Together both the judge and the lawyer possess uncertain powers as they face this quadrant.



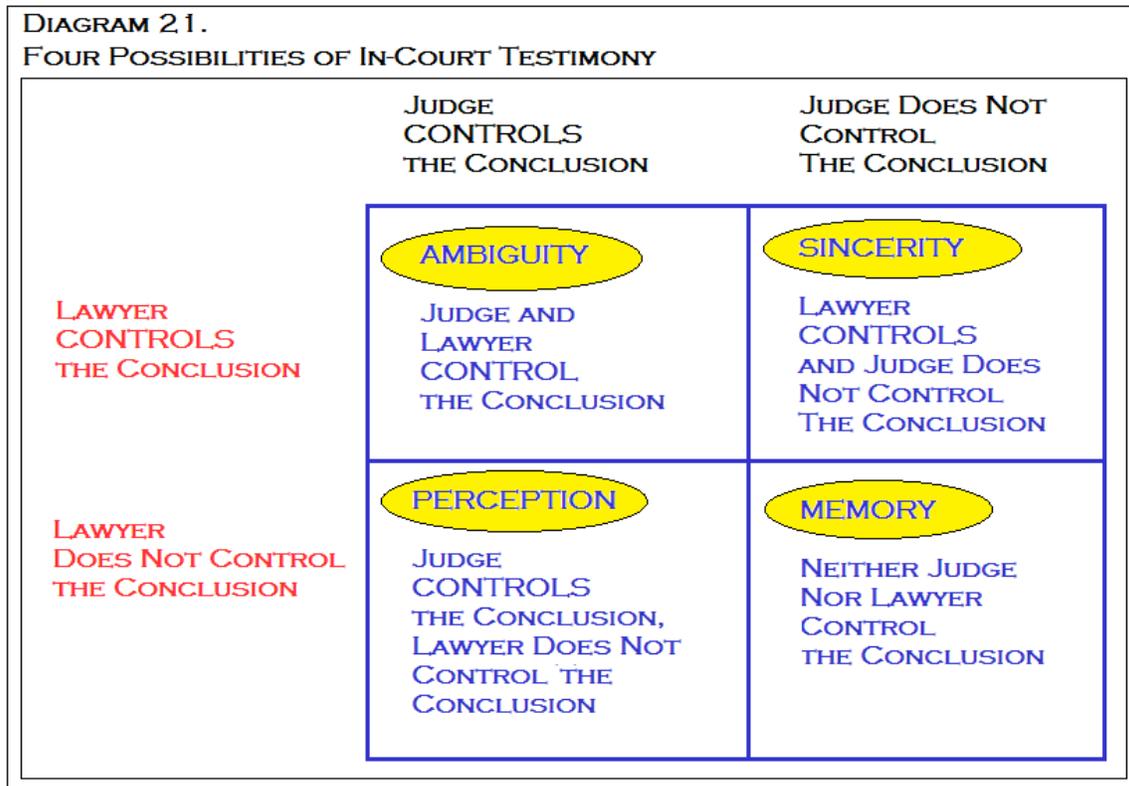
These elements of inherent uncertainty are picked up in the third definition of Hearsay, i.e.:

Jury: Hearsay is a statement *in which the jury is forced to reason from the witness' belief* of a statement or even to the truth of that event, via an understanding of the ambiguity, sincerity, perception or memory *of the witness*.

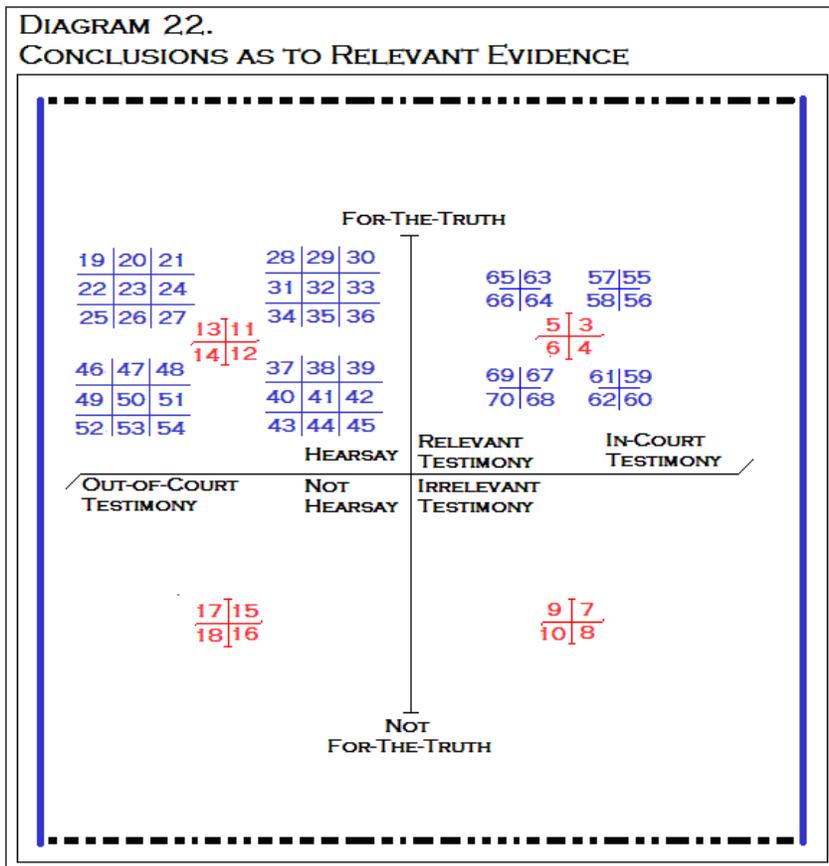
Because the jury is forced to reason about the evidence in ways which are beyond the power of the court or the advocate to cross-examine or control, hearsay in all its forms is excluded subject to exceptions which bring it within the purview and confidence of the judicial system under exceptions to the Rule Against Hearsay.

4.3.2 Conclusions as to In-Court Testimony

The uncertainty which typifies “hearsay” does not exist when the jury hears from the witness about something he/she *has actually and personally experienced*. In these circumstances, the jury is fully capable of evaluating the truthfulness, the sincerity, the clarity and the perception of the witness. Moreover the judge and the lawyers of the case are fully capable of making an inquiry of the actual experience by direct examination and cross-examination of the witness.



Referring to the diagram below, the affect of in-court *relevant* testimony upon every other piece of *relevant* information (55-58) is the result of the jury's personal experience of the memory, sincerity, perception and clarity of the witness. Because this affect is created by the direct in-court observation of the witness by the jury, there is no *inherent* uncertainty as to this affect, although there may be strong disagreement amongst the jurors as to their conclusions regarding the witness. The same may be said for the affect of in-court *relevant* testimony to *irrelevant* testimony (59-62), the affect of in-court *relevant* testimony to *hearsay* statements which have come before the jury (63-66), and the affect of in-court *relevant* testimony to "*not hearsay*" (67-70). In each of these cases, the jury evaluates the memory, sincerity, perception and clarity of the witness directly before them as a matter of their own personal experience of the witness. There is no *inherent* uncertainty forced upon the situation due to the statements being made out-of-court and then related in-court by some other witness.



4.3.3 Conclusions as to “Not Hearsay”

When we come to the realm of "Not Hearsay," an interesting and important qualification of the pattern must be made.

As noted previously words of slander, or words denoting state of mind, or words providing notice to the hearer are the classic examples of Not Hearsay. Such words, originally given out-of-court, are then repeated in court because they are the gravamen of the action, or give light to the circumstances surrounding a particular action, or because they demonstrate an effect upon the hearer. In each of these cases the testimony is both “out-of-court” and “not for the truth of the matter asserted.”

In essence Not Hearsay takes on the aspect of any other matter seen out-of-court and then described to the jury. Testimony as to the verbal statements of the out-of-court actor are essentially like the witness describing any other fact of the case – the weather, the lighting, the time of day, etc.

Consequently Not Hearsay carries an unusual “Yes-No” quality about it. This is conveyed by the “Yes – No” statement in the lower-left corner. (87-88)

If the Court finds that the out of-court testimony is offered for the truth of the statement, then it is hearsay and must be excluded.

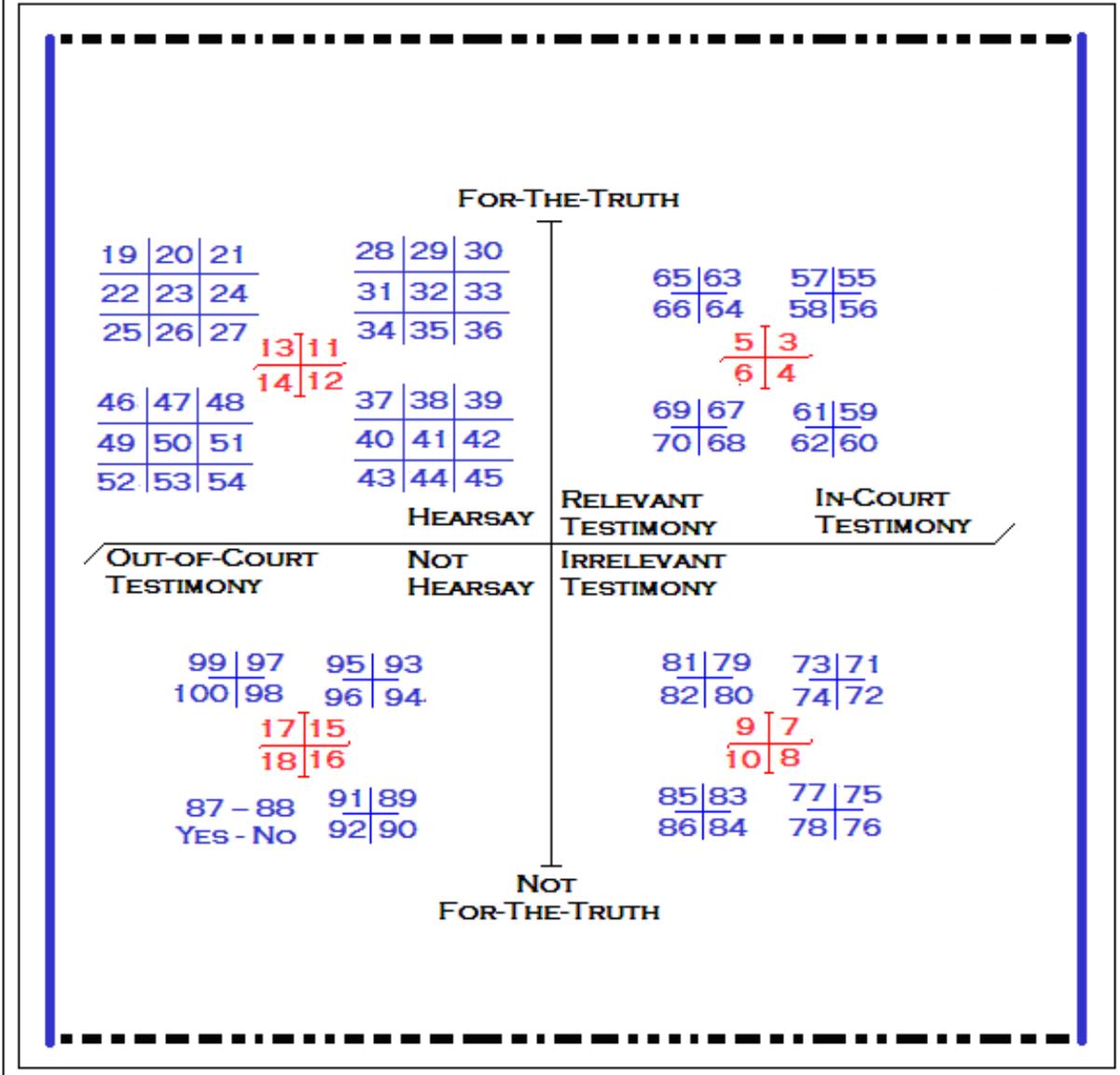
If the out-of-court testimony is “not offered for the truth” then it risks being irrelevant and must be excluded on this ground alone.

The entire premise of "Not Hearsay" is that because *both* objections which usually bar testimony are present and the double negative permits the material to be admissible if relevant to the proceedings.

Thus the perception and memory of the witness offering the testimony, and the sincerity or narration of the witness are initially unimportant. What is at stake is the proper characterization by the Court of the material itself.

Assuming that "Not Hearsay" testimony is presented in evidence, it will have an affect on the material deemed *irrelevant* (89-92), to the *relevant* testimony offered to the court (93-96) and to *hearsay* statements which have been permitted into evidence (97-100) in the same way that any other matter taking place out of court is described by the witness who personally experienced it. The jury can experience directly the testimony of the witness and consider the ambiguity, perception, sincerity and memory of the witness for Not Hearsay just as much as the witness describing the weather... once the judge first decides upon the proper characterization of the testimony itself (87-88).

DIAGRAM 24.
"SYSTEM OF MOVEMENT"



We have numbered as “1” and “2” above the original dichotomy of In-Court / Out-of-Court and For the Truth / Not For the Truth because this simple dichotomy lays the foundation for the entire scheme of evidence. We have not numbered as sets of opposites the original quadrants of possible testimony – Relevant Testimony, Irrelevant Testimony, Hearsay, Not Hearsay – because these quadrants are meaningless without a case to consider. The remaining numbers are given to add to a model of 100 parts whereby society “thinks” about the resolution of a particular case.

CONCLUSION

To summarize we have presented:

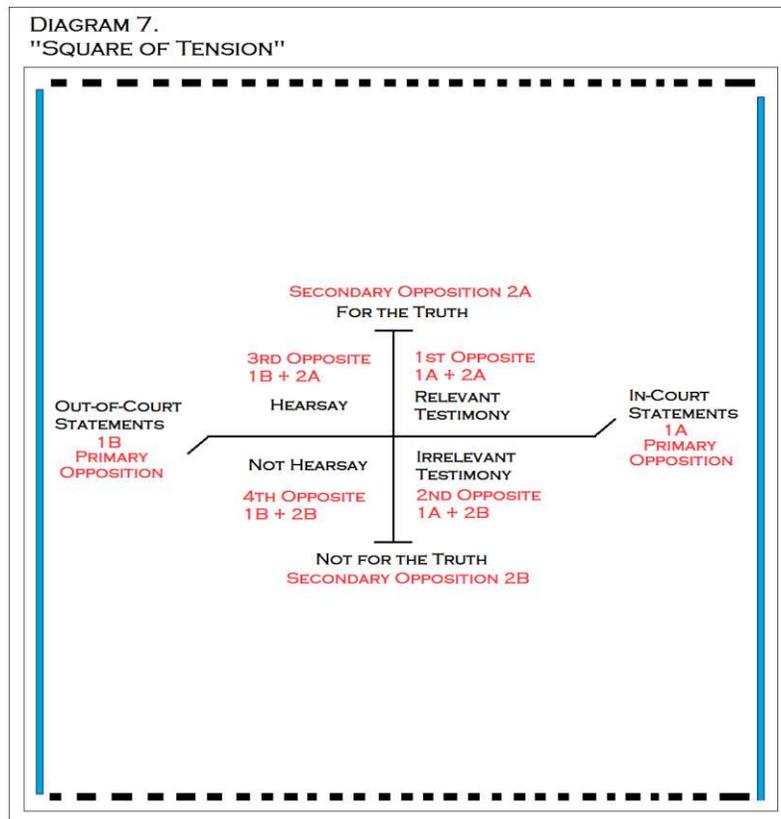
2 dichotomies

Primary Opposition:

1A = In-Court
 1B = Out-Of-Court,

Secondary Opposition:

2A = For-The-Truth
 2B = Not-For-The-Truth,

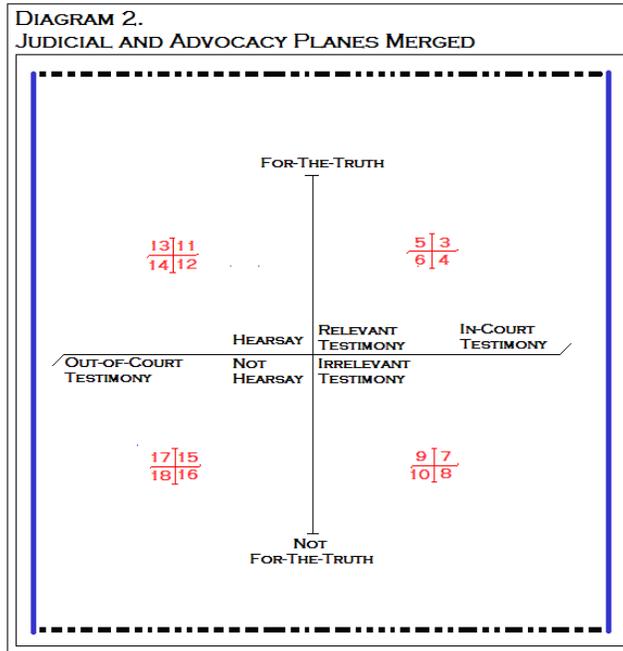


4 quadrants

Relevant Evidence =	First Opposite	1A + 2A
Irrelevant Evidence =	Second Opposite	1A + 2B
Hearsay =	Third Opposite	1B + 2A
Not Hearsay =	Fourth Opposite	1B + 2B,

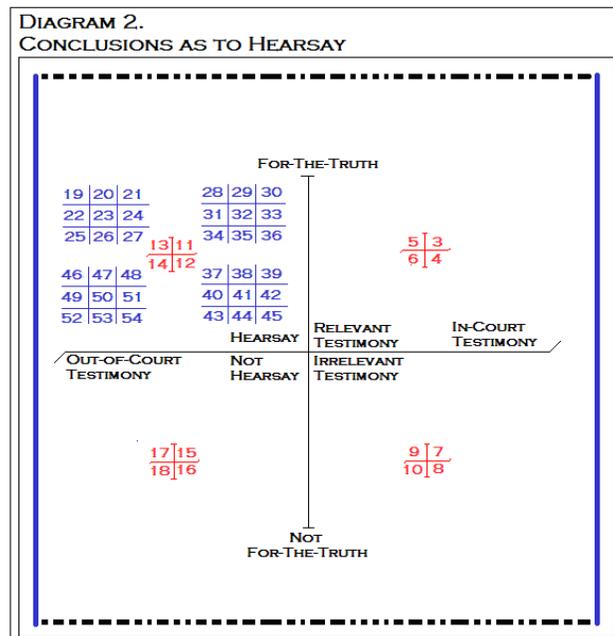
8 relationships inherent in Relevant and Irrelevant Evidence as brought forward by the advocates in the case (#3 through #10, in red),

8 relationships inherent in the Hearsay and Not Hearsay as brought forward by the advocates in the case (#11 through #18, in red),

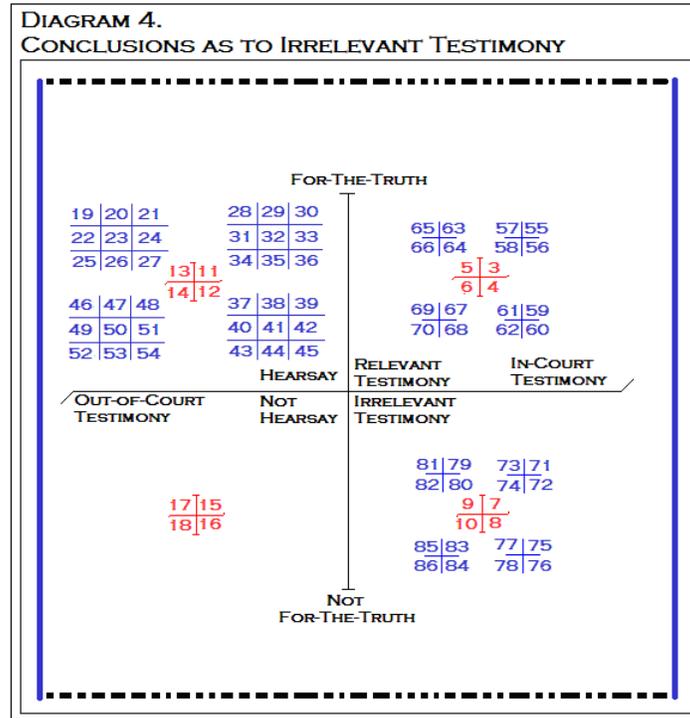


18 conclusions possible when hearsay evidence is considered in relation to other hearsay evidence and relevant evidence regarding a jury's evaluation of the ambiguity, sincerity, perception and memory of the witness (#19 through #36, in blue, top-left quadrant),

18 conclusions possible when hearsay evidence is considered in relation to other irrelevant evidence and non-hearsay uses of evidence regarding a jury's evaluation of the ambiguity, sincerity, perception and memory of the witness (#37 through #54, in blue, top-left quadrant),

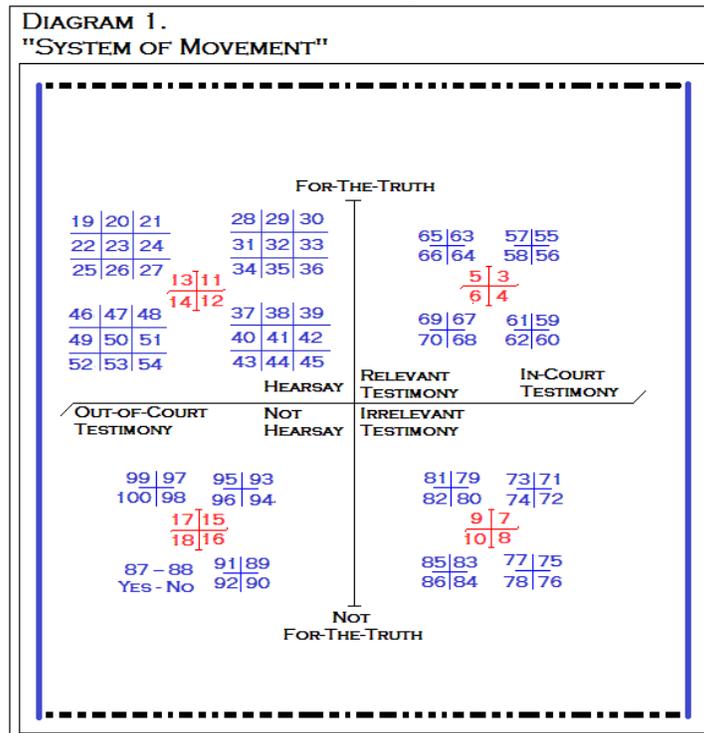


32 conclusions possible in considering the in-court testimony which comes before the jury, both relevant and irrelevant (#55-86, in blue, right hand quadrants),



2 conclusions possible in considering the initial categorization of Not Hearsay (#87, #88, in blue, lower-left quadrant),

12 conclusions possible regarding the relationships of any non-hearsay evidence to hearsay, irrelevant and relevant evidence (#89 through #100, in blue, lower-left quadrant).



Theoretical Foundations of the Economic and Social History of the United States

Essay Three: How Many Chemical Elements Are There?

It is the function of science to discover the existence of a general reign of order in nature and to find the causes governing this order. And this refers in equal measure to the relations of man - social and political - and to the entire universe as a whole.

Dmitri Mendeleev

ABSTRACT

Aims: To use the “System of Movement” pattern to identify the Periodic Table of Chemical Elements as a level of reality subject to the interpretation of these essays.

Study design: Philosophic / Mathematic discussion of the Periodic Table of Chemical Elements and its association with the numbering system presented for Russell’s Paradox.

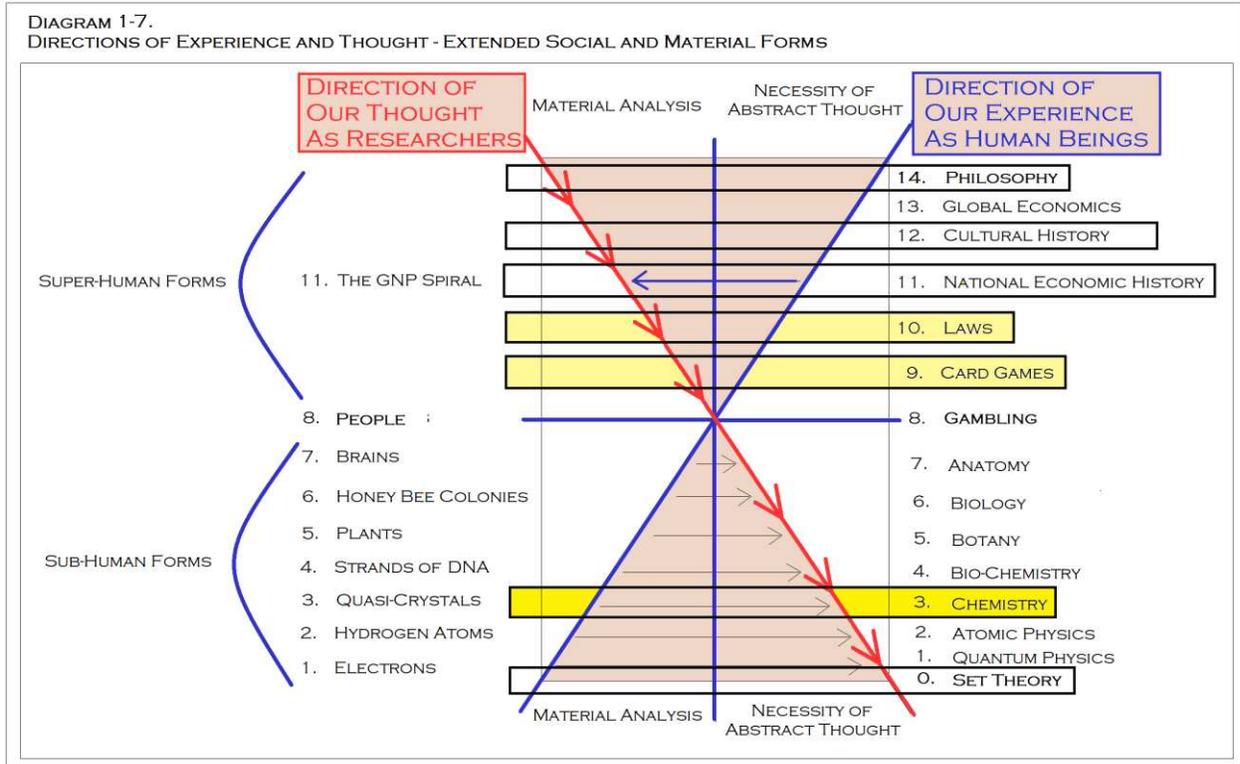
Place and Duration of Study: Library research.

Methodology: In this essay we discuss basic ideas underlying the Periodic Table of Chemical Elements. These ideas are presented in the form of a “System of Movement” which limits the development of naturally occurring chemical elements to 100.

Conclusions: The structure of consciousness which seems to govern the social realm has clear associations in the physical realm as well.

INTRODUCTION: WHAT IS “THE PERIODIC TABLE OF ELEMENTS”?

We turn to the level of chemistry in this essay, to investigate the possibility that the System of Movement pattern is found therein.



In his book *Six Easy Pieces*, Richard Feynman describes in very visual and simple terms the concept of atoms as they make up the world around us.

Matter is made of atoms.

If, in some cataclysm, all of scientific knowledge were to be destroyed, and only one sentence passed on to the next generation of creatures, what statement would contain the most information in the fewest words? I believe it is the atomic hypothesis (or the atomic *fact*, or whatever you wish to call it) that *all things are made of atoms – little particles that move around in perpetual motion, attracting each other when they are a little distance apart, but repelling upon begin squeezed into one another*. In that one sentence, you will see there is an *enormous* amount of information about the world, if just a little imagination and thinking are applied.¹⁸

¹⁸ Richard Feynman, *Six Easy Pieces: Essentials of Physics explained by its most brilliant teacher*, Helix Books, Reading Massachusetts, 1995, p. 4.

Professor Feynman goes on to describe in vivid detail the overall picture of the world of an atom, as follows.

To illustrate the power of the atomic idea, suppose that we have a drop of water a quarter of an inch on the side. If we look at it very closely we see nothing but water – smooth, continuous water. Even if we magnify it with the best optical microscope available – roughly two thousand times – then the water drop will be roughly forty feet across, about as big as a large room, and if we looked rather closely, we would still see relatively smooth water – but here and there small football-shaped things swimming back and forth. Very interesting. These are paramecia. You may stop at this point and get so curious about the paramecia with the wiggling cilia and twisting bodies that you go no further, except perhaps to magnify the paramecia still more and see inside. This, of course, is a subject for biology, but for the present we pass on and look still more closely at the water material itself, magnifying it two thousand times again. Now the drop of water extends about fifteen miles across, and if we look very closely at it we see the kind of teeming, something which no longer has a smooth appearance – it looks slightly like a crowd at a football game as seen from a very great distance. In order to see what this teeming is about, we will magnify it about two hundred and fifty times and we will see something similar to what is shown in Figure 1-1.

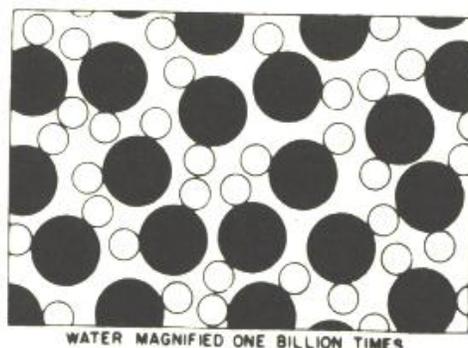


Figure 1-1.

This is a picture of water magnified a billion times, but idealized in several ways. In the first place, the particles are drawn in a simple manner with sharp edges, which is inaccurate. Secondly, for simplicity, they are sketched almost schematically in a two-dimensional arrangement, but of course they are moving around in three dimensions. Notice that there are two kinds of “blobs” or circles to represent the atoms of oxygen (black) and hydrogen (white), and that each oxygen has two hydrogens tied to it. (Each little group of an oxygen with its two hydrogens is called a molecule.) The picture is idealized further in that the real particles in nature are continually jiggling and bouncing, turning and twisting around one another. You will have to imagine this as a dynamic rather than a static picture. Another thing that cannot be illustrated in a drawing is the fact that the particles are “stuck together” – that they attract each other, this one pulled by that one, etc. The whole group is “glued together,” so to speak. On the other

hand particles do not squeeze through each other. If you try to squeeze two of them too close together, they repel.¹⁹

The size of these atoms of Hydrogen and Oxygen is taken up with an example equally as vivid.

The atoms are 1 or 2×10^{-8} cm in radius. Now 10^{-8} cm is called an angstrom (just another name), so we say they are 1 or 2 angstroms (A) in radius. Another way to remember their size is this: if an apple is magnified to the size of the earth, then the atoms in the apple are approximately the size of the original apple.²⁰

The idea of atoms and the development of the Table of Atomic Elements is described briefly in the article "Elements" by Dr. O. Lewin Keller, published in *The Encyclopedia of Physics*. Dr. Keller writes:

In 1661 Robert Boyle, who had developed a chemical atomic theory based on the concepts of Democritus, gave the definition of chemical elements as "certain primitive and simple, or perfectly unmingling bodies, which, not being made of any other bodies or one another" are the constituents of chemical compounds." ...

Over one and one quarter centuries after Boyle had given his definition of an element, Antoine-Laurent Lavoisier was able to determine a list of elements based on an experimentally verifiable definition: "A chemical element is a substance that cannot be decomposed further into simpler substances by ordinary chemical means." ...

Work of the sort being carried out by Lavoisier soon led to the development of the law of definite proportions, which stated that in any given compound the elements always occur in the same proportions by weight no matter how the compound is synthesized. This law led to the definition of "equivalent weights" of elements as that weight which will combine with or replace a unit weight of some standard element such as hydrogen.

John Dalton, in 1808, was the first to postulate an atomic theory that incorporated atomic weight as distinguished from equivalent weight and was capable of explaining the empirically derived laws of chemical combination.²¹

¹⁹ Id., pp. 4-5.

²⁰ Id., p. 5.

²¹ ²¹Editors Lerner and Trigg, Second Edition, VCH Publishing, New York, 1991, pp. 348-351.

The creator of the first successful periodic law was Mendeleev. This Russian scientist based his entire scheme upon the relationship between atomic weight and chemical behavior.

“I began to look about and write down the elements with their atomic weights and typical properties, analogous elements and like atomic weights on separate cards, and this soon convinced me that the properties of elements are in periodic dependence upon their atomic weights.”

--Mendeleev, *Principles of Chemistry*, 1905, Vol. II

Dr. Keller's article continues:

These efforts culminated in the work in 1869 of Dimitri Mendeleev, author of the periodic law.

The availability of fairly reliable atomic weights for a number of elements allowed chemists to seek relationships among them on a weight basis. In 1869, Dimitri Mendeleev knew of 65 elements with their atomic weights. While looking for relationships among these elements he made one of the most important discoveries in the history of chemistry: The properties of the elements are periodic functions of their atomic weights.

This periodic law allowed the arrangement of the elements in a table in order of increasing atomic weight such that the table contains columns and rows of elements. Elements with similar chemical properties, such as silicon, tin, and lead, were found to fall in the same column. Thus there appeared a regular recurrence of chemical and physical properties of the elements from the top to the bottom of the column even though the elements were widely separated in atomic weight. For the first time in history it was shown that the chemical elements form an entity in their interrelationships, and undiscovered elements with predictable properties could be sought to fill up the holes in the table. The periodic law proposed by Mendeleev was a daring break with the thought of the scientific community in 1869. In fact, Mendeleev's bold predictions of the chemical and physical properties of still undiscovered elements undoubtedly furnished the touch of drama needed to gain acceptance of his system. ... The three most famous predictions by Mendeleev concerned eka-aluminum (gallium), eka-boron (scandium), and eka-silicon (germanium). When the elements themselves were discovered, Mendeleev's detailed predictions were found to be amazingly accurate.²²

²² Id., pp. 348-351.

At the present time, the following chart is given as the order of the atoms which make up the physical reality around us.²³

1 H 1.0079																	18 He 4.0026
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 *	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Uun (281)	111 Uuu (272)	112 Uub (285)		114 Uuq (289)				
* Lanthanide series		57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	
# Actinide series		89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)	

²³ Taken from the Internet, University of Leeds, England.

Introduction 1.1 The 100 Elements of Nature

Dr. Richard Hahn describes the sharp break which occurs in nature at element 100, Fermium, as follows:

The transuranium elements have been synthesized in a variety of ways. ... At present, their production methods can be divided into two groupings:

(1) *The elements up to and including Fm (Fermium, element 100) can be produced in weighable amounts that vary from many grams down to about 10⁻¹² g (or 10⁹) atoms (1,000,000,000 atoms).* To produce these elements, targets such as uranium are irradiated in a high-flux reactor, where they undergo a series of multiple neutron captures and (negative) beta-particle radioactive decays to form elements with higher masses and atomic numbers than the targets. Chemical processing of the irradiated targets separates the different elements formed by this process.

(2) Elements with Z (atomic number) of 101 and above can only be obtained in trace amounts, from accelerator bombardment of targets with charged particles. To form the heaviest elements, beams of nuclei, which are called heavy ions because they have atomic masses greater than that of helium-4, must be used to introduce several protons into the target nucleus at one time, reactions such as $^{10}\text{O} + ^{249}\text{Bk} \rightarrow ^{262105} + 5n$ (neutrons) or $^{12}\text{C} + ^{249}\text{Cf} \rightarrow ^{257104} + 4n$ have often been used, in which the excess energy that is available in the reaction is released by the emission of several neutrons. Because the chance of forming a desired nucleus increases, a new approach has been used to form the elements above 105. Called "cold nuclear fusion," the process involves bombarding especially stable target nuclei, such as ^{208}Pb or ^{209}Bi , with beams such as ^{54}Cr or ^{58}Fe to form products with low excess energy, as indicated by the fact that only one or two neutrons are emitted in the reaction. ...²⁴

Dr. Hahn describes the transuranium elements and the scientific problems associated with them as follows.

(3) Added to these problems are the special difficulties encountered in trying to study the behavior of elements that exist only for seconds or minutes. For example, to study the chemical properties of elements 103 or 104, one has to work at an accelerator, produce a few hundred atoms (at most) in an irradiation, purify the desired element, perform a chemical measurement, and then begin the procedure over with a new irradiation prior to making another chemical measurement. Such methodology has been dubbed "one-atom-at-a-time" chemistry."²⁵

²⁴ Richard Hahn, "Transuranium Elements" as published in The Encyclopedia of Physics, 2nd Edition, VCH Publishers, New York, 1991, Pages 1303-1304.

²⁵ Id, p. 1304.

Regarding the list below, it is important to note that at the present time scientists are unable to obtain more than trace amounts ("a few hundred atoms (at most)"*) of any element over 100. Elements over 100 are brought about only through a process dubbed "one-atom-at-a-time chemistry" measuring the rate of the atom's "decay chain." Thus science is unable to measure the atomic weight of these elements. In this way they differ significantly from the preceding 100.²⁶

Number	Element:	Half-life:	Discovery Date:	Quantity:
92	Uranium (238)	4.5 billion years	(1841)*	Weighable
93	Neptunium	2 million years	1940	Weighable
94	Plutonium	80 million years	1940	Weighable
95	Americium	7,000 years	1944	Weighable
96	Curium	300,000 years	1944	Weighable
97	Berkelium	1,400 years	1949	Weighable
98	Californium	800 years	1950	Weighable
99	Einsteinium	276 days	1952	Weighable
100	Fermium	80 days	1953	Weighable
101	Mendelevium	54 days	1955	Unweighable
102	Nobelium	1 hour	1958	Unweighable
103	Lawrencium	3 min	1961	Unweighable
104	Kurchatovium	70 seconds	1964	Unweighable
104	Rutherfordium		1969	Unweighable
105	Nielsbohrium	40 seconds	1970	Unweighable
105	Hahnium		1970	Unweighable
106	(mass 259)	7 milli-seconds	1974	Unweighable
	(mass 260)	20 milli-seconds	1974	Unweighable
	(mass 263)	.9 seconds		Unweighable
107	(mass 261)	1 milli-second	1981	Unweighable
	(mass 262)	5 milli-seconds		Unweighable
	(mass 267)	1 second		Unweighable
108	(mass 265)	2 milli-seconds	1984	Unweighable
109	(mass 266)	4 milli-seconds	1982	Unweighable

²⁶ Taken from the *Handbook of Chemistry and Physics*, 54th ed., CRC Press, 1973-1974, Editor Robert Weast, Ph.D., p. B-35.

Dr. Hahn concludes his article with a comment on the end-point of the series, and on the search for additional elements.

The fact that very short half-lives are encountered in the heaviest elements has led many scientists to conclude that element 109 may be at or near the limit of nuclear stability, and that it may be very difficult, or even impossible, to produce elements with even higher atomic numbers. However, several years ago, an idea was developed about a possible new region of nuclear stability (called the "island of stability") that might exist far from the elements known today. Based on our knowledge of nuclear structure and stability, this new region of "superheavy elements" was predicted to occur around atomic numbers 114 or 126.

The prospect of finding such new, relatively stable, elements was especially exciting to many scientists, because it would allow them to test and to extend their ideas, not only about nuclear properties, but about chemical behaviour as well. Many ingenious experiments were carried out, to try to produce isotopes of these elements in nuclear bombardments, or to detect extremely long-lived varieties of the "SHE's" in nature (by taking advantage of the fact that elements that are members of a particular chemical "family" all have similar chemical properties, and tend to be found together in ore deposits, purified metals, etc.).

Although several optimistic claims have been made for the discovery of superheavy elements, none of them unfortunately has survived the scrutiny of the scientific community. Because of this lack of success, interest in this research area has waned in recent years. Many scientists have concluded that either the SHE's are much less stable than originally thought, or that the conditions that have been available in nuclear bombardments were simply not optimum for reaching the sought-after island of stability.²⁷

²⁷ Id, p. 1304.

METHODOLOGY

1. Hypothesis

I propose that there is good reason to believe that the structure of the Periodic Table of Chemical Elements must end at Element 100, Fermium, and that the remainder of the elements should be regarded as suspect due to “one-atom-at-a-time” chemistry used to create them.

2. Methods

We use the map developed in the previous essay to evaluate the structure of the Periodic Table of Chemical Elements.

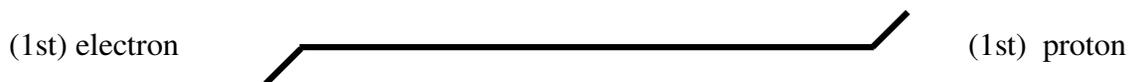
3. Data

We present here the standard notation of the Periodic Table of Chemical Elements and use it in a new form.

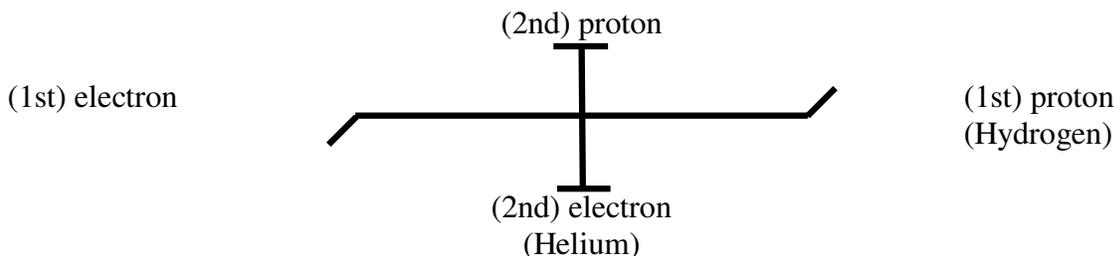
4. Procedure

4.1 Building the Periodic Table

The essential building block of the elements is the proton-electron pair, the proton bearing a positive charge, the electron carrying a negative charge. In Hydrogen this pair negate one another, permitting the element to bind with virtually any other element.



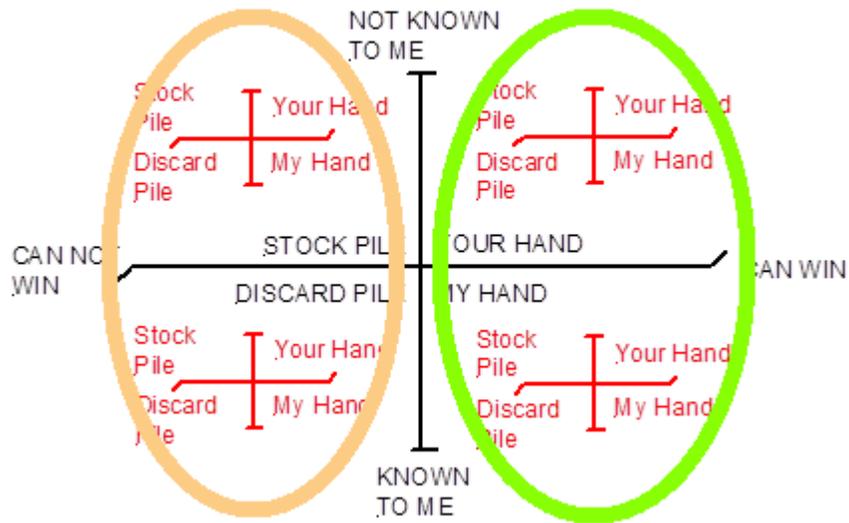
In Helium, a second proton/electron pair join the first pair, and the quadrant system is complete and stable. As a result Helium does not merge readily with any other element.



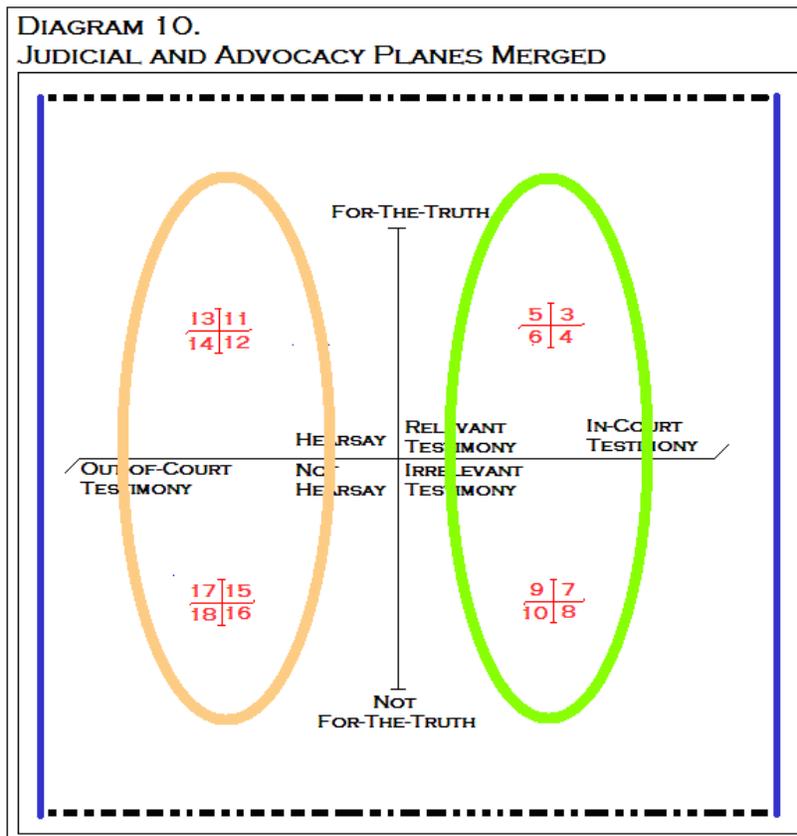
Taking these two dichotomies as personified by two separate elements, these are found in the periodic table of chemical elements as:

1																		18																	
1 H 1.0079																	2 He 4.0026																		
2																13		14	15	16	17	18													
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180																		
11 Na 22.990	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948																		
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798																		
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29																		
55 Cs 132.91	56 Ba 137.33	57-71 *	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)																		
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Dum (281)	111 Uun (272)	112 Uub (285)	113 Uuq (289)	114 Uuq (289)	115 Uuq (289)	116 Uuq (289)	117 Uuq (289)	118 Uuq (289)																		
* Lanthanide series	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)					
# Actinide series	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Dum (281)	111 Uun (272)	112 Uub (285)	113 Uuq (289)	114 Uuq (289)	115 Uuq (289)	116 Uuq (289)	117 Uuq (289)	118 Uuq (289)					

Two sets of eight were explored in both the psychology of Gin Rummy ...



... as well as the law of evidence.



These are found in the Periodic Table as the next sixteen elements, as follows.

										18							
1 H 1.0079											2 He 4.0026						
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 *	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Uun (281)	111 Uuu (272)	112 Uub (285)		114 Uuq (289)				
* Lanthanide series		57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	
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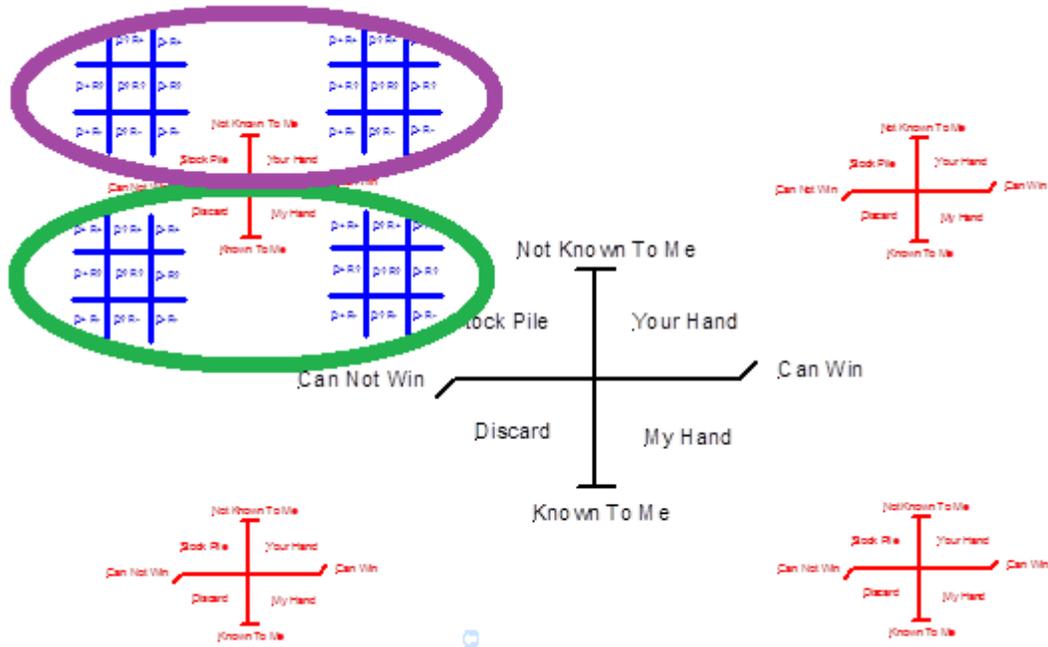
The first group of eight consist of the following elements:

Lithium (Li, #3), Beryllium (Be, #4), Boron (b, #5), Carbon (C, #6), Nitrogen (N, #7), Oxygen (O, #8), Fluorine (F, #9) and Neon (Ne, #10).

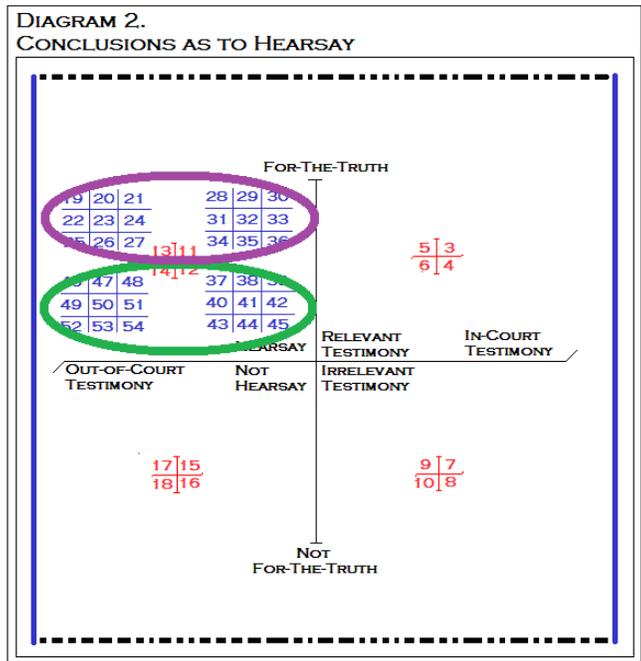
The second group of eight consist of the following elements.

Sodium (Na, #11), Magnesium (Mg, #12), Aluminum (Al, #13), Silicon (Si, #14), Phosphorus (P, #15), Sulfur (S, #16), Chlorine (Cl, #17), and Argon (Ar, #18).

Let us compare the remainder of our quadrant system with the table of periodic elements. In the upper left quadrants we would expect a first set of 18 elements. In the game of Gin Rummy this was pictured as conclusions as to the relationship of the Stock Pile towards sets of cards which could win or could not win the game.



In our study of the law of evidence a similar dichotomy of two sets of eighteen is displayed in the jury's conclusion as to the effect of Hearsay testimony upon In Court and Out Of Court testimony.



These are found in the periodic table as the Potassium series. This series includes Potassium (K, #19), Calcium (Ca, #20), Scandium (Sc, #21), Titanium (Ti, #22), Vanadium (V, #23), Chromium (Cr, #24), Manganese (Mn, #25), Iron (Fe, #26), Cobalt (Co, #27), Nickel (Ni, #28), Copper (Cu, #29), Zinc (Zn, #30), Gallium (Ga, #31), Germanium (Ge, #32), Arsenic (As, #33), Selenium (Se, #34), Bromine (Br, #35), and Krypton (Kr, #36).

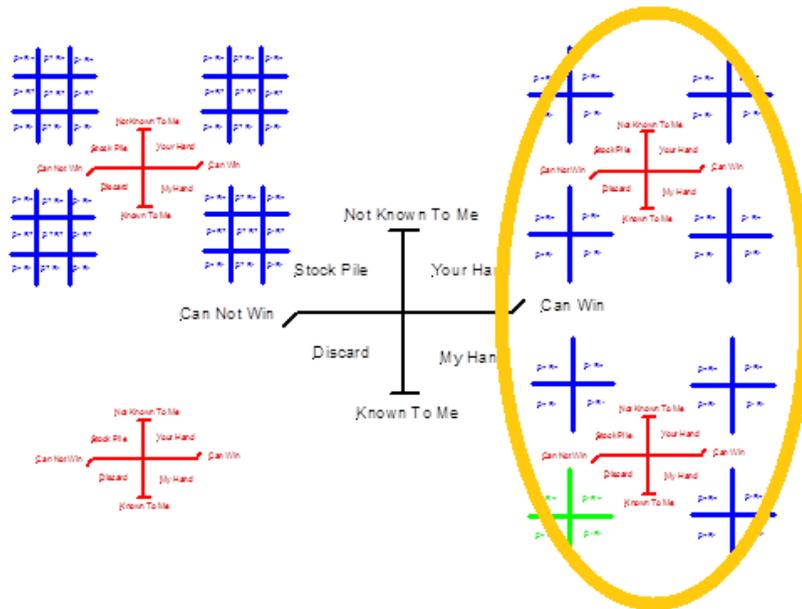
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3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.921	34 Se 78.96	35 Br 79.904	36 Kr 83.796
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 * #	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Uun (281)	111 Uuu (272)	112 Uub (285)			114 Uuq (289)			
* Lanthanide series		57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	
# Actinide series		89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)	

We would next expect a second set of 18 elements. This has previously been pictured as:

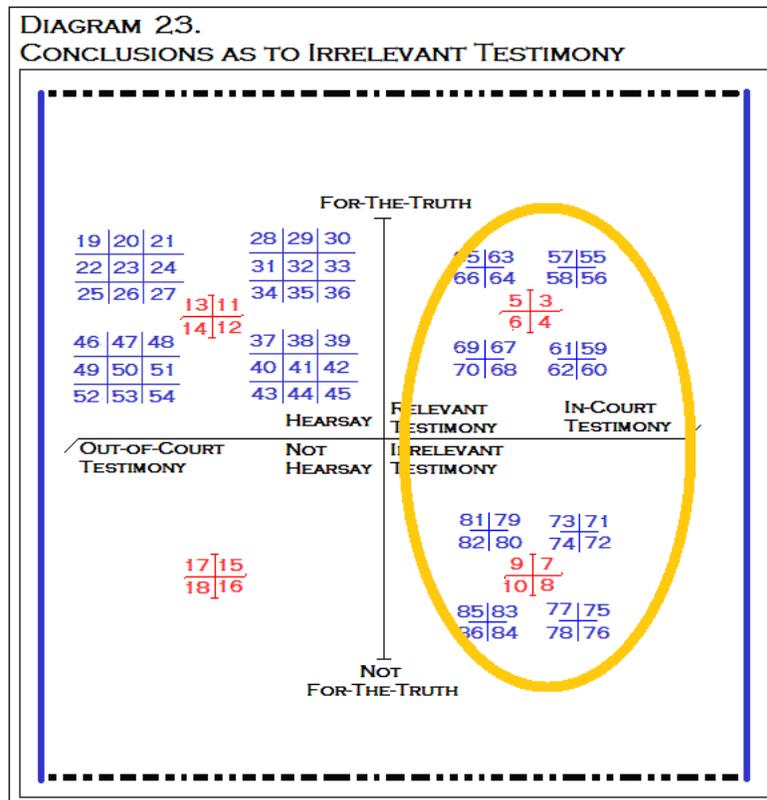
This is given in the periodic table as the Rubidium series. This series includes Rubidium (Rb, #37), Strontium (Sr, #38), Yttrium (Y, #39), Zirconium (Zr, #40), Niobium (Nb, #41), Molybdenum (Mo, #42), Technetium (Tc, #43), Ruthenium (Ru, #44), Palladium (Pd, #46), Silver (Ag, #47), Cadmium (Cd, #48), Indium (In, #49), Tin (Sn, #50), Antimony (Sb, #51), Tellurium (Te, #52), Iodine (I, #53), and Xenon (Xe, #54). They are found in the periodic table as:

1 H 1.0079																	2 He 4.0026
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.921	34 Se 78.96	35 Br 79.904	36 Kr 83.796
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 * #	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Uun (281)	111 Uuu (272)	112 Uub (285)			114 Uuq (289)			
* Lanthanide series		57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	
# Actinide series		89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)	

We would next expect a series of 32 elements. Regarding the conclusions which might be considered for sets of cards which can win the game, this has previously been pictured as:



... and for the conclusions which the jury might reach for evidence which is present In Court we have the following.

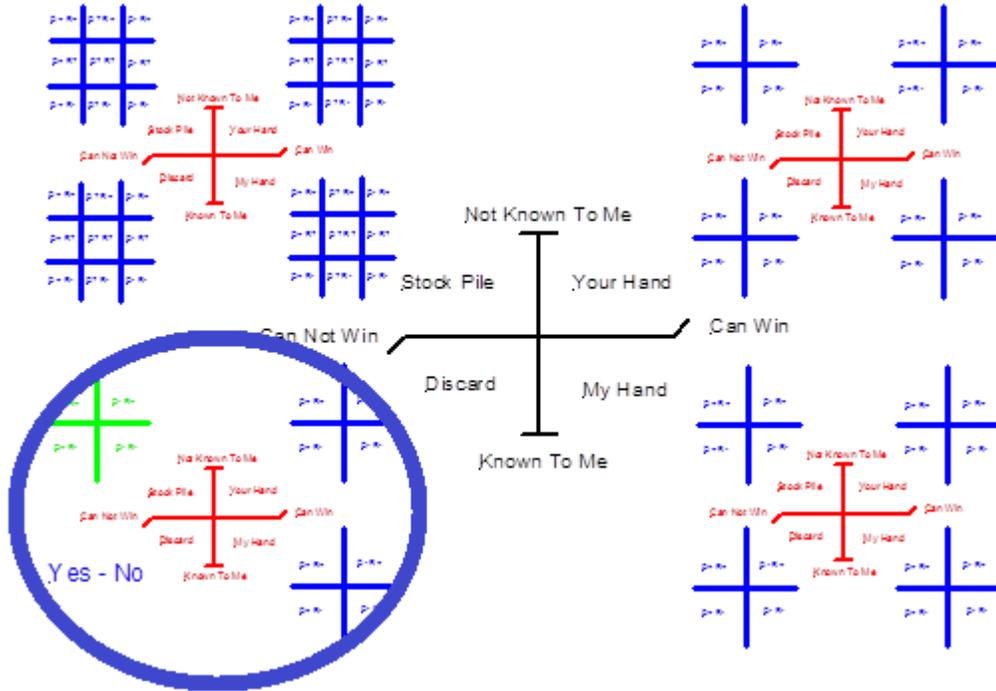


This is found in the periodic table as the Cesium series. Please note that with Element 57, Lanthanum, a break occurs. With this element begins the Lanthanide series, a repetition of qualities found within the families as marked, and including within it elements 57 through 71.

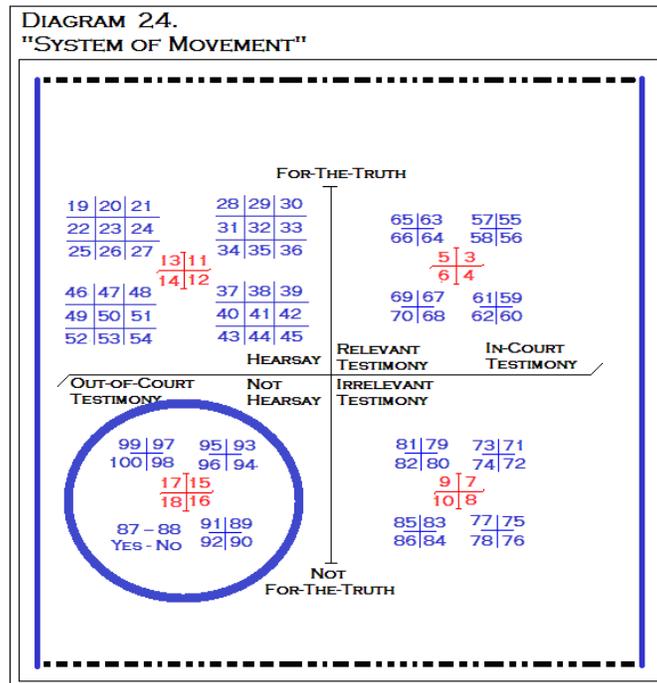
The total of 32 elements begins with Cesium (Cs, #55), Barium (Ba, #56), Lanthanum (La, #57), Cerium (Ce, #58), Praseodymium (Pr, #59), Neodymium (Nd, #60), Promethium (Pm, #61), Samarium (Sm, #62), Europium (Eu, #63), Gadolinium (Gd, #64), Terbium (Tb, #65), Dysprosium (Dy, #66), Holmium (Ho, #67), Erbium (Er, #68), Thulium (Tm, #69), Ytterbium (Yb, #70), Lutetium (Lu, #71), Hafnium (Hf, #72), Tantalum (Ta, #73), Tungsten (W, #74), Rhenium (Re, #75), Osmium (Os, #76), Iridium (Ir, #77), Platinum (Pt, #78), Gold (Au, #79), Mercury (Hg, #80), Thallium (Tl, #81), Lead (Pb, #82), Bismuth (Bi, #83), Polonium (Po, #84), Astatine (At, #85), Radon (Rn, #86).

1																		18	
1 H 1.0079																	2 He 4.0026		
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180		
11 Na 22.990	12 Mg 24.305											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948		
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798		
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29		
55 Cs 132.91	56 Ba 137.33	57-71 *	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)		
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Uun (281)	111 Uun (272)	112 Uub (285)	114 Uuq (289)							
* Lanthanide series			57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97		
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Finally we would expect a set of 14 elements, these being in the lower left quadrant. For Gin Rummy this has been portrayed as the conclusion which one must make in choosing a card from the Draw Pile. This has previously been pictured as:



In law, this has been portrayed as the relationship which Not Hearsay has to the rest of the case.



These are given in the periodic table as the Francium series, the seventh and last series of periodic chemical elements. These are Francium (Fr, #87), Radium (Ra, #88), Actinium (Ac, #89), Thorium (Th, #90), Protoactinium (Pr, #91), Uranium (U, #92), Neptunium (Np, #93), Plutonium (Pu, #94), Americium (Am, #95), Curium (Cm, #96), Berkelium (Bk, #97), Californium (Cf, #98), Einsteinium (Es, #99), and Fermium (Fm, #100).

1																		18					
1 H 1.0079																	2 He 4.0026						
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180						
11 Na 22.990	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948						
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798						
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29						
55 Cs 132.91	56 Ba 137.33	57-71 *	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)						
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* Lanthanide series		57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97							
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CONCLUSION

The previous break falling between Element 100 and 101 is explained by the map of Russell's Paradox as presented herein. The use of "one-atom-at-a-time" chemistry has proven to be unproductive and the classification of "elements" of nature via a chain of decay which as much represents the material conglomeration imploding as existing can not be taken as proof of the existence of an atomic element of universe construction or that it will be discovered outside the presence of laboratory conditions.

Theoretical Foundations of the Economic and Social History of the United States

Essay Four: A Map of Russell's Paradox

All movements go too far.

Bertrand Russell

ABSTRACT

Aims: To apply the System of Movement pattern to logic, specifically that of set theory and its famous Russell's Paradox. Further, to apply this logic to the Chooser – Available Choice model as presented previously in Essay Five of American political and economic development.

Study design: Philosophic / Mathematic discussion of Russell's Paradox and its correlation to the economic model described in the five previous essays.

Place and Duration of Study: Library research.

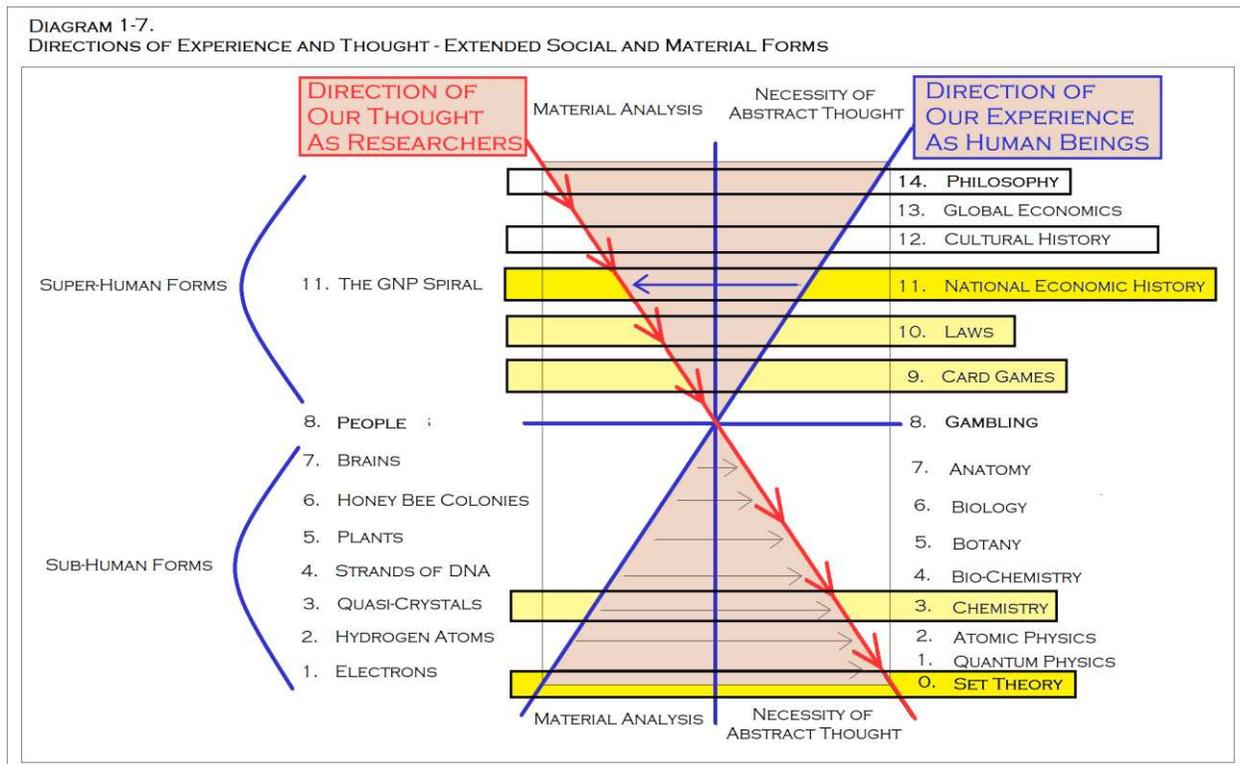
Methodology: In this essay we dissect the basic parts of one of the most famous mathematic puzzles of the twentieth century, Russell's Paradox. We chart correlations between the map thereby developed and the pattern of economic development within the United States.

Conclusions: If Russell's Paradox is an example of the structure of consciousness, it may be the key to understanding the organization of all levels of reality.

INTRODUCTION: SET THEORY AS LOGIC

We have followed the System of Movement pattern through three levels of reality. These are: (1) game theory, (2) law and (3) chemistry. We now set forth the basic terms of Russell's Paradox, a fundamental beginning point for set theory. Using the structure of a "map" of Russell's Paradox, we consider the national economic development of the United States as presented via the GNP Spiral developed in the first five essays.

The previous discussions of the System of Movement pattern are presented in beige below. The levels of reality which will be discussed in this essay – set theory / mathematics and national economic history – are highlighted in yellow.



Introduction 1.1 What is Russell's Paradox?

The mathematics which describes for us the economics of a planet and the motion of an electron is premised upon a set theory which, in Frege's words, forms "not only the foundations of my arithmetic, but also the sole possible foundations of arithmetic."²⁸ It may be difficult to appreciate the importance of Russell's Paradox without first understanding of the centrality of set theory in mathematics. A standard textbook notes:

Set theory is the foundation stone of the edifice of modern mathematics. The precise definitions of all mathematical concepts are based on set theory. Furthermore, the methods of mathematical deduction are characterized by a combination of logical and set-theoretical arguments. To put it briefly, the language of set theory is the common idiom spoken and understood by mathematicians the world over. From all this it follows that if one is to make any progress in higher mathematics itself or in its practical applications, one has to become familiar with the basic concepts and results of set theory and with the language in which they are expressed.²⁹

"Russell's Paradox" asks the following question:

Is the "set of all individual sets which are NOT members of themselves" a member of itself?

The paradox arises in the following manner.

First let us name the "set of all individual sets which are NOT members of themselves" the "super-normal set," (traditionally named elsewhere as the "Russell Set").

Second, if we say that the super-normal set IS a member of itself, we say that it is included in the set defined as "the set of all sets which ARE NOT members of themselves." However this is a blatant contradiction of the definition of the set proposed, because only sets which ARE NOT members of themselves are to be permitted entrance into the set as defined.

Third, and on the other hand, if we say that the super-normal set IS NOT a member of itself then we MUST include it within itself in order to satisfy the terms of the set proposed, i.e. "the set of ALL sets which ARE NOT members of themselves." If we leave this set out of itself under these circumstances we have left out one set from the category SUPER-NORMAL sets, to wit: itself. In this event we cannot say that ALL sets have been included therein and again we contradict ourselves.

The paradox arises because there is an inherent uncertainty as to which of these arguments should prevail by way of arriving at a conclusion to the question posed.

²⁸ Letter to Russell, quoted in footnote 7 at page 349 of *Infinity and the Mind*, Bantam Books, Toronto, 1982 by Rudy Rucker, quoting Jean Van Heijenoort *From Frege to Godel* at page 114.

²⁹ W. Gellert, et al., *The VNR Concise Encyclopedia of Mathematics*, Van Nostrand Reinhold Company, New York, 1975, p. 320.

William Dunham describes the significance of this contradiction.³⁰

(R)ecall that the object of Russell's work was to build all of mathematics upon the unshakable foundation of logic. His paradox jeopardized such a program. Just as the occupant of the penthouse suite should feel uneasy upon learning of a crack in the basement, so should mathematicians feel uneasy knowing that, at the very foundation of their subject, there lies a crack in the logic. It suggests that the whole mathematical enterprise, like the apartment tower, could come tumbling down at any time.

Needless to say, Russell was shaken by the existence of his paradox. "I felt about the contradictions," he wrote, "much as an earnest Catholic must feel about wicked Popes." Others were similarly dismayed, as is evident in the famous exchange between Russell and the logician Gottlob Frege (1848-1925). The latter had published *Grundgesetze der Arithmetik*, a huge work aimed at exploring the foundations of arithmetic. In it Frege had worked with sets in the same naive and cavalier manner that had led Russell to his paradox. Russell communicated his example to Frege, who immediately recognized it as dealing a deathblow to his enterprise. In the second volume of his *Grundgesetze*, which was going to press at the time of Russell's letter, Frege had to face every scholar's greatest nightmare: that his or her work, at the last minute, has been rendered incorrect. With a poignancy matched only by his integrity, Frege wrote:

"A scientist can hardly meet with anything more undesirable than to have the foundations give way just as the work is finished. I was put in this position by a letter from Mr. Bertrand Russell when the work was nearly through the press."

Frege's response to Russell was the following.

Your discovery of the contradiction caused me the greatest surprise and, I would almost say, consternation, since it has shaken the basis on which I intended to build arithmetic...

It is all the more serious since not only the foundations of my arithmetic, but also the sole possible foundations of arithmetic, seem to vanish. ... In any case, your discovery is very remarkable and will perhaps result in a great advance in logic, unwelcome as it may seem at first glance... The second volume of my *Grundgesetze* is to appear shortly. I shall no doubt have to add an appendix in which your discovery is taken into account. If only I already had the right point of view for that!³¹

³⁰William Dunham, *The Mathematical Universe*, John Wiley and Sons, Inc. New York, New York, 1994 p. 221.

³¹ Taken from Rudy Rucker, *Infinity and the Mind*, footnote number 7 at page 349, Bantam Books, Toronto, New York, 1982. He quotes from the Jean van Heijenoort anthology "*From Frege to Godel*," at p. 11.

The present mathematic approach to Russell's Paradox, and in particular to the "Super-normal set" and the ambiguities inherent in conclusions regarding it, has been to exclude the set entirely from the analysis. William Dunham notes:

After years of unsuccessful attempts (to understand the paradox), logicians eventually tried to legislate it away by stipulating that a set that contained itself as a member is really not a set. By means of such logical tactics, and some carefully crafted definitions, such classes were proclaimed to be illegitimate. ... (Russell) wrote that "whatever involves all members of a collection must not itself be a member of the collection." Consequently, the self-referential nature of membership in the Russell set ("the set of all individual sets which ARE NOT members of themselves," usually named "The Russell set") was illegitimate. The Russell set is not a set at all.

This solution, which required some excruciating convolutions of thought, seemed cumbersome and artificial. Russell spoke of it as "theories which might be true but were not beautiful." If nothing else, it transferred the study of sets from the naive, pre-Russellian domain into a less intuitive realm.³²

Roger Penrose mentions Russell's Paradox in the following quote:

Russell was merely using, in a rather extreme form, the same type of very general mathematical set theoretic reasoning that the mathematicians were beginning to employ in their proofs. Clearly things had got out of hand, and it became appropriate to be much more precise about what kind of reasoning was to be allowed and what was not. It was obviously necessary that the allowed reasoning must be free from contradiction and that it should permit only true statements to be derived from statement previously known to be true. Russell himself, together with his colleague Alfred North Whitehead, set about developing a highly formalized mathematical system of axioms and rules of procedure, the aim being that it should be possible to translate all types of correct mathematical reasoning into their scheme. The rules were carefully selected so as to prevent the paradoxical types of reasoning that led to Russell's own paradox. The specific scheme that Russell and Whitehead produced was a monumental piece of work. However, it was very cumbersome and it turned out to be rather limited in the types of mathematical reasoning that it actually incorporated.³³

The foundational elements of the problem are intriguing. If Frege is correct in proposing that set theory forms "not only the foundations of my arithmetic, but also the sole possible foundations of arithmetic," then how are we to arrive at a clear conclusion of anything in the realm of mathematics without an approach to this dilemma?

³² William Dunham, *The Mathematical Universe*, p. 221.

³³ Roger Penrose, *The Emperor's New Mind*, Penguin Books, New York, New York, 1991, p. 101.

METHODOLOGY

1. Hypothesis

We propose that Russell's Paradox, as mapped in the fashion which is proposed herein, is a key part of any social or physical organization.

2. Methods

We introduce a simple set of dichotomies to identify the key elements in Russell's Paradox. We then number the resulting quadrants, specifying that this numbering system will be used throughout these essays to track congruent "fractal" organization at higher levels.

3. Data

We present here a strictly philosophic argument underlying the rest of the essays.

4. Procedure

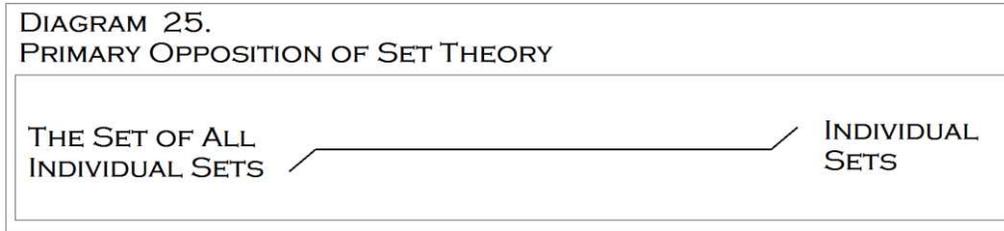
Let us begin then by proposing that the job of the mathematician or logician is to:

- (1) define the categories under investigation,
- (2) describe the relationships which these categories have to one another, and
- (3) come to conclusions as to the interaction between the categories described and the relationships inherent in these descriptions.

Consequently the three "planes of thought" forming the basis of an analysis of Russell's Paradox are the "plane of definition," the "plane of relationship," and the "plane of conclusion." These "planes of thought" represent the definitions, potential relationships, and conclusions every mathematician must consider in coming to any mathematical opinion. The interaction of these three planes of thought creates the pattern which underlies Russell's Paradox, as follows.

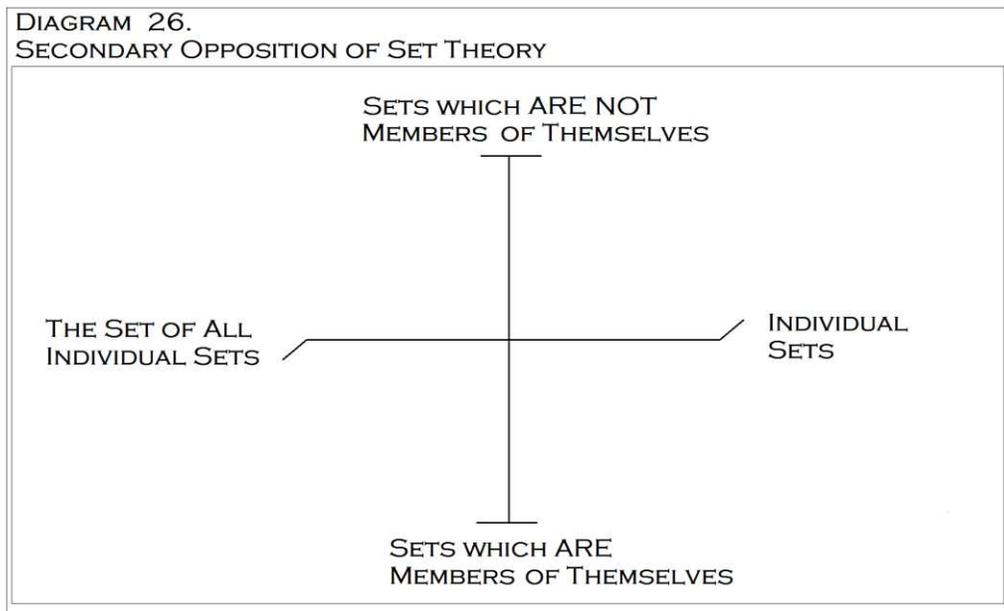
4.1 The Plane of Definition

Russell's Paradox begins by defining the following dichotomy:



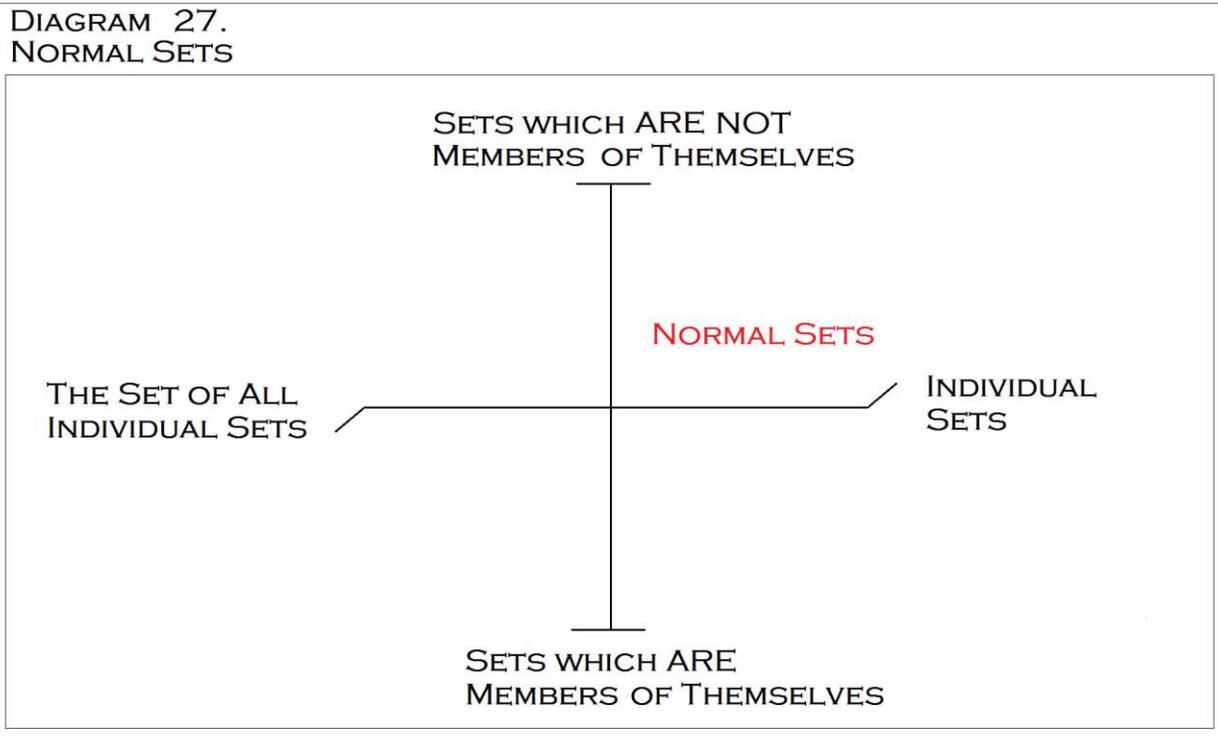
The horizontal symbol between this dichotomy is taken to be a gulf between opposites, the "Primary Opposition" of set theory. On the right hand side we might place "the set of odd numbers," or "the set of even numbers." On the left we have an enormous set, the set of ALL individual sets. The Primary Opposition represents a *difference in kind*, a difference in the basic nature of two things, as opposed to oppositions arising from a struggle between similar elements or a difference in gradation between similar elements.

Russell's Paradox then adds an additional opposition to the scheme, i.e. the distinction between sets which ARE or ARE NOT members of themselves.



The vertical symbol is intended to represent a Secondary Opposition, a different type of gulf between the ideas organized by the diagram. The Secondary Opposition represents an opposition based upon like natures in conflict or in some competition with one another as *gradations of the same basic nature*. A Secondary Opposition is one which, unlike the Primary Opposition, is not absolute or complete, because it deals with a form of opposition which is based upon difference with like categories, not differences in kind between the categories themselves. This leads to a clear division of four separate categories of sets. The terminology which is adopted for the purpose of this essay only is as follows.

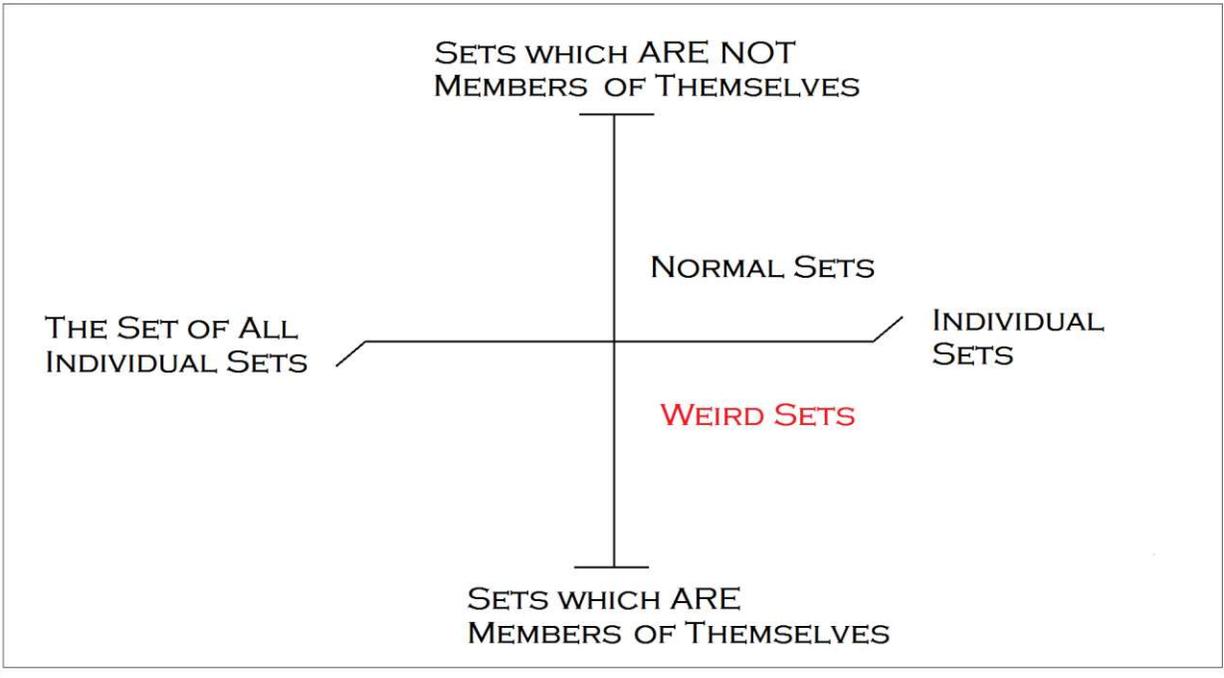
**4.1.1. Individual sets which are NOT members of themselves. (top right)
“NORMAL” SETS**



"Normal sets." A "Normal set" is "an individual set which is NOT a member of itself." The "set of all buffaloes" would be in the top right hand quadrant as a "normal" set. The "set of all buffaloes" is not a buffalo. The "set of all buffaloes" does not walk around North America, it does not eat grass, it is not covered with hair. Like most other sets this set is NOT a member of itself and would go in the top right hand corner. Obviously the "set of all buffaloes" is not a category including ALL individual sets - the set of prime numbers for example is not found within it. Therefore it can not be placed in either of the left hand quadrants. These sets are denominated "normal" sets because they describe categories typically thought of as "sets": the set of all real numbers, the set of all pigeons, the set of all red buffaloes, etc. It is true that each "normal" set might contain within it a potentially infinite number of sets (the set of buffaloes, the set of all red buffaloes, the set of all red buffaloes living in the 20th century, etc.) Our ability to describe in infinite detail the characteristics of any set however does not create therein a category of "ALL individual sets" whatsoever. The infinite amount of detail which might go into the description, still refers to a solitary set, i.e. "the set of all buffaloes." In any normal set, we deal still with some subset of the category "ALL individual sets."

4.1.2 Individual sets which ARE members of themselves (bottom right) “WEIRD” SETS

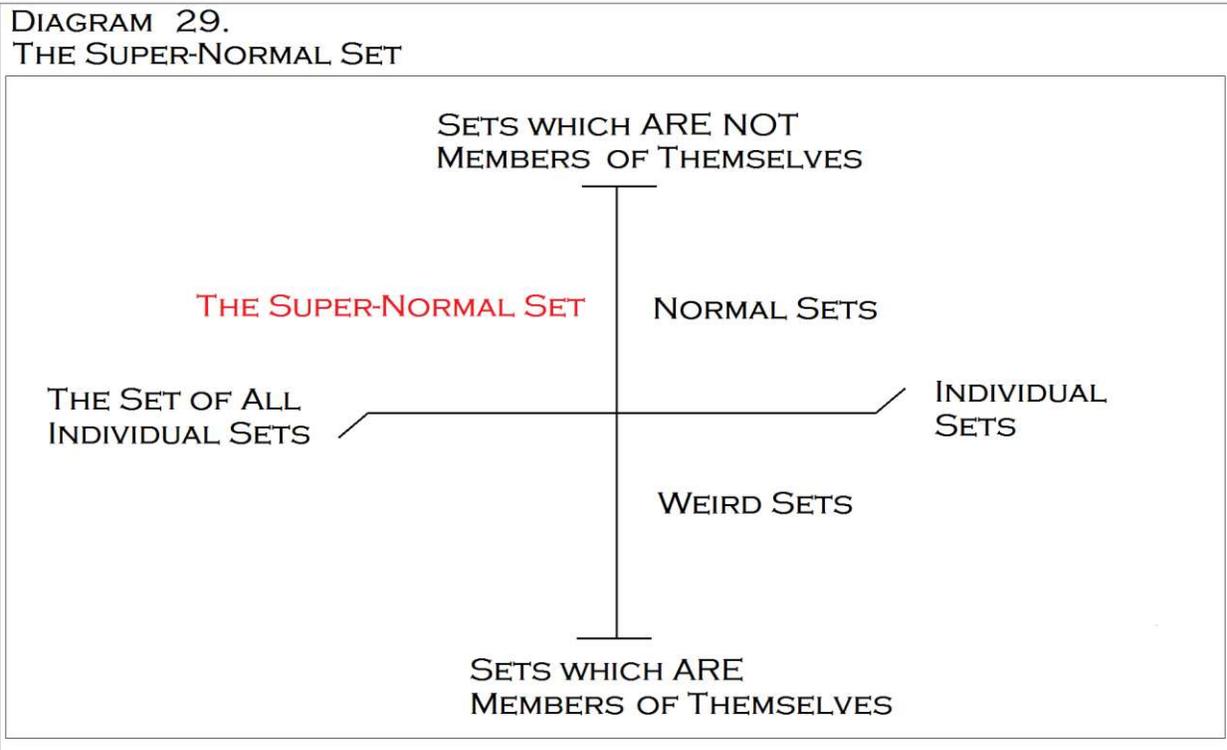
DIAGRAM 28.
WEIRD SETS



"Weird sets." A "Weird set" is defined as "An individual set which IS a member of itself." If we imagine "the set of all sets describable in twelve words or less" we see that we have created a "set" that is a part of itself. The set mentioned is described in eleven words and therefore falls within the parameters of the set described. (Eleven-word sets are a sub-set of the twelve-words-or-less set described.) This set is a member of itself and therefore must fall in the bottom right hand quadrant. Because the set is one which is contained within itself it must be excluded from the top quadrants. Because there are many sets which are not describable in twelve words or less and which are yet members of themselves ("the set of all sets describable in twenty ancient Arabic words or less") this set does not include ALL sets which might be members of themselves and is therefore not found within the left-hand quadrants.

We must see that for any "set" to be a member of itself, we must deal with "sets" within "sets." This convolution of language creates a very weird form of set, and the term "weird" is used to characterize the bottom right-hand quadrant.

**4.1.3 The set of ALL individual sets which are NOT members of themselves (top left)
 “THE SUPER-NORMAL” SET
 (also known as “The Russell Set”)**



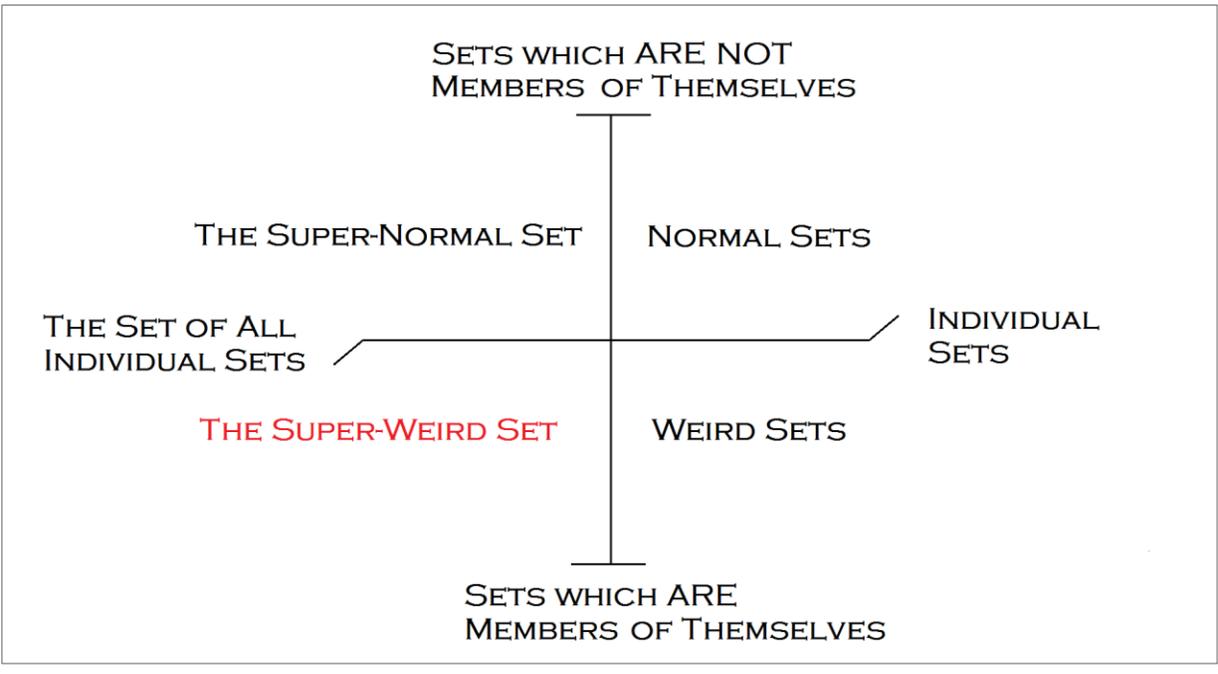
"The Super-normal Set." Let us suppose that we attempt to draw a connection between the "collections of ALL individual sets" with both "normal" and "weird" sets. Looking at our above diagram we would expect that the "Super-normal set" would be simply an enormously large collection of ALL normal sets. Conversely we would expect that the "Super-weird set" would be an enormous collection of all "weird sets."

For purposes of drawing a relationship between the word "individual sets" and "the set of ALL individual sets" let us mark the top left hand quadrant as the "Super-normal" set. "Normal sets" are then defined as "Individual sets which are NOT members of themselves." The Super-normal set is defined as "The set of ALL individual sets which are NOT members of themselves."

The "Super-normal" set is generally referred to as "The Russell Set" because it leads to an investigation of Russell's Paradox. The term "Super-normal" is used here simply to emphasize graphically a tremendously large collection of "ALL" "Normal" sets.

**4.1.4 The set of ALL individual sets which ARE members of themselves (bottom left)
“SUPER-WEIRD” SET**

DIAGRAM 30.
THE SUPER-WEIRD SET

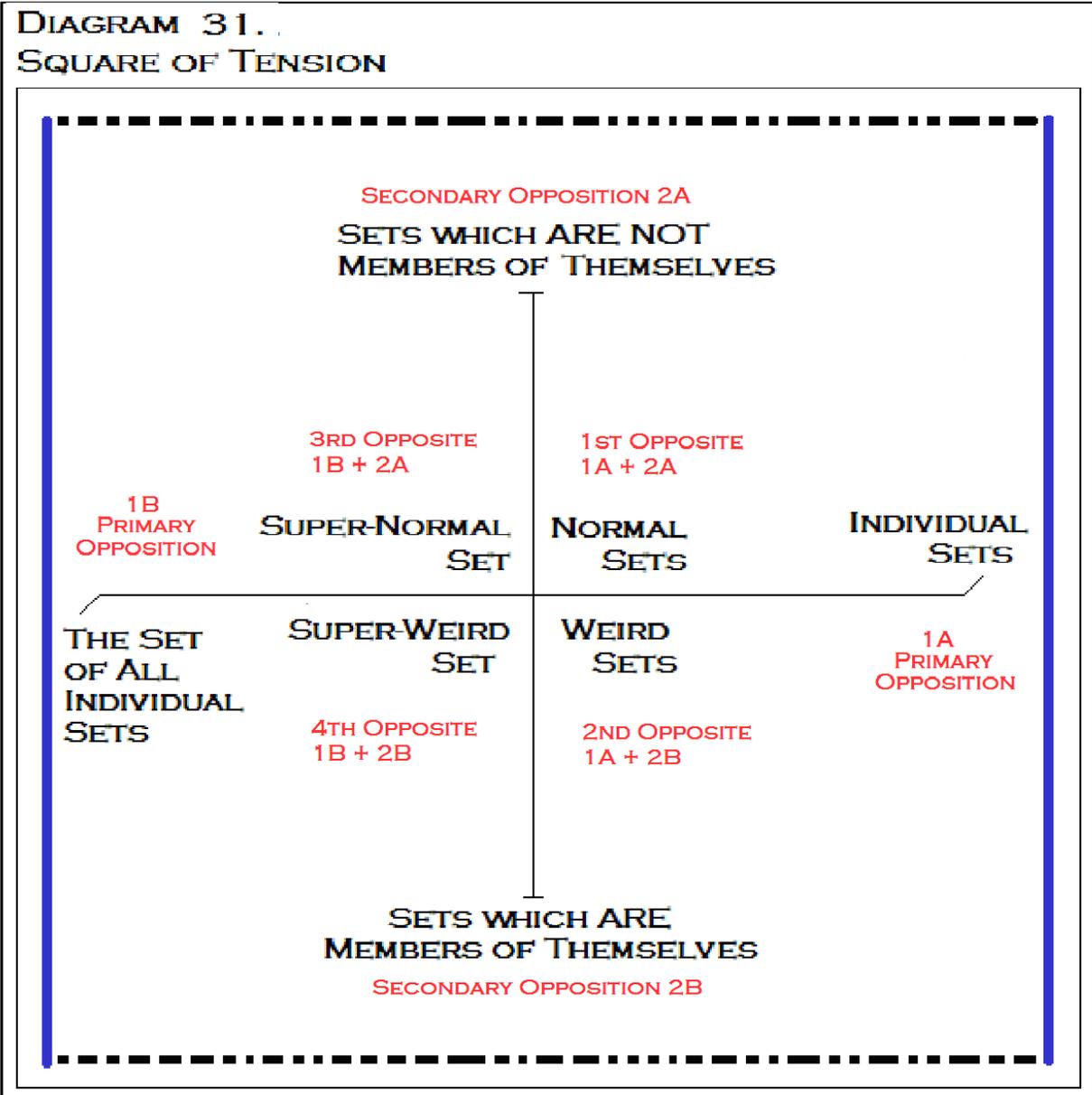


"The Super-weird set." Conversely we might draw a similar relationship between the individual "weird" set and the collection of ALL weird sets. This quadrant will be referred to as the "Super-weird" set. "Weird sets" are defined as "individual sets which ARE members of themselves." The "Super-weird set" is defined as "The set of ALL individual sets which ARE members of themselves."

This first set of four quadrants is referred to herein as simply "the definitional plane." Mathematicians must first begin their work by defining certain ideas. No attempt has yet been made to study the relationships between these defined "normal sets," "weird sets," the "super-normal set," or the "super-weird set," or to draw conclusions from these definitions and/or relationships.

These four vectors, or logical outcomes, are the four corners of this “map” of set theory, represented by the terms “Normal Sets,” “Weird Sets,” “The Super-Normal Set,” and “The Super-Weird Set.”

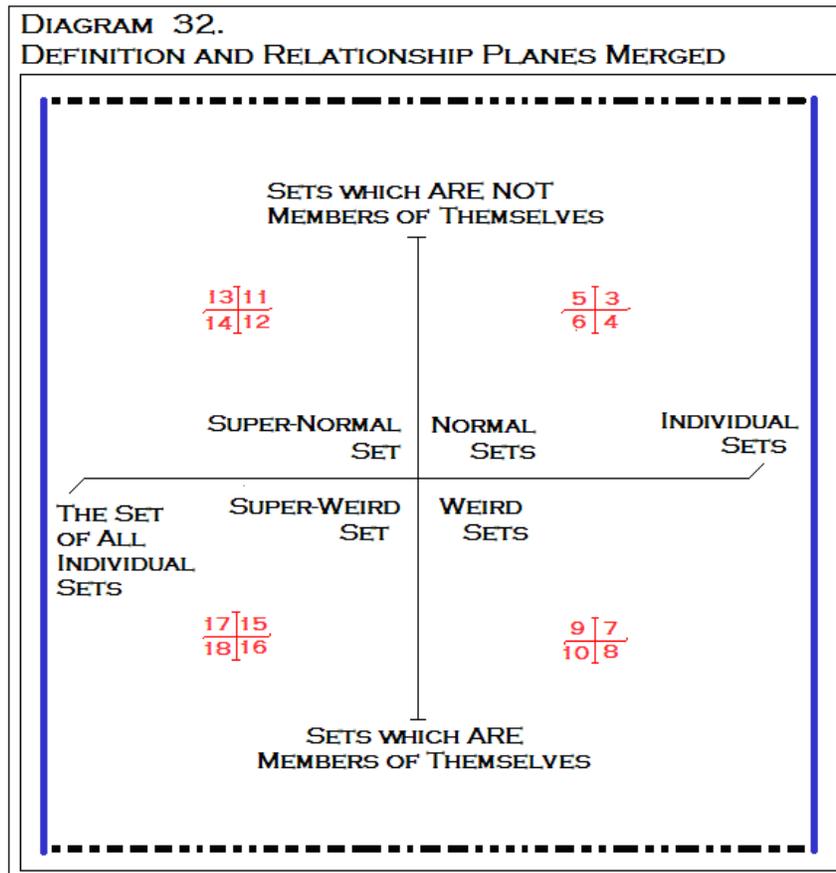
The following square of tension is at the root of set theory. The dotted horizontal lines represent a gulf, created by the Primary Opposition, which occurs between the notions of “Individual Sets” and “The Set of ALL Individual Sets.” The blue vertical lines represent the Secondary Opposition created by the distinction between sets which “ARE NOT members of themselves” and sets which “ARE Members of Themselves.”



4.2 The Plane of Relationship

In order to study the relationships between these defined categories to each other, we would see that "normal sets" have some sort of relationship to themselves, to weird sets, to the super-normal set and to the super-weird set (3-6). Similarly weird sets have some sort of relationship to themselves, to normal sets, to the super-normal set and to the super-weird set. (7-10) The supernormal set has a relationship to itself, to normal sets, to weird sets and to the super-weird set. (11-14) Finally the super-weird set has a relationship to itself, to normal sets, to weird sets, and to the super-normal set. (15-18)

This could be pictured as the following, where the red cross represents the importance of the Relationships between these four categories and the category of the "Super-weird set."



The vertical blue lines represent the tensions generated between types of sets which have something in common (on the right, both are individual sets; on the left, both are enormous collections of ALL sets) yet nevertheless are in direct conflict with each other as to the issue of membership in the set. The horizontal dotted lines represent a gulf, an impossibility, an absolute logical exclusion. As viewed herein the concepts of a single, simple "individual set" versus an enormous and potentially infinite collection of "ALL individual sets" are mutually exclusive.

This has occurred by squaring the number four, i.e. multiplying the four initial *definitions* of "types of sets" by the four *relationships* inherent in these defined types of sets. This might be imagined as setting up a second "plane of relationship."

4.3 The Plane of Conclusion

We may treat the concept of "defining" in mathematics, and of interpreting "relationships" between defined entities, as two separate aspects which "control" our "conclusion" to any question.

Taking Euclid's geometry, for example, we find the word "point" defined as "that having no part." If we ask how many parts the point has, we must conclude the answer to be "none" upon the strength of the *definition* of "point" itself. The definition of "point" controls the answer "none." Other relationships within Euclid's geometry are unnecessary in order to resolve the question.

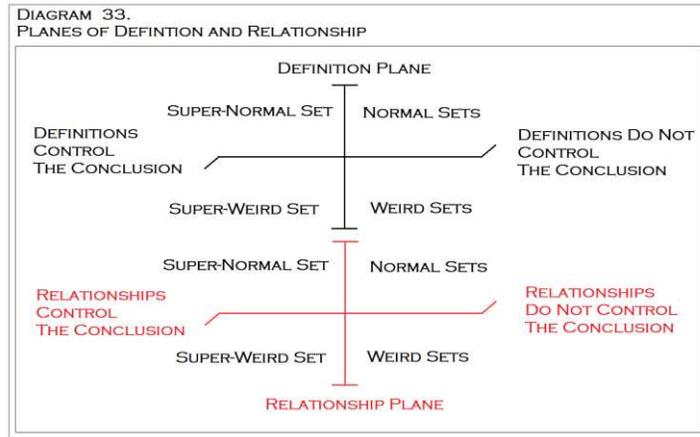
If we ask if two lines which intersect define but one point, we must seek to understand *both the definition of the point as well as the relationships contemplated* within Euclid's geometry between points, lines, planes, angles, etc. In this instance both the definition of point as well as its relationship to the concepts of lines in space control the answer "one."

We might ask how many points lie between any two points? In this case the definition of point is uncertain in providing an answer. Nevertheless the *relationships* contemplated between points on a line give us the answer of "infinity." Here the relationships contemplated control the answer given of "infinity." If we see in these definitions and relationships between concepts a continual overlap we understand the nature of mathematics and its approach to reality.

Finally we might ask, "What color is a point?" To this we must answer that *neither the definitions nor relationships contemplated* control the answer, any more than one may answer questions pertaining to the size, smell or marital status of geometric constructs. Within the framework of definitions contemplated and relationships assigned in Euclidean Geometry, such questions are not contradictory or ambiguous but are rather void of controlling answer.

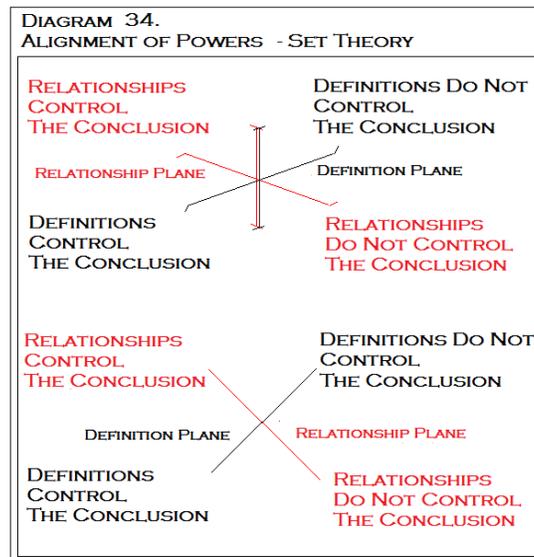
Let us begin by seeing in the Plane of Definition and the Plane of Relationship two fundamental forces controlling the development of mathematics. These planes are the underlying basis upon which the previous dichotomies of "Individual Sets" and "The Set of ALL Individual Sets" are written, and they have their own oppositions. These oppositions concern the extent to which either "Definition" or "Relationship" control the final conclusion to any answer given.

To imagine the development of a "Plane Of Conclusion" we might state the "Plane of Definition" with the "Plane of Relationship" separately, and then align them along a common axis, in the case of Russell's Paradox, a common axis of set membership (i.e. sets which are/are not members of themselves).



To answer any question in mathematics either the definitions proposed, or the interrelationships specified, must control the answer. The mathematician must reach any specified conclusion based upon the adequacy of the definition of a given set, or upon the relationships mandated by the definitions adopted.

The mathematician now is expected to come to conclusions regarding the interplay between the definitions proposed and the interrelationships inherent in the definitions proposed. We should treat the concept of "defining" in mathematics, and of interpreting "relationships" between defined entities, as two separate aspects which "control" our answer to any question. As this pertains to any branch of mathematics, we would then have the following "conclusion" plane:



A fundamental expectation of every form of mathematics is that one of these quadrants will render an appropriate answer.

4.3.1 Conclusions Regarding The Super-Normal Set (a.k.a. The Russell Set)

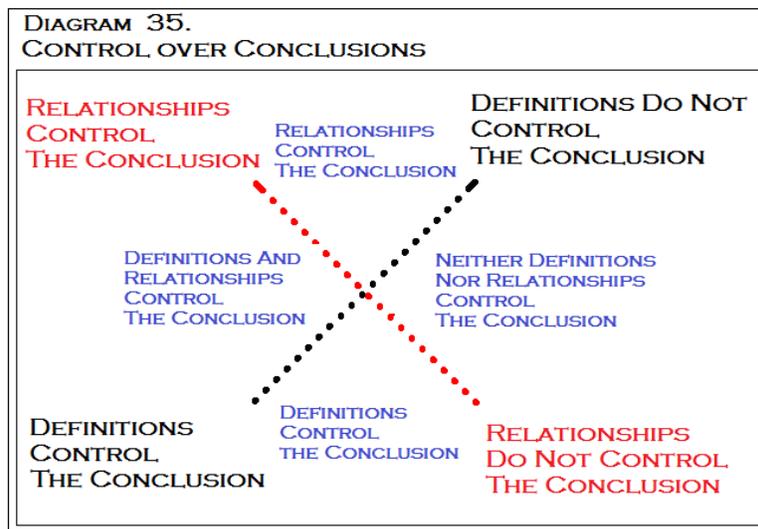
As stated at the outset of this discussion, “Russell's Paradox” asks the following question:

Is the "set of all individual sets which are NOT members of themselves" a member of itself?

Referring to the “super-normal set” as the “set of all individual sets which are NOT members of themselves” (traditionally named elsewhere as the “Russell Set”), we have noted that if we say that the super-normal set IS a member of itself, we say that it is included in the set defined as "the set of all sets which ARE NOT members of themselves." However this is a blatant contradiction of the definition of the set proposed, because only sets which ARE NOT members of themselves are to be permitted entrance into the set as defined.

On the other hand, if we say that the super-normal set IS NOT a member of itself then we MUST include it within itself in order to satisfy the terms of the set proposed, i.e. "the set of ALL sets which ARE NOT members of themselves." If we leave this set out of itself under these circumstances we have left out one set from the category SUPER-NORMAL sets, to wit: itself. In this event we cannot say that ALL sets have been included therein and again we contradict ourselves.

In the case of “Russell's Paradox” and the Super-normal set we are uncertain about the Definitions, and the Relationships, which control the answer to the Paradox.

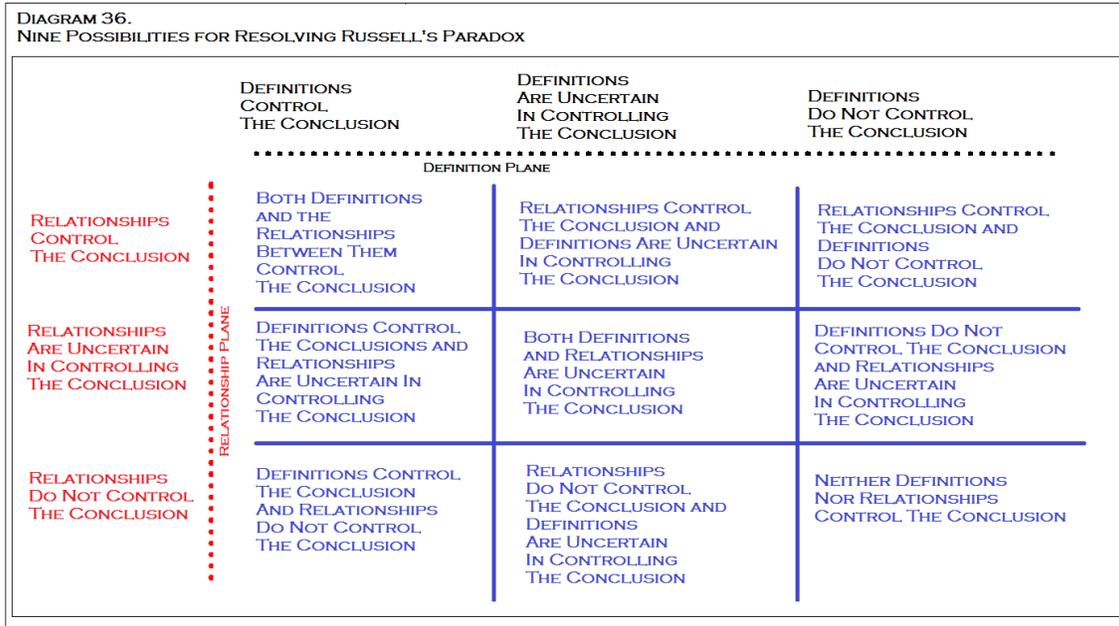


The uncertainty created by the Paradox creates a new and unavoidable variable in the matter. This variable is the extent to which the “Definitions Are Uncertain In Controlling The Conclusion,” and the extent to which “Relationships Are Uncertain In Controlling The Conclusion.”

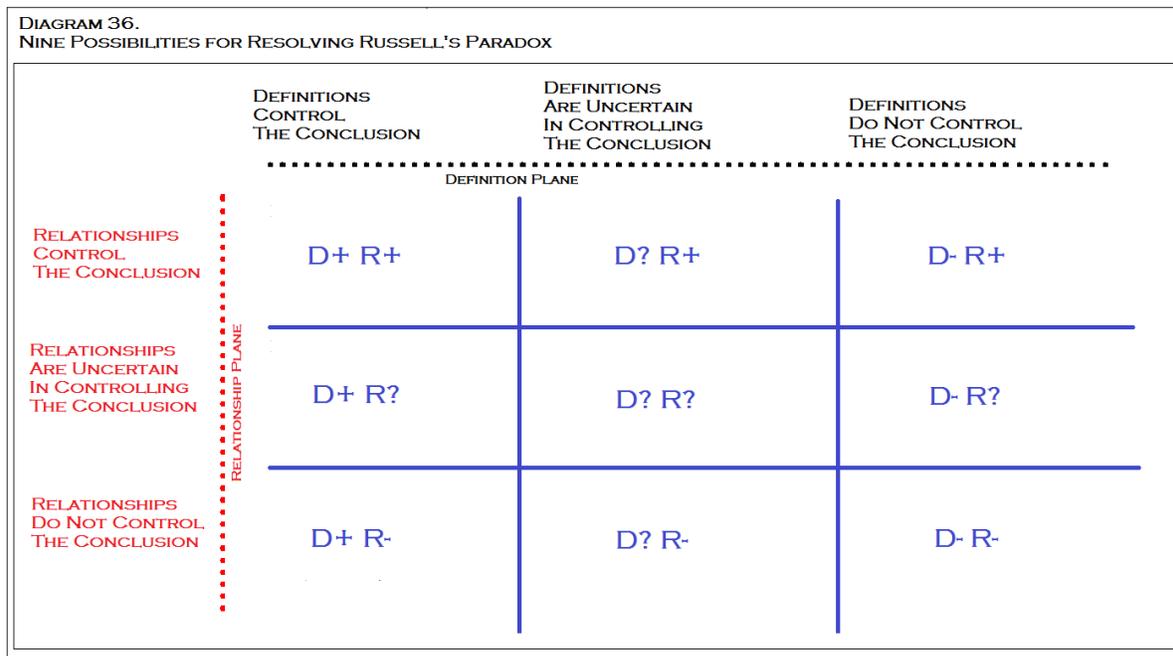
When we deal with the Supernormal Set, the uncertainty we face regarding our *Definitions*, renders the following two new possibilities.

Similarly, when we deal with the Super-normal Set, the uncertainty we face regarding the *Relationships* renders two more possibilities.

The checkerboard of possibilities below represents the uncertainty inherent in the contradictions found in Russell's Paradox. To determine whether the Super-normal set is a member of itself we face nine separate possibilities: That is to say, in attempting to align the concepts of definition and relationship in answering whether the super-normal set is a member of itself, we have nine possible answers, none of which takes precedence over the others.



... or in simplified notation:



If we place this in the “Conclusion Plane” within the Relationships of the Super-normal set to itself, we have (19-27), below.

Is the super-normal set a member of the category of sets known as “normal sets”? (28-36) Only sets which are not members of themselves are permitted into this category. The previous discussion makes clear that the decision to include the super-normal set as a member - or a non-member - of itself results in nine possible conclusions symbolized by the checkerboard pattern, this time located in the relationship which the super-normal set has to normal sets. Thus we are forced to repeat the nine-part answer as before.

The intense sense of uncertainty as faced at these two portions of the upper-left quadrant are correlated to the intense uncertainty which typifies the comparable period of American Economic History, as presented in the preceding set of five essays on the mathematic prediction of social and economic crises.

DIAGRAM 37.
POSSIBILITIES REGARDING RUSSELL'S PARADOX

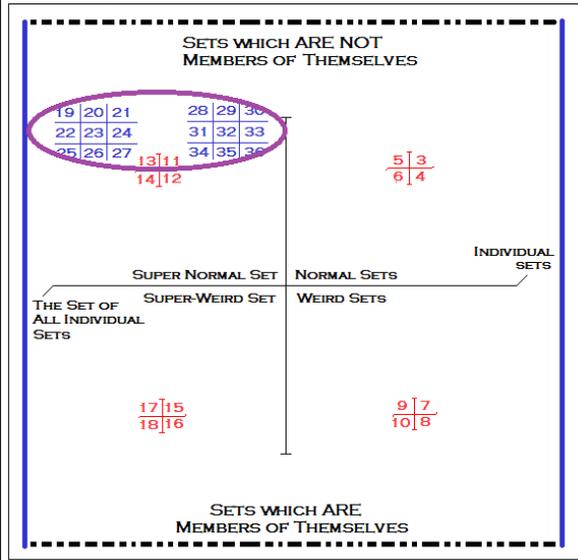
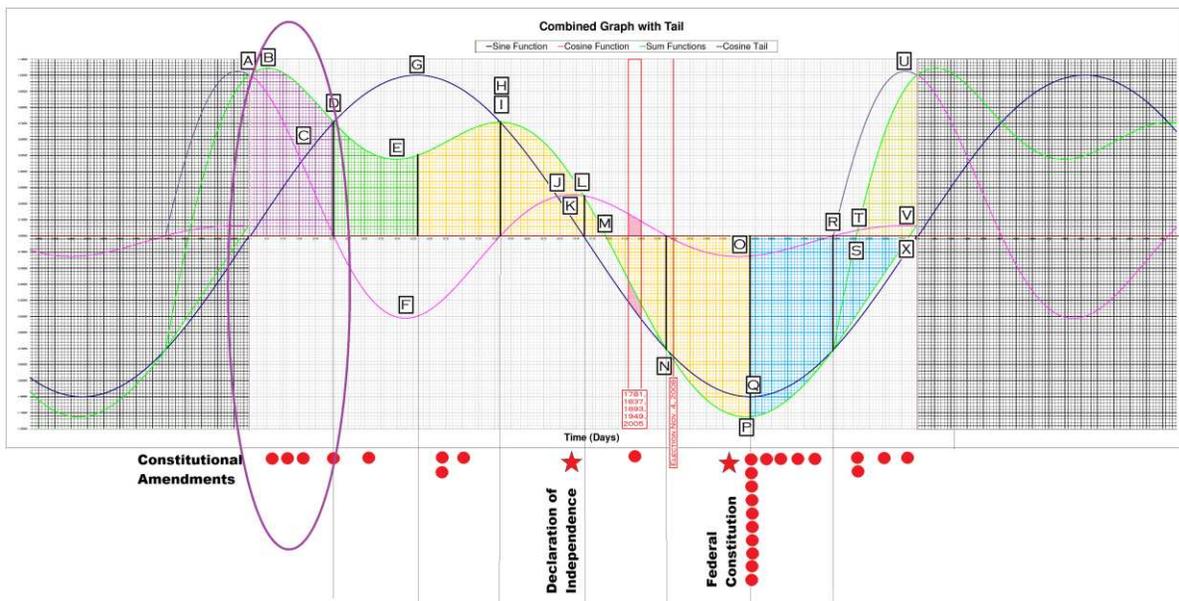
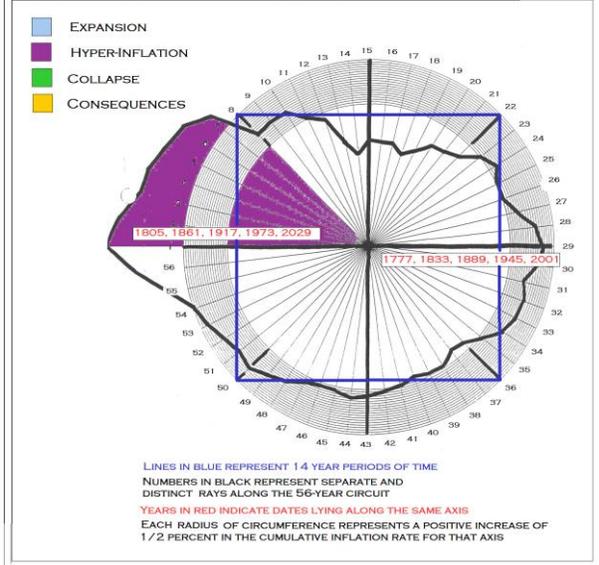


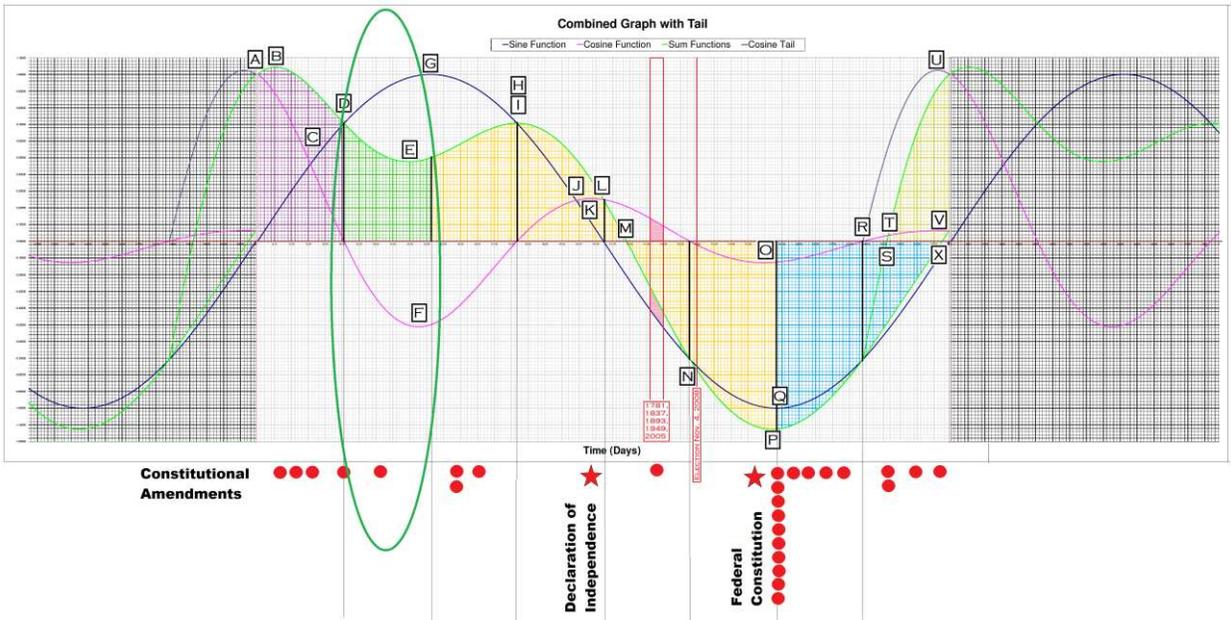
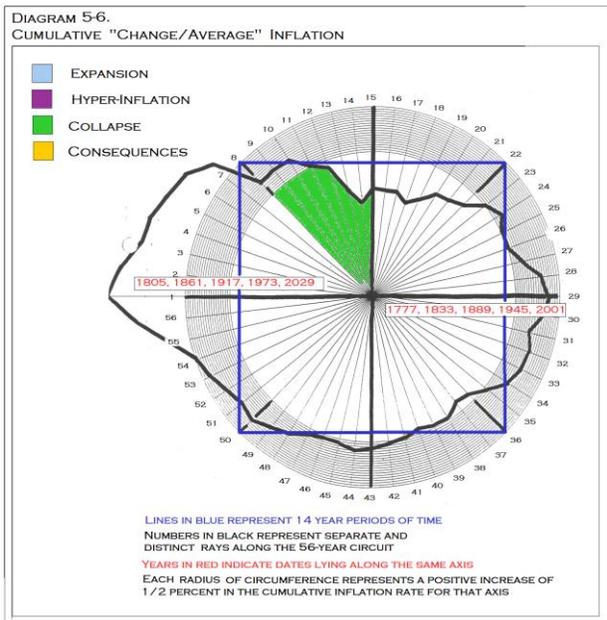
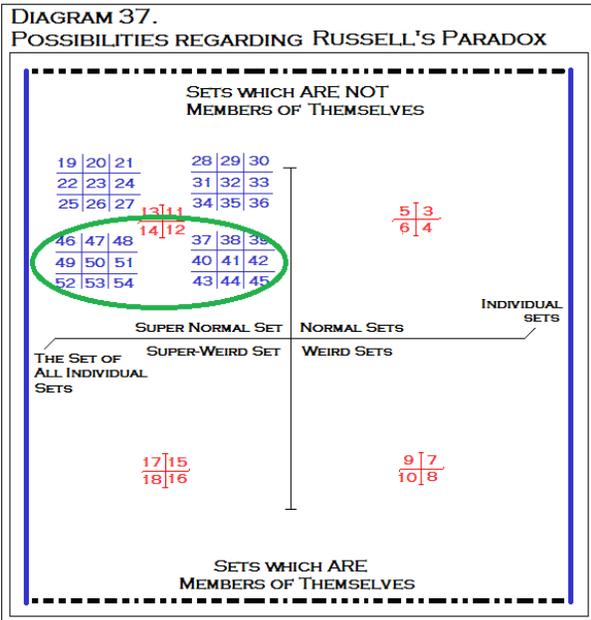
DIAGRAM 5-6.
CUMULATIVE "CHANGE/AVERAGE" INFLATION



Is the super-normal set a member of the category of sets known as "weird sets?" (37-45) Only sets which are members of themselves are permitted into this category. Again the previous discussion makes clear that the decision to include the super-normal set as a member - or a non-member - of itself results in nine possible conclusions symbolized by the checkerboard pattern, this time located in the relationship which the super-normal set has to weird sets. Thus we are forced to repeat the nine-part answer as before.

Is the super-normal set a member of the category of sets known as "the super-weird set?" (46-54) Only sets which are members of themselves are permitted into this category. Again the previous discussion makes clear that the decision to include the super-normal set as a member - or a non-member - of itself results in nine possible conclusions symbolized by the checkerboard pattern, this time located in the relationship which the super-normal set has to the super-weird sets.

The uncertainty of the first section of this quadrant (correlating with hyper-inflation) now leads to an imploding uncertainty (correlating with collapse). This is compared to American Economic History, as follows.



The essential ambiguity of the super-normal set to itself places the relationships of this category with all other sets in doubt. We are unable to establish clear conclusions for the "Super-normal set" with itself, with normal sets, with weird sets and with the Super-weird set.

This pattern is one of necessity. The logical impossibility present when the super-normal set attempts to clarify a definition of or relationship with itself renders impossible a further description of its relationship with other defined types of sets, including its position as a "normal set." Unable to discuss "normal" sets in the context of the super-normal set we are unprepared to discuss or decide relationships with the weird, and the super-weird set. The contradictions of Russell's Paradox force this effect only upon the super-normal set and conclusions regarding it.

4.3.2 Conclusions Regarding Individual Sets (Normal and Weird)

We might expect that this same uncertainty would ruin any chance of a coherent set theory. If this was the case we might expect that these same nine possibilities would “infect” every other quadrant anticipated under the Definitions and Relationships envisioned.

Plainly, this is not the case. If we ask the question "Is a normal set a member of itself?" we ask: "Is an individual set which is NOT a member of itself a member of itself?" The answer is no, based upon the clear definition of terms. Moreover the relationships envisioned in set theory do not permit us to answer the question other than "no." Because we have no *inherent* uncertainty or contradiction, no unavoidable and relentless ambiguity, we may return to a simple and straightforward placement of planes.

That is to say, when dealing with normal sets, set theory is capable of reaching clear and consistent conclusions without paradox or contradiction. (55-58)

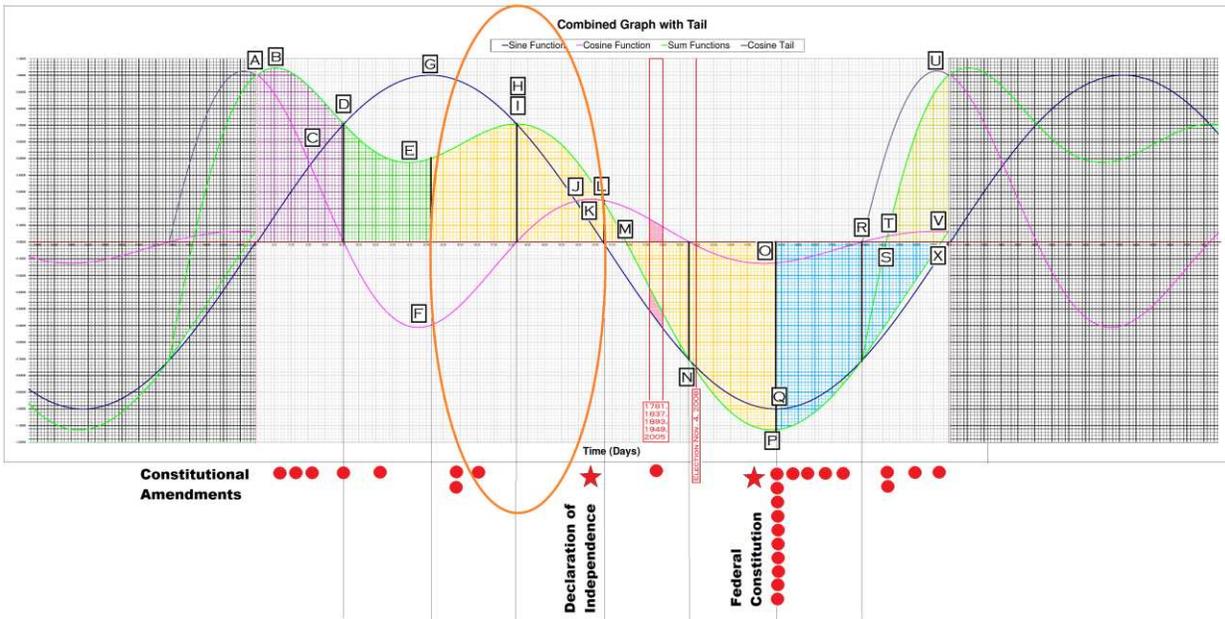
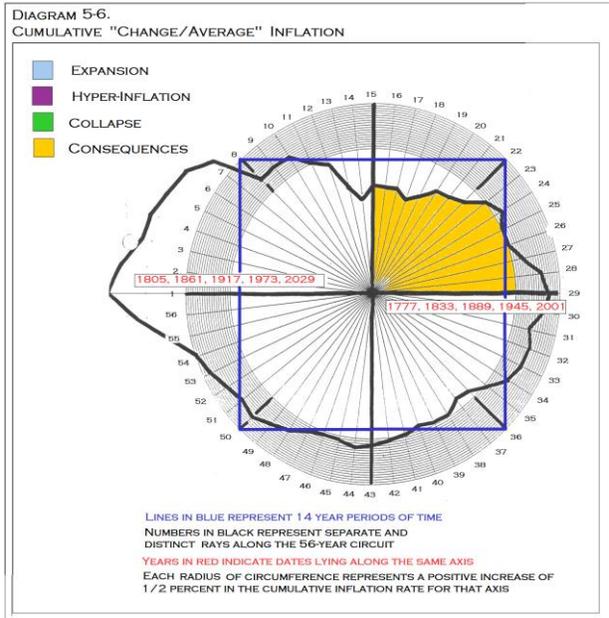
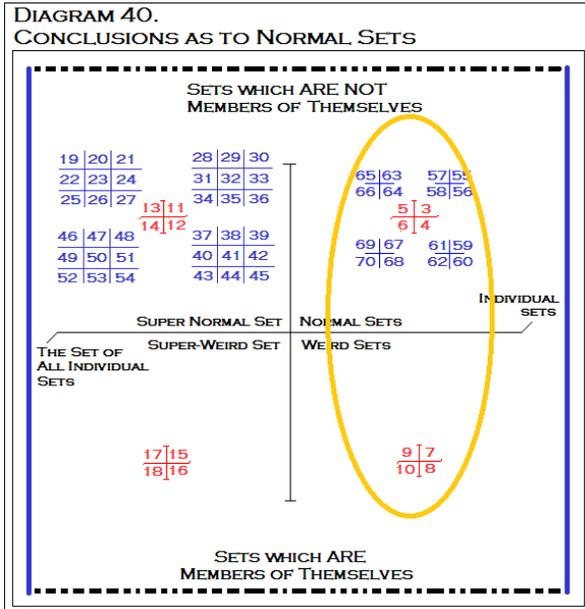
If we ask whether a normal set may be a member of the category known as "weird sets," we ask again whether an individual set which is NOT a member of itself IS a member of itself. Again the answer is "no" based upon the definitions proposed and the relationships understood. Unlike the Super-Normal Set, there is no *inherent* ambiguity or uncertainty. (59-62)

If we ask whether the normal set is a member of the category known as the super-normal set- the set of ALL individual sets which are NOT members of themselves- the answer must be yes, since any normal set is defined as an individual set which is NOT a member of itself. Again we face no *inherent* uncertainty. (63-66)

Regarding our previous discussion of Russell's Paradox, this position is something akin to noting that this view of set theory is non-commutative; that is, the statement " $A + B = B + A$ " is not necessarily a true statement. From the point of view of normal sets, there is no particular problem in seeing that they are part of a broad conceptual framework "all sets which are not members of themselves," i.e. the super-normal set. From the standpoint of the super-normal set, however, membership of ALL normal sets within it - at least in regards to itself - renders considerable *and inherent* ambiguity of result.

If we ask whether a normal set is a member of the category known as the super-weird set- the set of all individual sets which ARE members of themselves- the answer must be no, because a normal set is defined as an individual set which is NOT a member of itself. It may not be included in such a set. Again there is no *inherent* uncertainty. (67-70)

The correlation here is to a more stable, less uncertain portion of economic history.



If we ask whether a weird set is a member of the category known as "normal sets," we ask "Is an individual set which IS a member of itself NOT a member of itself?" The question contradicts itself on its own terms and must be answered "no." There is no ambiguity or contradiction *inherent* in the question. (71-74)

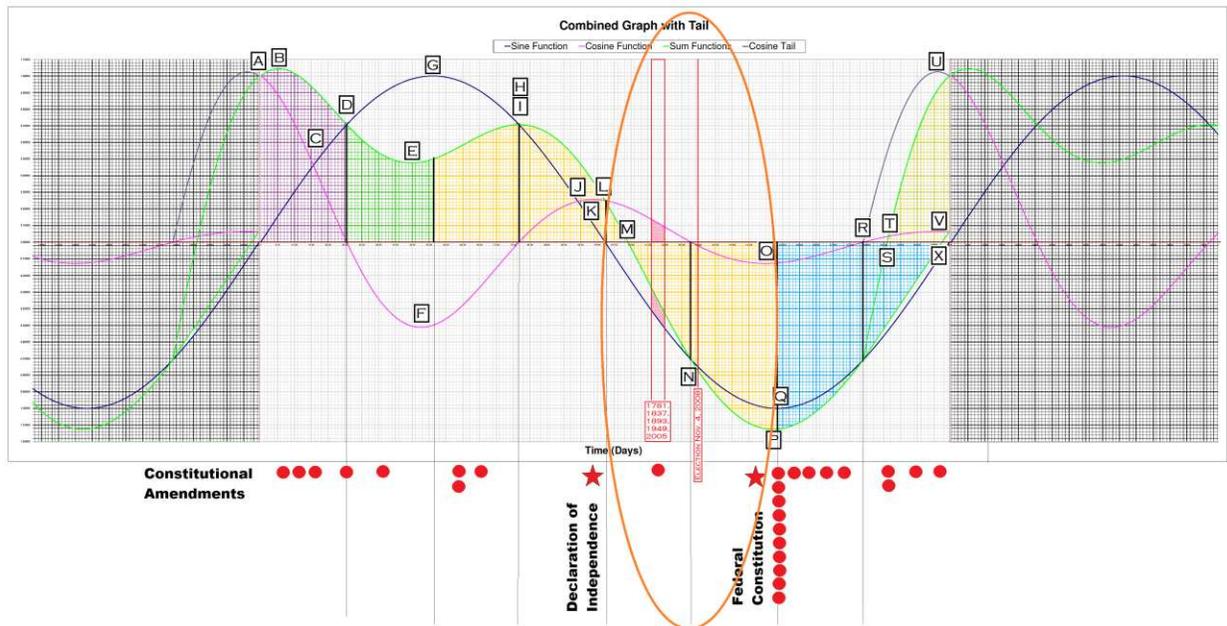
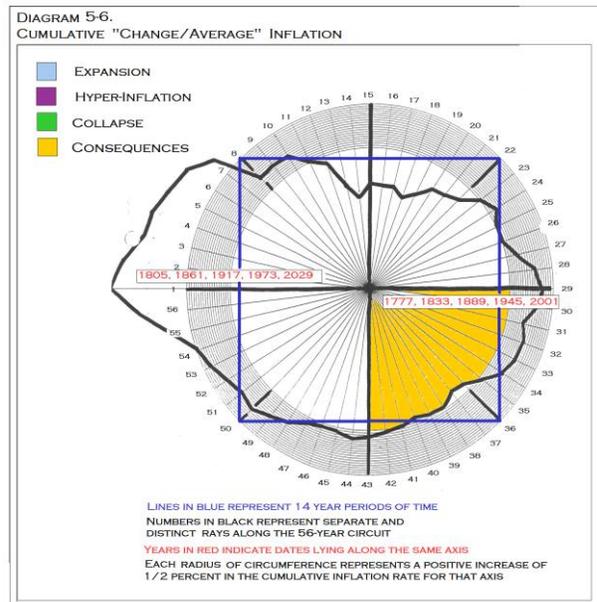
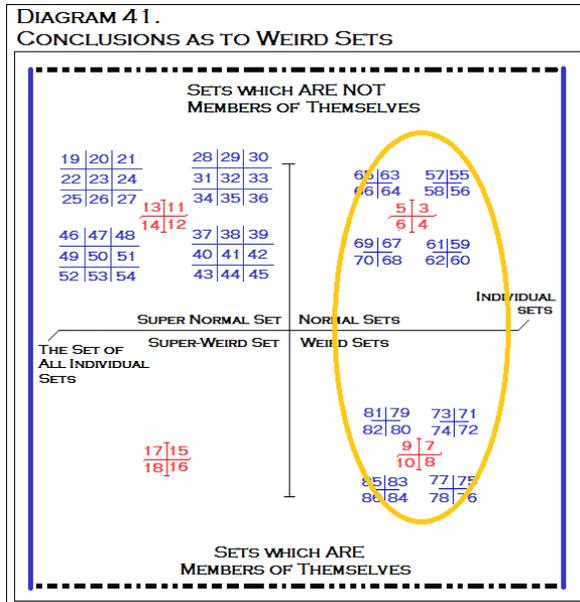
If we ask whether a weird set is a member of itself, we ask, "Is an individual set which IS a member of itself a member of itself?" Based upon our definitions proposed we must say "yes." There is no *inherent* uncertainty in the answer. Again set theory seems consistent when dealing with this category of set. (75-78)

If we ask whether a weird set is a member of the category known as the super-normal set we ask "Is an individual set which IS a member of itself a member of the set of ALL individual sets which are NOT members of themselves."

The conclusion reached must be "no". There can be no uncertainty or ambiguity in the answer under the definitions or relationships defined. Unlike the Super-Normal set, we do not face here *inherent* uncertainty. (79-82)

If we ask whether a weird set is a member of the category known as the super-weird set, we ask "Is an individual set which IS a member of itself a member of the set of ALL individual sets which ARE members of themselves?" The answer must be yes. In so far as it is one set which is a member of itself, it must be considered a member of the set of ALL sets which ARE members of themselves. Again, there is no *inherent* paradox or uncertainty in the answer. (83-86)

This completes the right hand side of economic history, that part dedicated to stability and consolidation.



The definitions and relationships specified for both quadrants of the right hand side ("Individual sets") are clear. In order to determine whether a set is either "normal" or "weird" we need only refer to the set as defined. There is no inherent contradiction in dealing with these sets as presented. There is no ambiguity here because of the limited and individual nature of the sets themselves. As a result the concepts inherent in large collections of these sets ("ALL" sets which are/are not members of themselves) are not difficult to define or to understand relationships between individual defined types of sets.

For example, "the set of all sets describable in five words or less" includes within it "the set of prime numbers" but does not include itself. Both of these sets are normal sets because neither includes itself.

"The set of all sets describable in twelve words or less" is a member of itself and therefore a weird set because it is described in eleven words. "The set of all sets describable in fifteen syllables or less" does not include itself and is therefore a normal set because it uses 17 syllables to describe itself. None the less this normal set includes within it the previous set mentioned ("twelve words or less"), a weird set. "The set of prime numbers," on the other hand, is a normal set contained in the weird set described.

Thus weird sets may contain normal sets and normal sets may contain weird sets. The definition of whether these sets may contain themselves does not affect the clarity with which the categories of sets may function.

4.3.3 Conclusions regarding The Super-Weird Set

Regarding the Super-Weird set, let us ask: "Is the set of ALL individual sets which ARE members of themselves a member of itself?"

Note: The terms proposed do not suggest an answer.

If we say – arbitrarily - that the super-weird set IS a member of itself, we include it as a member of "the set of all individual sets which are members of themselves."

On the other hand, if we say – equally arbitrarily – that the super-weird set IS NOT a member of itself, we exclude it from "the set of all individual sets which are members of themselves."

In this case, unlike the Super-Normal set, we do not contradict the definition or relationships of the Super-Weird set by either excluding or including the set as a member of itself. Here the answer must be a Yes-or-No without any hint of logical preference toward the outcome of the question. Because this result is not in accord with the clearly defined "conclusion" plane used elsewhere, let us simply mark it as a Yes-No choice. (87-88)

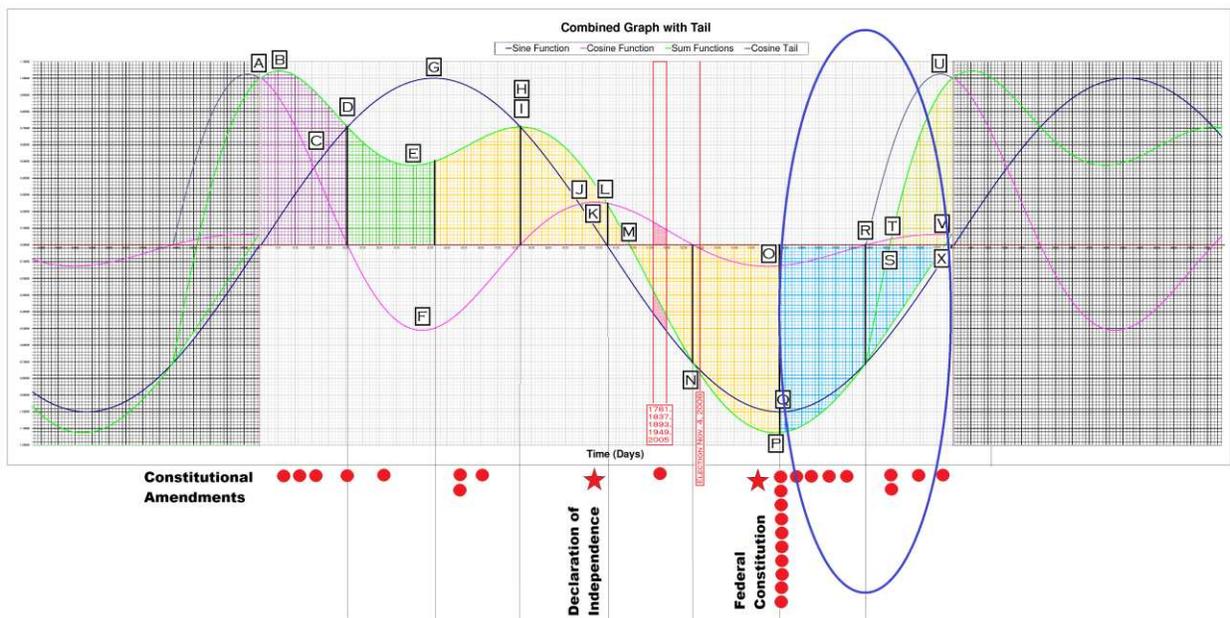
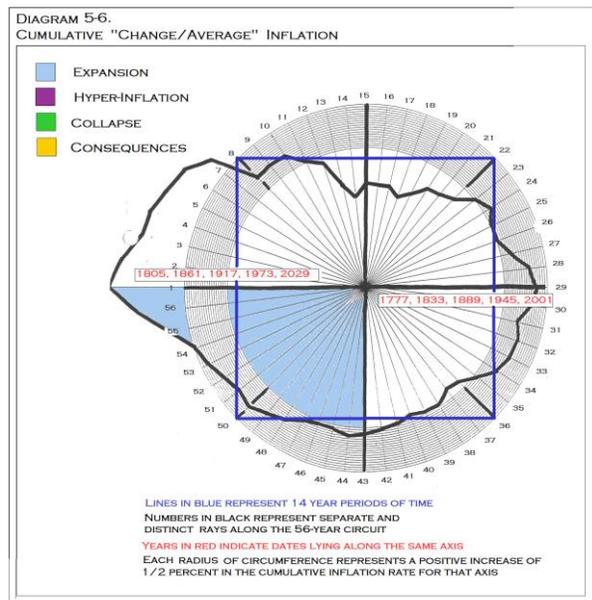
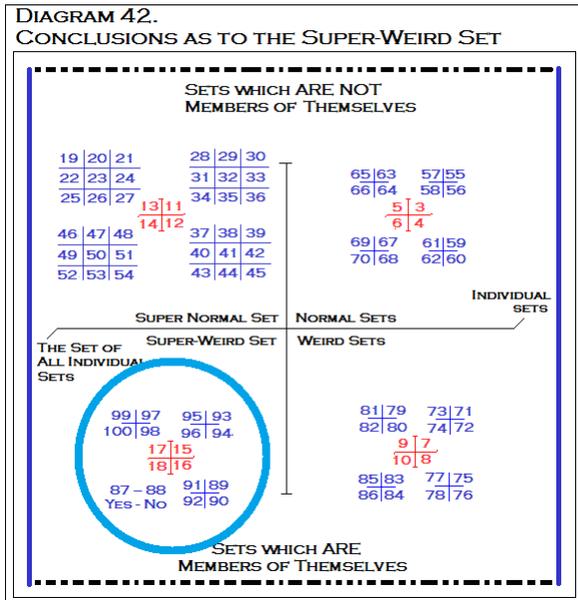
If we now ask whether the Super-Weird set is a member of the category known as "weird sets" we ask "Is the set of ALL sets which ARE members of themselves a member of itself?" If we have given a "Yes" to the first question ("Is it a member of itself?") we may give a "Yes" to this one as well. On the other hand, if we have given a "No" to the first question we must give a "No" to this one as well. The only uncertainty to the question lies in the nature of the initial question. Once the answer is determined, the conclusion reached in this question is not subject to any inherent uncertainty or contradiction. The simple blue cross is in tact, although the specific answer given relies entirely on the issue presented in the first question. (89-92)

If we ask if the super-weird set is a member of the category known as "normal sets" we ask "Is the set of ALL individual sets which ARE members of themselves a set which is NOT a member of itself" Once again our answer is premised upon the choice we have made at the outset. If we have said "No" to the first question, we have said that the Super-Weird set is NOT a member of itself. In this case, we must answer "yes" to the present question, i.e. that it IS a set which is NOT a member of itself- i.e. a normal set.

On the other hand, if we have said that the super-weird set IS a member of itself, then we must say No, it is NOT a normal set. Again the terms of the relationships and definitions are not contradictory, although they do not suggest a preferred resolution and they rely entirely upon the answer given in the first question. (93-96)

Finally, if we ask whether the super-weird set is a member of the category known as "the super-normal set," we ask "Is the set of all individual sets which ARE members of themselves a member of the set of ALL individual sets which are NOT members of themselves?" Again our answer lies in the choice made initially. Once made- "Yes-or-No" -there is no contradiction to including or excluding it from membership in the super-normal set, and in fact, must be included/excluded under the definition of the super-normal set. (97-100)

This "Yes-No" characteristic is completely different than any of the other quadrants. Consequently an expansion of ideas, mind-sets, "consciousness" results when society travels through this period of economic history. As seen previously, this period is clearly connected with the development of constitutional amendments whereby people say "Yes" and "No" to their circumstances with great determination.



This is the final design which is proposed herein for the foundation of set theory and Russell's Paradox within it. At present only the top-right quadrant ("normal sets") are considered clear enough to warrant approval. By virtue of the definition of a set, the three remaining categories of sets - super-normal, weird and super-weird - are ignored.

CONCLUSION

Alan Weir, in his essay entitled *Naïve Set Theory Is Innocent!*, makes the following comments regarding the present state of affairs.

The philosophic community is notorious for rarely reaching a consensus, even after thousands of years of discussion of a topic. This ought to be seen as evidence of the depth of the subject. Even so, it is natural to want to point to some philosophical problems which have been conclusively resolved in order to counter any suggestion that the subject is entirely empty or lacking in content; and so natural, in turn, to dismiss as mischief-makers those iconoclasts who seek to overturn even such limited consensus as exists. Though in general (I feel) sympathy with this reaction, I feel the need to demur from the consensus at, perhaps, one of its most firmly held points. This is the almost universal belief that naive set theory, a theory which had seemed well-nigh self-evident, has been shown to be false by the set theoretic antinomies.

...

(L)ike most of our fundamental concepts – cause, substance, person, etc. – the naïve notion of set and the naïve notion of class ... evolved undesigned. Consider seventeenth century cases such as Locke's 'which Operation ... do furnish the Understanding with another set of *Ideas*'; or Evelyn's 'Anemomies and Flowers and that Class should be discretely pruned.' These examples make it plausible that 'set' and 'class' have long had a usage in which they mean something like 'natural kind.'

But even if I am wrong on the history and the naïve notion of class or set did not evolve but was invented, I want to maintain that that invention was borne out of necessity and we cannot now disinvent the naïve notion any more than we can disinvent nuclear weapons. But if that is the case, will not disaster ensue at least in the set-theoretic case?³⁴

We argue herein that disaster is not born from the map proposed. It is hoped that if mathematicians and logicians accept the above design as accurate and descriptive of the present situation *visa vi* the foundation of mathematics, i.e. as to Russell Set and its place in set theory, then the map itself may prove useful in areas wherein asymmetry and inherent uncertainty abound.

³⁴ Alan Weir, "Naïve Set Theory is Innocent!" *Mind* 107, (1998), pp. 763-798; taken from pages 1-4 in the original text.

Theoretical Foundations of the Economic and Social History of the United States

Essay Five: The Coming Revolution in Europe

Revolutions are born of hope.

Crane Brinton

ABSTRACT

Aims: To analyze the development of European culture from the point of view of the models introduced.

Study design: Philosophic / Mathematic discussion of European History.

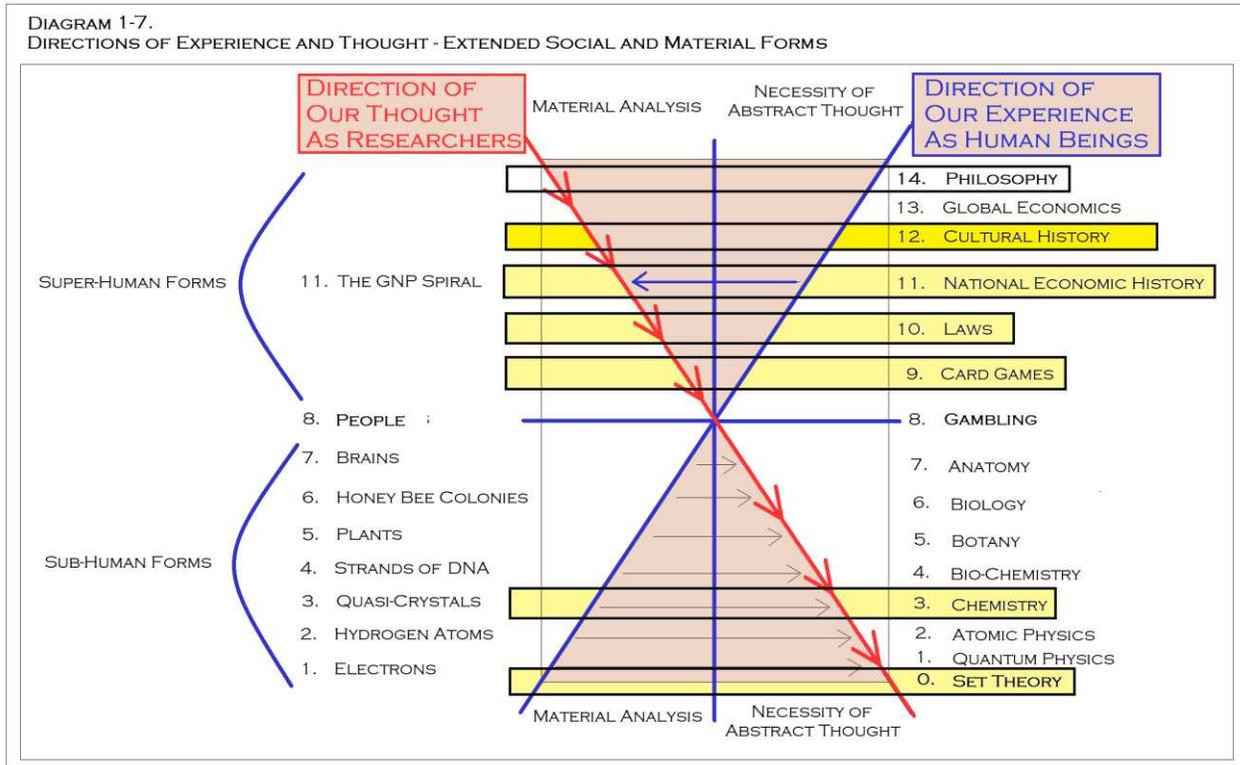
Place and Duration of Study: Library research.

Methodology: In this essay we consider the development of European history from the point of view of a system of movement, superior to, but interacting with, that of the United States.

Conclusions: If the structure of consciousness is understood correctly, the present implosion of European economic certainty is a central part of the present pattern.

INTRODUCTION

In this essay I bring the insights of the previous essays to bear on a discussion of European and the present on-going crisis of debt.



It is possible through the use of a European System of Movement to consider the likely timeline of future economic development in Europe and its association with the GNP Spiral. I suggest that the period 2028-2029 may bring a “perfect storm” of social change, one which is both rapid and world wide.

METHODOLOGY

1. Hypothesis

We suggest that the present state of affairs in Europe demonstrates that a system of Movement is operating to effect the implosion of culture and economics presently being experienced.

2. Methods

We use the dichotomies introduced previously to explain the basis for social patterns IN European History.

3. Data

We use the system of movement pattern to understand the present “melt-down” of European history.

4. Procedure

4.1 A Brief Summation of the Cultural Development of Europe

To the modern historian viewing very small increments of time - The French Revolution, the Second World War, the Renaissance, the religious revolution of the 1500s - it might seem odd to attempt the quantification of social evolution. Looking simply at a textbook outline of the past 400 years of French history we find the following.

The Bourbon dynasty	1589-1792.	This period includes
Henry IV	1589-1610,	
Louis XIII	1610-1643,	
Louis XIV	1643-1715,	
Louis XV	1715-1774,	and
Louis XVI	1774-1792.	This is followed by
The First Republic	1792-1804,	in which we find
a Convention	1792-1795,	
a Directory	1795-1799	and
a Consulate	1799-1804.	This is followed by
The First Empire	1804-1814	(Napoleon I) and
Restored Bourbon dynasty	1814-1830.	In this "Restoration" we find
Louis XVIII	1815-1824	and
Charles X	1824-1830.	Next we have a new king
The Orleans dynasty	1830-1848	(Louis-Phillippe) followed by
The Second Republic	1848-1852,	and
The Second Empire	1852-1870	(Napoleon III). Next we find
The Third Republic	1870-1940,	followed by
The Vichy Regime	1940-1944	and a
Provisional Government	1944-1946.	Succeeding this we find
The Fourth Republic	1946-1958	and currently
The Fifth Republic	1958-present.	

Counting the above we have five republics (one of which falls into three revolutionary stages), two empires, two lines of kings (one of which was both original and restored), a provisional government, and a government of occupation.

The relevance of the quest for order in this series of French governmental institutions lies in the importance of France. France lies at the heart of Western Europe. The geography of France has protected it from Huns, Vandals, Mongols, Moors and Turks. It has exposed it to Romans, Vikings, Germans and (to a lesser extent) Greeks. Even the English common law dates from the reign of William I, vassal of Henry I of France, crowned King of England Christmas 1066.

Historically the French have led Europe in fashion, politics, architecture, literature and the evolution of national unity. To find a pattern or logical order in the above series of events may lead to an understanding of the Western consciousness, the European "Mind" and its historic development. Upon this understanding we might frame a larger understanding of all evolution.

The "system of movement" presented here is a logical order, a pattern which makes a partial appearance in the European cultural development. To demonstrate this pattern and its current state of evolution we must summarize very briefly a description of the French class system.

4.2.0 The French Class System

The origins of the French class system stem from the division of France by the Romans at the time of Julius Caesar into two competing groups. These are (1) the Gauls and the Franks, the natives of France, and (2) the Romanized leadership. Throughout the Middle Ages, when serfdom and knighthood separated individuals by more than linguistic differences, these two groups evolved into four classes. Thus today in France we find four distinct groups of people. These are the descendents of the Romanized leadership, the kings and the nobles, as well as the descendents of the natives of France who do not claim this royal or noble heritage, the bourgeoisie and the peasants.

This class system was molded and contained throughout the Dark and Middle ages by the doctrines of Christianity. To this day Christianity is perhaps the single most powerful influence upon the day-to-day conduct of the French citizen, regardless of philosophic affiliation or scientific predisposition. One can appreciate the completeness of this association by opening a *Plan de Paris*, a city map of Paris, and counting the numbers of streets (rues, avenues, boulevards, etc.) named after a Christian saint, denominated St. (masculine) or Ste. (feminine). One counts 121 in the City of Paris alone in one edition.

The integrity of this catholic and medieval system of religious faith was seriously interrupted at the time of the discovery of America, 1492. The opening of large possibilities of trade and commerce with this new land was delayed by a Spanish monopoly (with the exception of Portuguese Brazil) for 100 years. During this time northern Europe experienced perhaps its most devastating period, the Wars of Religion.

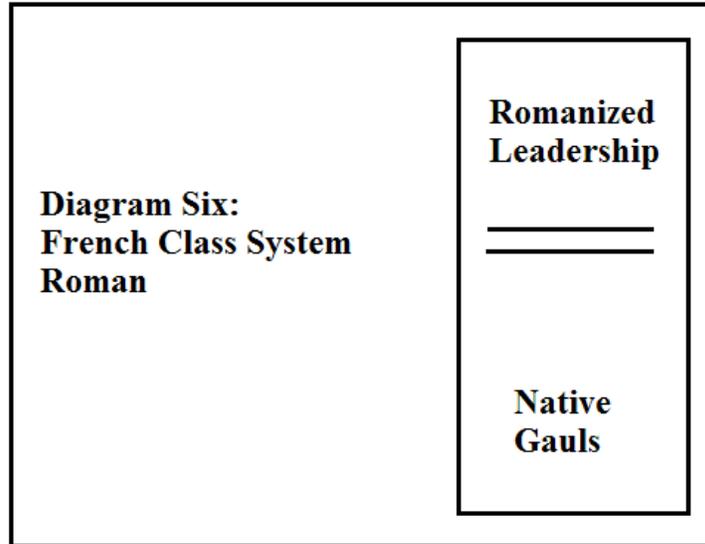
In France the answer to the question "Catholic or Protestant?" was given by a king of the Protestant area of Navarre. After years of religious unrest Henry of Navarre was at the point of capturing the city of Paris in what promised to be a bloody battle for control of France itself. When offered the city of Paris without a fight but on condition that he surrender the Protestant faith his decision was straightforward and simple.

"Paris is well worth a mass." (1593)

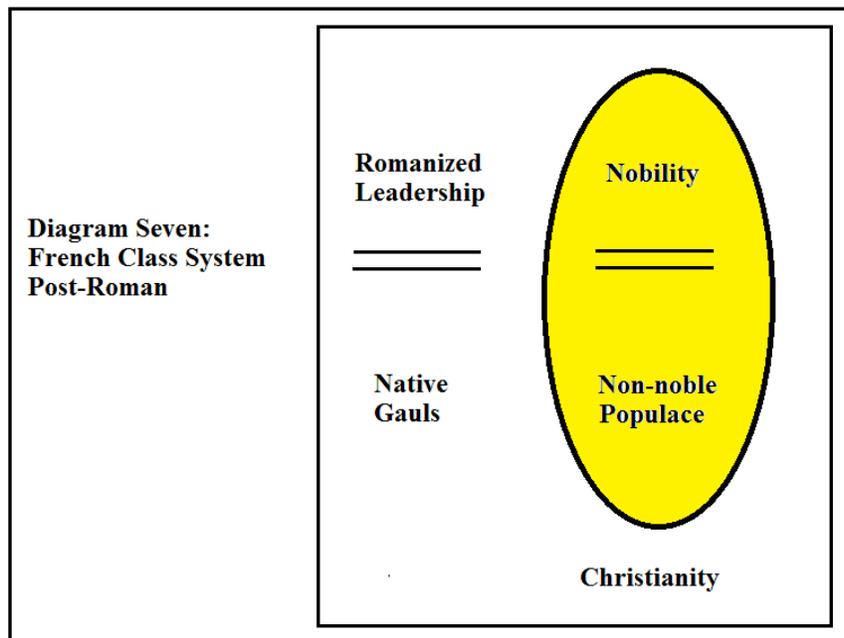
Henry of Navarre thus became Henry IV, founder of the Bourbon dynasty. Followed by his son Louis XIII and his advisors - notably Cardinals Richelieu and Mazarin - these two rulers serve as a transition, one paving the way for the modern evolution of France via the Bourbon dynasty.

4.2.1 A Simple Diagram of French Cultural Development

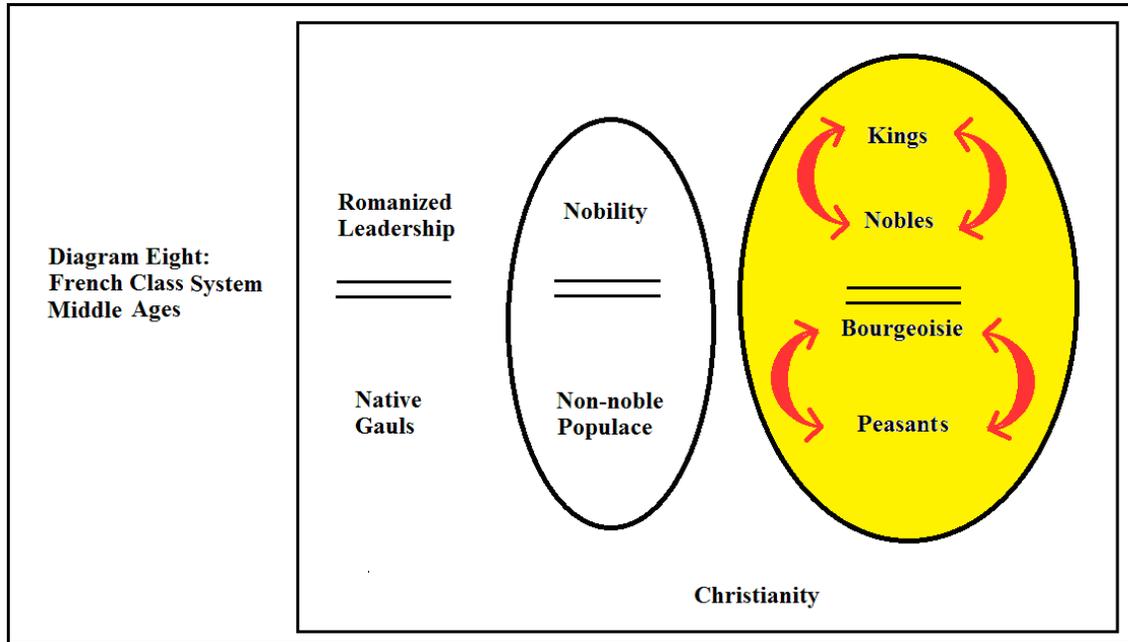
We might draw a simple cartoon of this process by noting the initial division of France by the Romans into Native and Romanized Gauls ...



... which evolved under Christianity into culturally separate groups of people, a nobility and a non-noble populace.

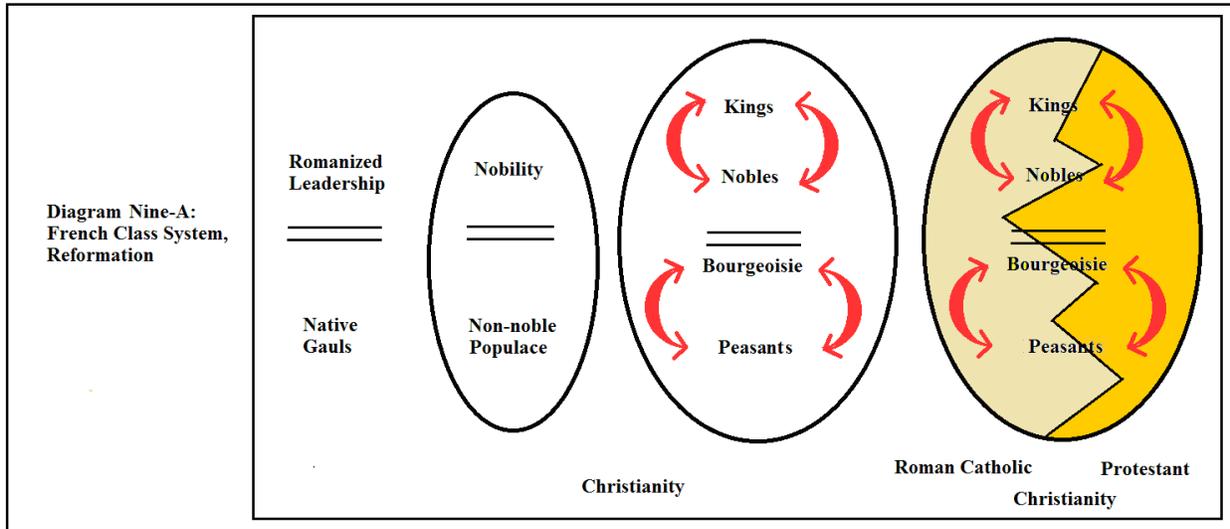


Throughout the Middle Ages these two separate groups developed internal rivalries resulting in a centralized noble court, or king, as well as a landed and more financially powerful segment of the populace, the bourgeoisie.

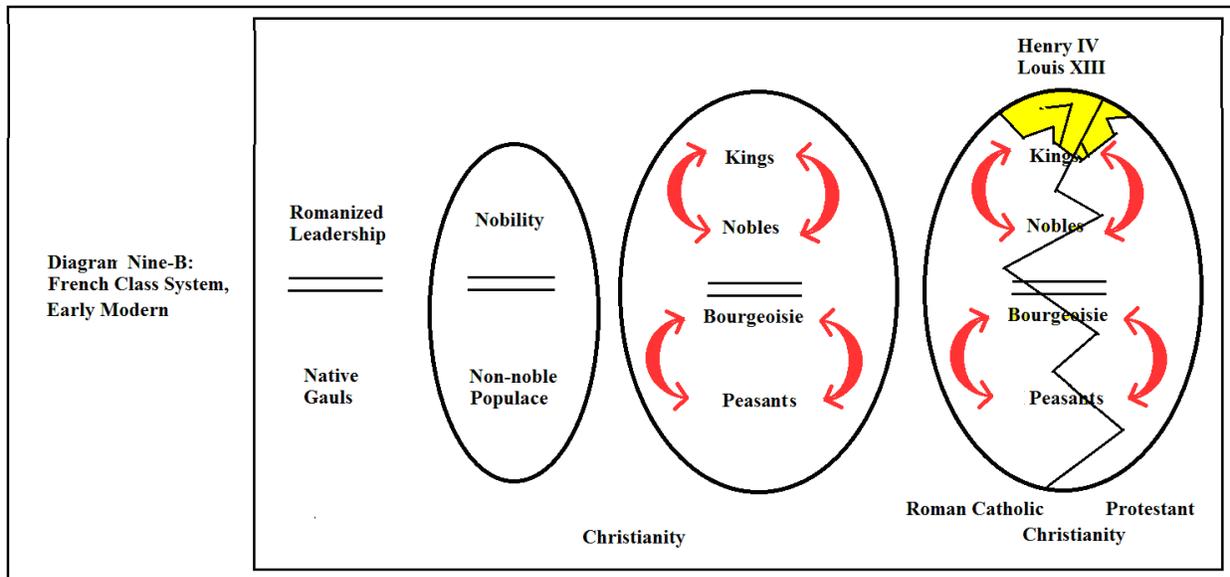


It is important to see that the origins of the classes in France are in competition, i.e. Roman and non-Roman. It is also important to see that the classes themselves are the results of serious oppositions between internal segments within the larger groups.

The glue sustaining cultural evolution in France throughout the Middle Ages was the Holy Christian Church. Against this backdrop the crisis of faith experienced by Europeans throughout the 1500's can perhaps be appreciated. The Protestant Reformation was not simply a new and worthwhile reform of religious practices. Rather it resulted in the dismemberment of life as it was known in the Middle Ages. Kings, Nobles, Bourgeoisie and Peasants each divided along religious grounds. For the first time in history the king might not be obeyed - not because of internal economic or social conditions - but rather because the king himself was "of Satan." The rebellions caused by these concerns left Europe devastated.



The transition of Henry IV and Louis XIII might be written then as a "hinge" uniting this time of Roman and medieval France to modern France.



4.2.2 France in Modern Times

The abandonment of religious rights for Protestants throughout the tenure of Louis XIII led to the ability of the next king, Louis XIV, to establish himself as sole ruler of France. His doctrine of government – and as applicable to modern times as well – is quite famous.

L'etat, c'est moi. (I AM the state.)

If we look for patterns over the past 400 years of historic development in France, we must first notice that four centralizing periods stand out. These are the governments of Louis XIV, Napoleon Bonaparte, Napoleon III and de Gaulle. These four individuals represent the tendency of history to hand governmental control to a semi- or real dictator when the disastrous chaos of an earlier period threatens the further development of the French nation-state.

If we place these four persons below one another historically under the heading "centralizing" we have:

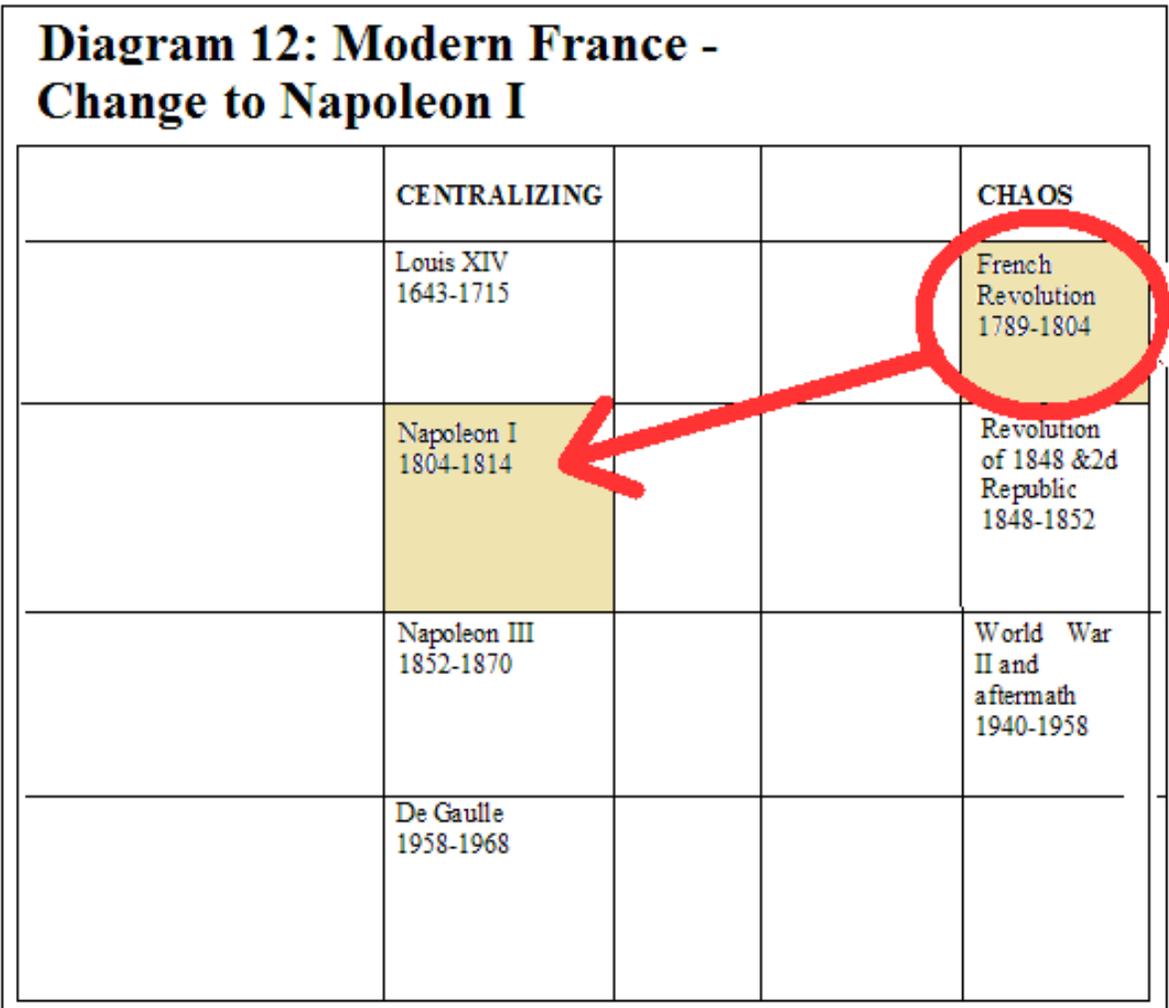
Diagram 10: Modern France - Centralizing Forces				
	CENTRALIZING			
	Louis XIV 1643-1715			
	Napoleon I 1804-1814			
	Napoleon III 1852-1870			
	De Gaulle 1958-1968			

If we place slightly opposite these men the chaotic period which led to their position as head of state, we have:

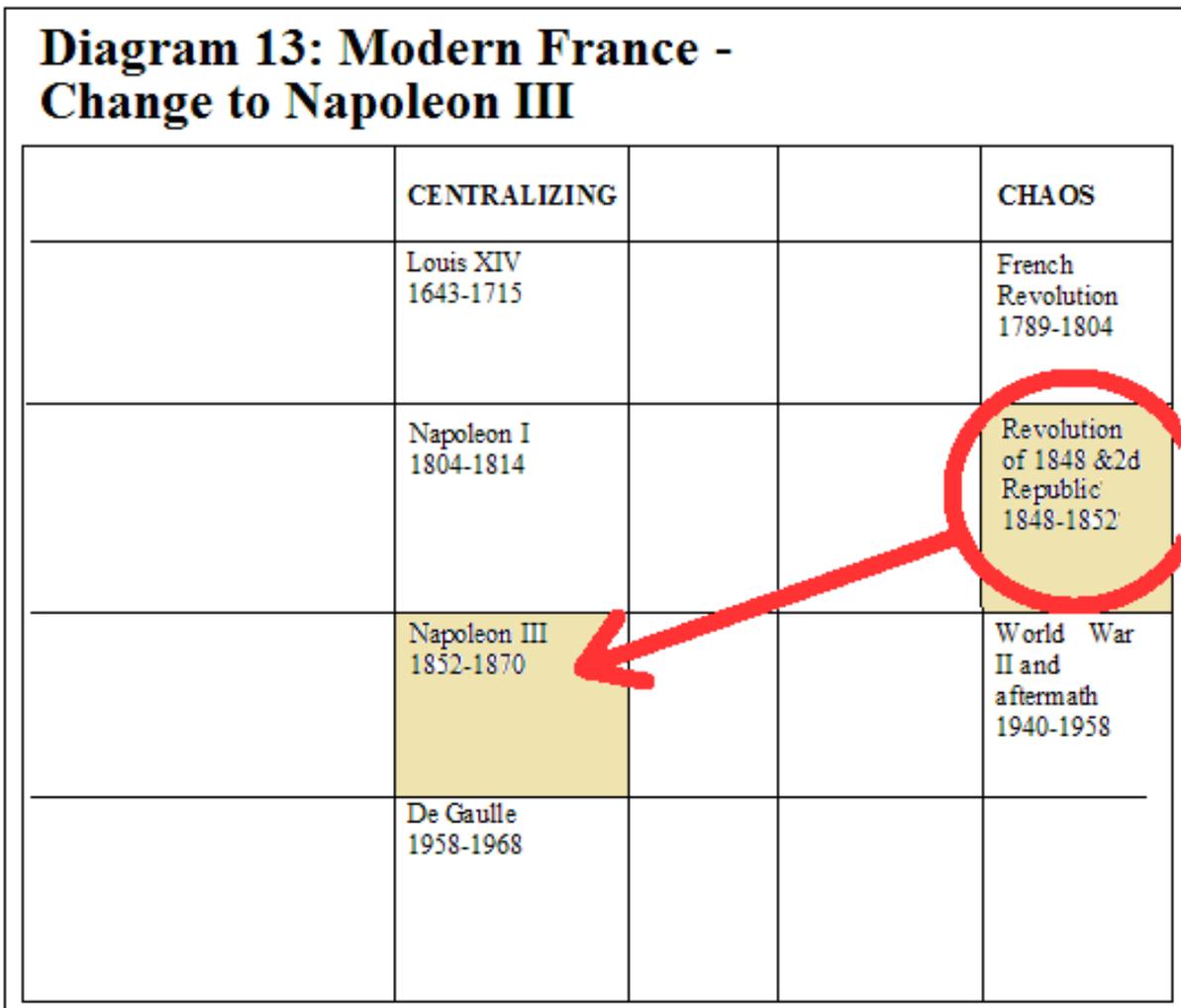
Diagram 11: Modern France - Chaotic Forces

	CENTRALIZING			CHAOS
	Louis XIV 1643-1715			French Revolution 1789-1804
	Napoleon I 1804-1814			Revolution of 1848 & 2d Republic
	Napoleon III 1852-1870			World War II and aftermath 1940-1958
	De Gaulle 1958-1968			

This is to say: (1) The French Revolution brought Napoleon Bonaparte to political office as First Consul of the First Republic in 1799, after which he became Consul For Life (1802), after which he crowned himself Emperor Napoleon I on December 2, 1804;



... (2) The Revolution of 1848 brought Napoleon III to political office first as president of the Second Republic in December 1848 after which, through coup d'etat, he established himself as Emperor Napoleon III on December 2, 1852;



... and (3) World War II (1940-44) and its chaotic aftermath of Provisional Government (1944-46) and Fourth Republic (1946-58) brought de Gaulle to power as the first president of the Fifth Republic, December, 1958.

Diagram 14: Modern France - Change to De Gaulle

	CENTRALIZING			CHAOS
	Louis XIV 1643-1715			French Revolution 1789-1804
	Napoleon I 1804-1814			Revolution of 1848 & 2d Republic 1848-1852
	Napoleon III 1852-1870			World War II and aftermath 1940-1958
	De Gaulle 1958-1968			

The remaining periods of history might be introduced by differentiating the styles of government subsequent to Louis XIV. These would be the cabinet government of Louis XV and the more chaotic and ultimately parliamentary rule of Louis XVI. (Louis XVI was beheaded in 1793, approximately 4 years after the fall of the Bastille to revolutionary mobs, July 14, 1789.)

**Diagram 15: Modern France -
Cabinet and Parliament Periods - 1700's**

	CENTRALIZING	CABINET	PARLIAMENT	CHAOS
	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804
	Napoleon I 1804-1814			Revolution of 1848 & 2d Republic 1848-1852
	Napoleon III 1852-1870			World War II and aftermath 1940-1958
	De Gaulle 1958-1968			

This evolution of French politics from a centralized, to a cabinet, to a parliamentary, to a chaotic position has held true through four separate stages of development. Thus we see in the Bourbon Restoration of Louis XVIII and Charles X a cabinet government, succeeded by "The Bourgeois King," Louis-Phillippe, and a parliamentary reign.

Diagram 16: Modern France - Cabinet and Parliament Periods - 1800's

	CENTRALIZING	CABINET	PARLIAMENT	CHAOS
	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804'
	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & 2d Republic 1848-1852
	Napoleon III 1852-1870			World War II and aftermath 1940-1958
	De Gaulle 1958-1968			

The Third Republic likewise underwent a division of its long tenure in power. The period from 1870 through the First World War was governed under principles of cabinet rule. This was replaced by a parliamentary rule after the First World War.

Diagram 17: Modern France - Cabinet and Parliament Periods - Early 1900's

	CENTRALIZING	CABINET	PARLIAMENT	CHAOS
	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804
	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & 2d Republic 1848-1852
	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958
	De Gaulle 1958-1968			

As of 1977, mid-way through the final stage of this system and the date wherein the chart above was first devised, the chaos of World War II and its aftermath had been replaced by the centralizing government of de Gaulle (1958-68). In turn de Gaulle had been replaced by the cabinet or “technocrat” tenure of Pompidou and d’Estaing.

But what of the date of the final chaotic period?

Diagram 18: Modern France - Cabinet and Parliament Periods - Late 1900's

	CENTRALIZING	CABINET	PARLIAMENT	CHAOS
	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804
	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & 2d Republic 1848-1852
	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958
	De Gaulle 1958-1968	Pompidou, d’Estaing 1968-?	?	?

4.3. A Theory of Cultural Development

One may estimate the timing of the final stage of French - or more broadly European cultural - "evolution" by considering the significance of the class system as reflected in the right to vote. As in the United States, the French have not eagerly granted the franchise, the right to vote, to as many people as possible without a struggle.

If we imagine the ability to vote as co-equal with the right to control, we find the control of the kings giving way after the French Revolution to a broader group of persons: men of substantial wealth and property. This ability to control is broadened as the result of the

Revolution of 1848 to a still larger group: men of some property, the bourgeoisie. As a result of the national trauma of World War II the ability to control is opened yet again during the tenure of de Gaulle to a still broader group: all men and women over age 21 who are citizens of France.

Note that we begin with a separation of French politics into two sections, Romanized Gaul and Native Gaul, operating still as a modern division of times. We see in the last four hundred years an extension of the franchise, the right to vote, in four different periods, each corresponding to a class of the French body politic. We begin with the control of government in the hands of kings, moving next a high nobility or those possessing significant property, next a bourgeoisie, and finally all citizens equally. Continuing the division of Romanized and Native Gaul, we have:

Diagram 19: Modern France - Class Divisions - Roman, Native

	CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized KINGS	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804
Romanized NOBLES	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & 2d Republic 1848-1852
Native BOURGEOISE	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958
Native PEASANTS	De Gaulle 1958-1968	Pompidou, d'Estaing 1968-?	?	?

Next note that the groups which have “emerged” or evolved (Kings, Bourgeoisie) from more ancient divisions (Nobles, Peasants) enjoy a period of governance approximately three times that of the group from which they emerge. (See Diagram Eight) Measuring the length of time during which kings hold governmental authority we have Louis XIV to the coming of Napoleon Bonaparte as emperor, 1643 to 1804 = 161 years. Following this we have a period wherein nobility or “high bourgeoisie” hold governmental authority, to wit: Napoleon I through the Revolution of 1848 and the end of the Second Republic in the crowning of Napoleon III as a second emperor, 1804 to 1852 = 48 years. The exact ratio is 161 years divided by 48 = 3.354.

Measuring the tenure of the bourgeoisie we have Napoleon III through the end of the Fourth Republic, 1852 through 1958, 106 years. 106 divided by 3.354 = 31.60. Adding 31 years to the date on which de Gaulle assumed power yields 1958 + 31 = 1989. Under this calculation one would anticipate that the end of the Reign of the Peasantry would see a “year of chaos” in 1958 + 31 = 1989.

Diagram 20: Modern France - Original vs. Emerging Classes

		CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized	KINGS 1643-1804 161 years	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804
	NOBLES 1804-1852 48 years	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848, 2 nd Repub. 1848-1852
Native	BOURGEOISE 1852-1958 106 years	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958
	PEASANTS 1958 - 1989? + 31 years?	De Gaulle 1958-1968	Pompidou, d'Estaing 1968-?	?	Year of Chaos 1989?

The above figures date the “end of chaos” with the creation of “empire.” In “empire” we find a formal and drastic departure from the preceding “revolutionary” governments (Consulate of the First Republic, Presidency of the Second Republic). These chaotic governments are replaced by an irresistible “imperial” centralization (Napoleon “I”, Napoleon “III”).

On the other hand, we might consider chaos “ended” and centralization begun in the year Bonaparte or his nephew first assume political office. Under this interpretation the French Revolution and First Republic end in 1799, the year Bonaparte became First Consul of the First Republic. Similarly the Revolution of 1848 might be considered to end in December 1848 when the future Napoleon III assumed the presidency of the Second Republic. The ratios thus shift slightly.

1643 through 1799 = 156 years.
 1799 through 1848 = 49 years.
 156/49 = 3.18.
 1848 through 1958 = 110 years.
 110/3.18 = 34.59 years.
 1958 + 34 years = 1992 as the anticipated “date of chaos.”

Diagram 21: Modern France - Personalities vs. Governments

		CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized	KINGS 1643-1804 156 years?	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	<i>French Revolution</i> <u>1790-</u> <u>1799?</u>
Romanized	NOBLES 1799-1848? 49 years?	<u><i>Napoleon I</i></u> <u>1799-1814</u>	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	<u><i>Revolution of 1848?</i></u>
Native	BOURGEOISIE 1848-1958 110 years?	<u><i>Napoleon III</i></u> <u>1848-1870</u>	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958
Native	PEASANTS 1958 - 1992? + 34 years?	De Gaulle 1958-1968	Pompidou, d'E staing 1968-?	?	Year of Chaos <u>1992?</u>

Thus two dates - 1989, 1992 - might be considered potential “years of chaos” depending upon whether this model describes the evolutions of governments or personalities.

Figuring the period of rule of the “ancient” class *roughly* at one-third of the period of the “emerged” class, using our first scheme we divide 106 by 3 = 35.33. 1958 + 35 = 1993. 1993 might be considered a candidate for the “year of chaos” using governments as the focus of the model and the approximate ratio of one-third.

Again, using one-third as a *rough* or averaged ratio between emerged/ancient periods of rule, under our second scheme we divide 110 by 3 = 36.67. 1958 + 36 = 1994. 1994 must be considered a candidate for the “year of chaos” using personalities as the focus of the model and the rough or approximate ratio of one-third.

Diagram 22: Modern France - Exact Ratios vs. Average Ratios

		CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized	KINGS 1643 - 1804? 1643 - 1799? 161 years? 156 years?	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804? 1789-1799?
Romanized	NOBLES 1804 - 1852? 1799 - 1848? 48 years? 49 years?	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & 2d Republic? 1848-1852? 1848?
Native	BOURGEOISE 1852 - 1958? 1848 - 1958? 106 years? 110 years?	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958 18 years
Native	PEASANTS 1958 - ? + 31 years? + 34 years? + 35 years + 36 years	De Gaulle 1958-1968	Pompidou, d'Estaing 1968-?	?	Year of Chaos 1989? 1992? 1993? 1994?

The question arises, is this model one of people or governments? and does it use “specific” ratios (dividing periods by 3.354 or 3.18) or “averaged” (dividing periods by 3)?

Note as well that the duration of periods of chaos during each of these reigns is quite different. We have during the Reign of Kings a French Revolution which lasts approximately ten to fifteen years (1789 to 1799, or to 1804). During the Reign of Nobles a new chaotic period, the Revolution of 1848, brings about sudden changes in governments throughout Europe in approximately six months. This revolutionary movement results in the Second Republic of four years, 1848 to 1852. This second period of chaos is much shorter, but by what ratio?

During the Reign of the Bourgeoisie we have a period of chaos - World War II and aftermath - of 18 years (1940-1958). Simply following the pattern one would anticipate a rapid - not a prolonged - change of governments throughout Europe akin to the Revolution of 1848 somewhere between the dates 1989 to 1994.

Diagram 23: Modern France - Comparative Lengths of Chaotic Periods					
		CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized	KINGS 1643 - 1804? 1643 - 1799? 161 years? 156 years?	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804 1789-1799 15 years? 10 years?
Romanized	NOBLES 1804 - 1852? 1799 - 1848? 48 years? 49 years?	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & Second Republic? Rev. of 1848 4 years? 6 months?
Native	BOURGEOISIE 1852 - 1958? 1848 - 1958? 106 years? 110 years?	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958 18 years
Native	PEASANTS 1958 - ? + 31 years? + 34 years? + 35 years + 36 years	De Gaulle 1958-1968	Pompidou, d'Estaing 1968-?	?	Year of Chaos 1989? 1992? 1993? 1994? Months?

Thus as of 1977, a sudden, revolutionary change, analogous to the Revolution of 1848, sweeping suddenly across Europe in 1989 or the early 1990s, could be predicted. Preceding this change one would expect the cabinet government of d'Estaing to be replaced by parliamentary rule.

On May 10, 1981 Francois Mitterand, head of the French Socialist Party, became president of France, defeating Valerie Giscard d'Estaing with 52% / 48% of the vote. Parliamentary elections on June 14 and 21, 1981 gave the Socialists control of the National Assembly. These events ended 23 years of right wing and right-centrist rule.

Diagram 24: Modern France - Socialists Elected					
		CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized	KINGS 1643 - 1804? 1643 - 1799? 161 years? 156 years?	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804 1789-1799 15 years? 10 years?
Romanized	NOBLES 1804 - 1852? 1799 - 1848? 48 years? 49 years?	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & Second Republic? Rev. of 1848 4 years? 6 months?
Native	BOURGEOISE 1852 - 1958? 1848 - 1958? 106 years? 110 years?	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958 18 years
Native	PEASANTS 1958 - ? + 31 years? + 34 years? + 35 years + 36 years	De Gaulle 1958-1968	Pompidou, d'Estaing 1968-1981	Mitterand 1981 -	Year of Chaos 1989? 1992? 1993? 1994? Months?

On November 9, 1989 the Berlin Wall crumbled. With this event began the rapid disintegration of the Soviet Union as a European Power and finally as a World Power. By Christmas Day, December 25, 1991, the Soviet Union had imploded as a political force; it did not exist. As summed up by the magazine, *The Economist*:

In 1989 one East European communist regime after another loosened its grip on one-party power: Hungary (February), Poland (June), Bulgaria, East Germany and Czechoslovakia (November), Romania (December). By January 1992 every East European country had freely and fairly elected governments. All were non-communist, though in Romania and Albania ex-communists kept much power.

Diagram 25: Modern France- The Soviet Implosion

		CENTRALIZING	CABINET	PARLIAMENT	CHAOS
Romanized	KINGS 1643 - 1804? 1643 - 1799? 161 years? 156 years?	Louis XIV 1643-1715	Louis XV 1715-1774	Louis XVI 1774-1793	French Revolution 1789-1804 1789-1799 15 years? 10 years?
Romanized	NOBLES 1804 - 1852? 1799 - 1848? 48 years? 49 years?	Napoleon I 1804-1814	Bourbon Restoration 1814-1830	Louis-Phillippe 1830-1848	Revolution of 1848 & Second Republic? Rev. of 1848 4 years? 6 months?
Native	BOURGEOISE 1852 - 1958? 1848 - 1958? 106 years? 110 years?	Napoleon III 1852-1870	Third Republic First Half 1870-1919	Third Republic Second Half 1919-1940	World War II and aftermath 1940-1958 18 years
Native	PEASANTS 1958- 1989/1991 +31 to 33 years	De Gaulle 1958-1968	Pompidou, d'Estaing 1968-1981	Mitterand 1981 -	Soviet Implosion 1989-1991 26 Months

One might describe the “image” of these periods in French history – an “image axis” so to speak - by identifying key phrases or slogans for each of our sixteen divisions of modern French history. Our purpose is to provide a feel for the period and thereby provide an idea or understanding of the importance and place of the period itself. The following may be proposed:

- Louis XIV “L’etat, c’est moi.” (“I AM the state.” Referring to the establishment of all government under Louis’ personal and relentless control.)
- Louis XV “Après nous, le deluge.” (“After us, the flood.” Statement attributed to the mistress of Louis XV predicting the loss of royal privileges after the death of Louis XV in a flood of popular resentment.)
- Louis XVI “Laissez-les manger les gâteaux.” (“Let them eat cake.” Statement attributed to Marie-Antoinette, Queen of Louis XVI, who proposed this as the solution to peasant rioting due to the absence of bread, a poor harvest and famine.)
- French Revolution “Liberte, Egalite, Fraternite” (“Liberty, Equality, Brotherhood,” idealistic goals of the French Revolution.)
- Napoleon “Ma femme.” (“My wife.” Napoleon’s response to the question of a sophisticated courtesan of Paris who asked him which woman met in his travels across Europe, Africa and Asia was the most beautiful. The reign of Napoleon saw a no-nonsense return to values which might support a national military effort, the most lasting of which is the modern Code Napoleon, the French civil and criminal law.)
- Louis XVIII, Charles X “They have learnt nothing and they have forgotten nothing.” (Phrase attributed to Talleyrand as to the impossibility of establishing a true constitutional monarchy in France under the Bourbons.)
- Louis-Phillippe “The Bourgeois-King.” (Popular description of Louis-Phillippe and his necessary constituency, an unusual contradiction in terms.)
- Revolution of 1848 “Workers Unite! You have nothing to lose but your chains!” (Final and most famous phrase of Marx’ *Communist Manifesto* of the same year.)
- Napoleon III “The Bourgeois Emperor.” (Another contradiction in terms.)
- 3rd Republic First Part “To The Day!” (Toast between French and German military officers who looked forward to the inevitable war between Germany and France as the French endeavored to retrieve the surrendered territories of Alsace and Lorraine lost during the Franco-Prussian war of 1870. Harbinger of the disastrous World War I.)

3rd Republic Second Part “Better Hitler than Blum.” (Popular French political slogan opposing increased (socialist) involvement of the peasantry in French government. Symbol of a divisive French political life and harbinger of the chaotic and disastrous World War II and post-War period.)

W. W. II and aftermath “Blood, toil, tears and sweat.” (Churchill’s summary of the English effort in the War to liberate France from the Germans and thereby save itself.)

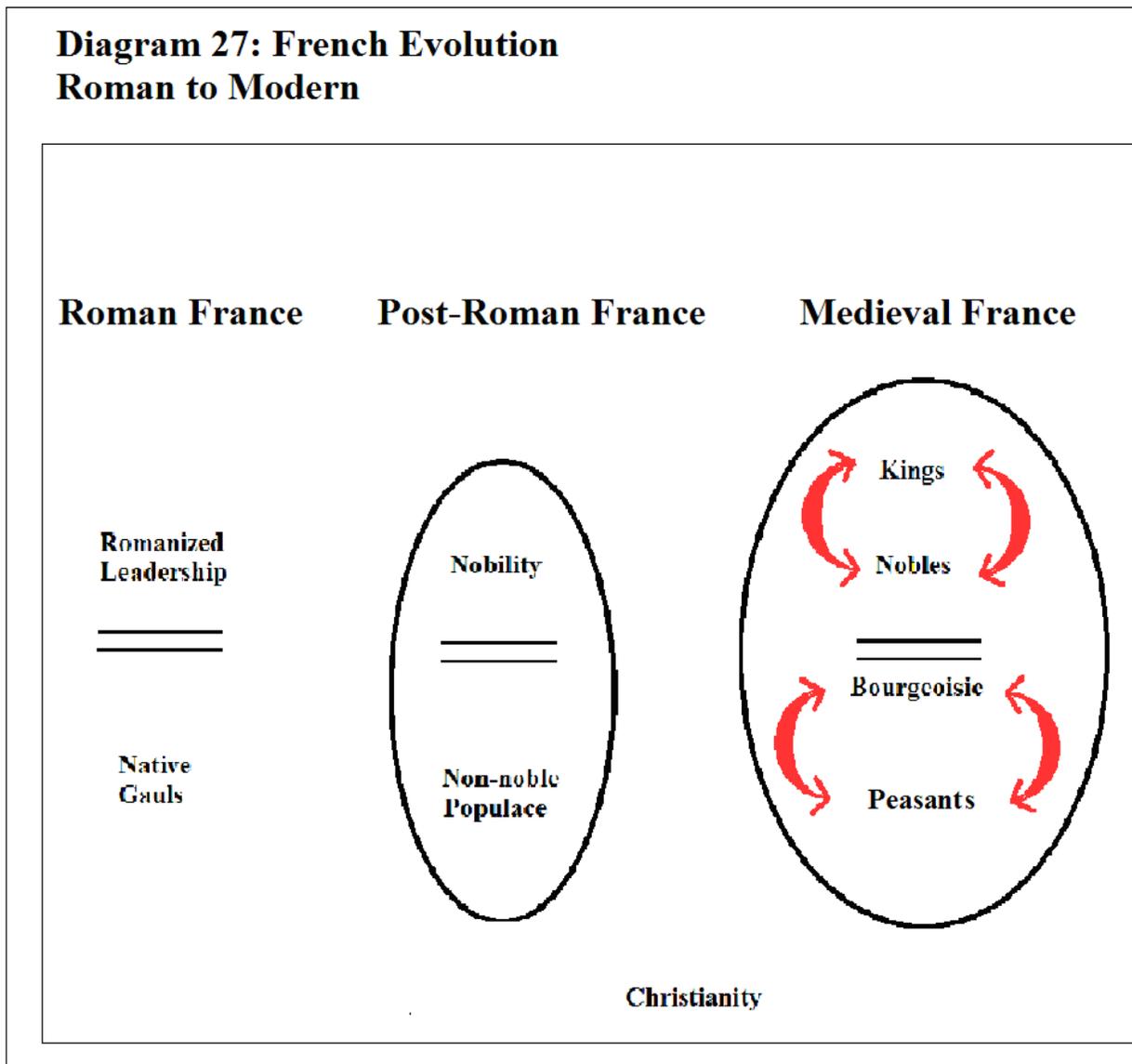
DeGaulle “Vive la France!” (“Long Live France!” First time this political slogan entered into the popular political life of France. Previously slogans such as “Vive la Republic!” or “Vive le Roi!” had been common.)

Pompidou, d’Estaing “The technocrats.” (Word invented to describe the highly educated professional elite leading France into a modern world of nuclear power and declining French influence.)

Placing these in the previously assembled 16-part plan, we have:

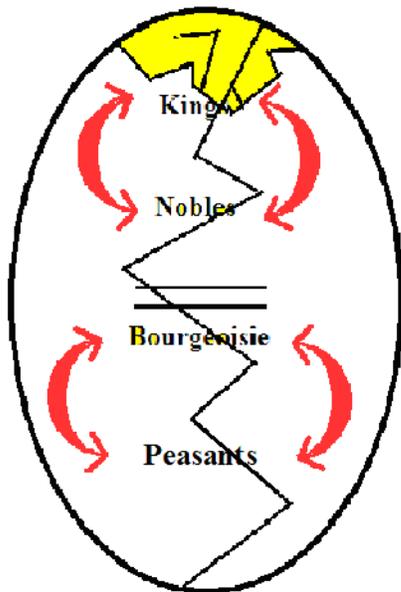
Diagram 26: Modern France - Historic Catch Phrases, Slogans				
	CENTRAL.	CABINET	PARLIAMENT	CHAOS
KINGS 1643-1804 161 years	Louis XIV 1643-1715 “L’etat, c’est moi.”	Louis XV 1715-1774 “Après nous, le deluge.”	Louis XVI 1774-1793 “Laissez-les manger les gateaux.”	French Revolution 1789-1804 15 years “Liberte, Egalite, Fraternite!”
NOBLES 1804-1852 48 years	Napoleon I 1804-1814 “Ma femme.”	Bourbon Restoration 1814-1830 “They have learnt nothing, and they have forgotten nothing.”	Louis-Phillippe 1830-1848 “The Bourgeois King”	Revolution of 1848, Second Republic 1848-1852 4 years “Workers of the World Unite! You have nothing to lose but your chains!”
BOURG. 1852-1958 106 years	Napoleon III 1852-1870 “The Bourgeois Emperor.”	Third Republic First Half 1870-1919 “To The Day!”	Third Republic Second Half 1919-1940 “Better Hitler the Blum.”	World War II and aftermath 1940-1958 18 years “Blood, Toil, Tears, and Sweat.”
PEASANTS 1958-1989 + 31 years	De Gaulle 1958-1968 “Vive la France!”	Pompidou, d’Estaing 1968-1981 “The Technocrats.”	Mitterand 1981-	Soviet Implosion 1989-1991 26 months

Placing side by side the above slogans in the organization previously described, we have:



Reformation France

Henry IV
Louis XIII



Roman Catholic Christianity Protestant Christianity

Modern France

Modern France - Historic Catch Phrases, Slogans

	CENTRAL.	CABINET	PARLIAMENT	CHAOS
KINGS 1643-1804 161 years	Louis XIV 1643-1715 "L'etat, c'est moi."	Louis XV 1715-1774 "Après nous, le deluge."	Louis XVI 1774-1793 "Laissez-les manger gateaux."	French Revolution 1789-1804 15 years "Liberte, Egalite, Fraternite!"
NOBLES 1804-1852 48 years	Napoleon I 1804-1814 "Ma femme."	Bourbon Restoration 1814-1830 "They have learnt nothing, and they have forgotten nothing."	Louis-Philippe 1830-1848 "The Bourgeois King"	Revolution of 1848, Second Republic 1848-1852 4 years "Workers of the World Unite! You have nothing to lose but your chains!"
BOURG. 1852-1958 106 years	Napoleon III 1852-1870 "The Bourgeois Emperor."	Third Republic First Half 1870-1919 "To The Day!"	Third Republic Second Half 1919-1940 "Better Hitler than Blum."	World War II and aftermath 1940-1958 18 years "Blood, Toil, Tears, and Sweat."
PEASANTS 1958-1989 + 31 years	De Gaulle 1958-1968 "Vive la France!"	Pompidou, d'E staing 1968-1981 "The Technocrats."	Mitterand 1981-	Soviet Implosion 1989-1991 26 months

The implosion of the Soviet Union between 1989 and 1991 coincides entirely with the estimate that 1989 should see rapid, revolutionary change in Europe in a change of governments similar to that of the Revolution of 1848. Note also that the scope of violence between these two revolutions is very similar. To the astonishment of the world the Soviet Union, like the European monarchies of 1848, imploded almost without a shot. It must also be understood that our use of “averaged ratios” (dividing periods by 3) and “personalities” led to incorrect dates. We must consider governments as the subject of this model and use exact, not approximate, ratios (dividing periods by 3.354).

This model describes the cultural development of Western Europe from Julius Caesar to the present in but two pages. It portrays France as a kind of heart, a central barometer around which all other nations of Europe gather. It demonstrates that in France political events - kings, governments, revolutions, sudden changes of policy - are themselves players in a larger game, a larger and underlying logic. In 1977 this model predicted a revolutionary period of chaos in Europe falling between 1989 and 1994. The outcome of change was unknown.

Regarding the end of communist rule in Eastern Europe in 1989 and the sudden implosion of the USSR in 1991, it is interesting to consider the international scene as described by former President Richard Nixon nine years earlier in his book *The Real War*. The elimination of Eastern European tyranny was not believed possible in the 1970s and 80's.

This book is a *cri du coeur*, addressed not only to our political leaders but to leaders in all walks of life - to take hold before it is too late, and to marshal America's strengths so as to ensure its survival.

The Soviet Union today is the most powerfully armed expansionist nation the world has ever known, and its arms build-up continues at a pace nearly twice that of the United States. There is no mystery about Soviet intentions. The Kremlin leaders do not want war, but they do want the world. And they are rapidly moving into position to get what they want.

In the 1980s America for the first time in modern history will confront two cold realities. The first of these is that if war were to come, we might lose. The second is that we might be defeated without war. The second prospect is more likely than the first, and almost as grim. The danger facing the West during the balance of this century is less that of a nuclear holocaust than it is of drifting into a situation in which we find ourselves confronted with a choice between surrender and suicide - red or dead. That danger can still be averted, but the time in which we can avert it is rapidly running out.

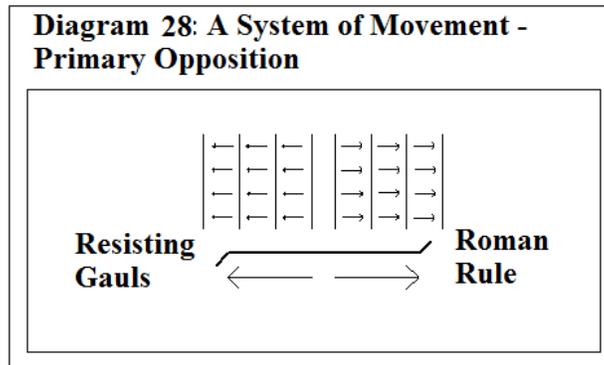
The next two decades represent a time of maximum crisis for America and for the West, during which the fate of the world for generations to come may well be determined.

Other nations have much longer experience than we have in the use of power to maintain the peace. But they no longer have the power. So, by default, the world looks to the United States. It looks today with nervous apprehension, as the bulwarks against Soviet expansion crumble in one nation after another, and as the United States appears so lost in uncertainty or paralyzed by propriety that it is either unable or unwilling to act.

4.5 General Theory: A Partial “System of Movement”

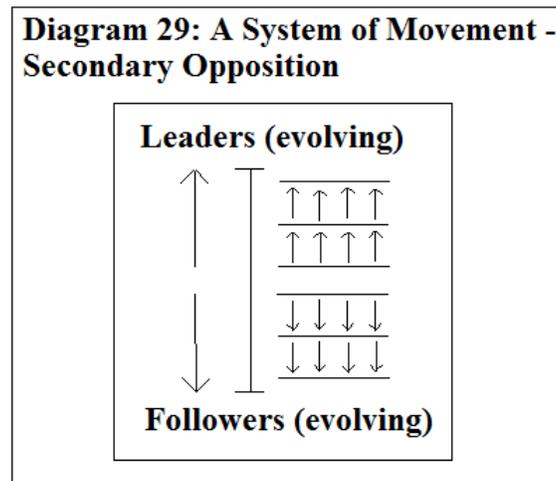
The set of facts and/or ideas set forth in Part 2 may be organized according to the architecture of a “system of movement” using the following basic principles.

At the ground level of all French cultural and economic development one finds an opposition between the organization which Rome imposed upon the Gauls, and the Franks and Gauls who struggled to resist.



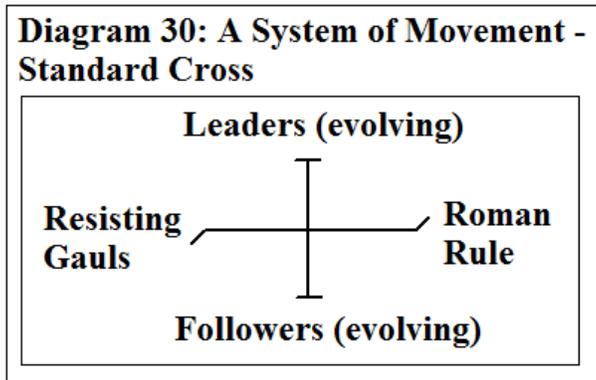
The symbol above represents a “Primary Opposition.” As used in this analysis, a Primary Opposition represents a *difference in kind*, a difference in the basic nature of two things, as opposed to oppositions arising from a struggle between similar elements or a difference in gradation between similar elements.

Further note the opposition occasioned between followers and leaders of any given group.

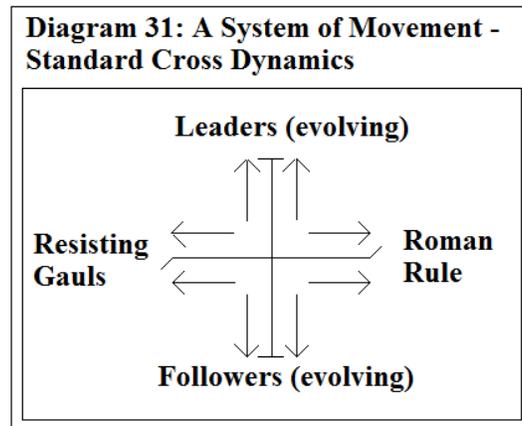


The symbol above represents a “Secondary Opposition.” As used in this analysis a Secondary Opposition represents an opposition based upon like natures in conflict or in some competition with one another as *gradations of the same basic nature*. A Secondary Opposition is one which, unlike the Primary Opposition, is not absolute or complete because it deals with a form of opposition which is based upon difference with like categories, not differences in kind between the categories themselves.

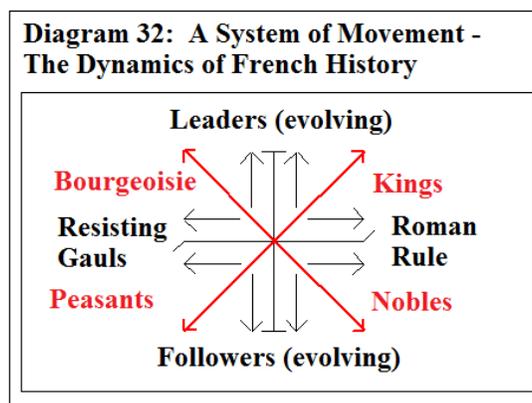
As these two oppositions contrast with each other, we may propose a joining of them in the following symbol, a Standard Cross.



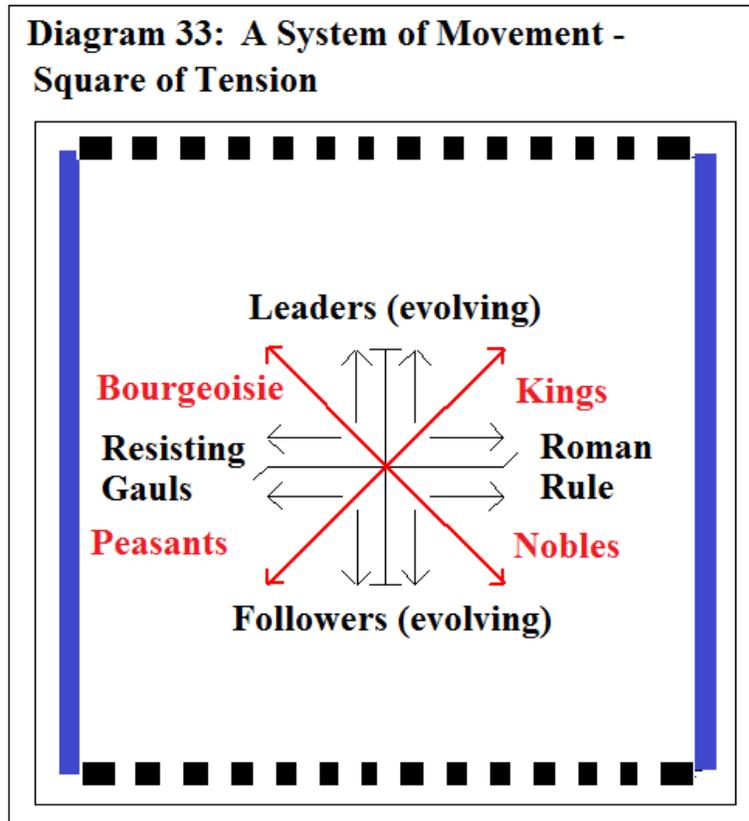
These two Oppositions operate to divide culture into four competing classes or groups.



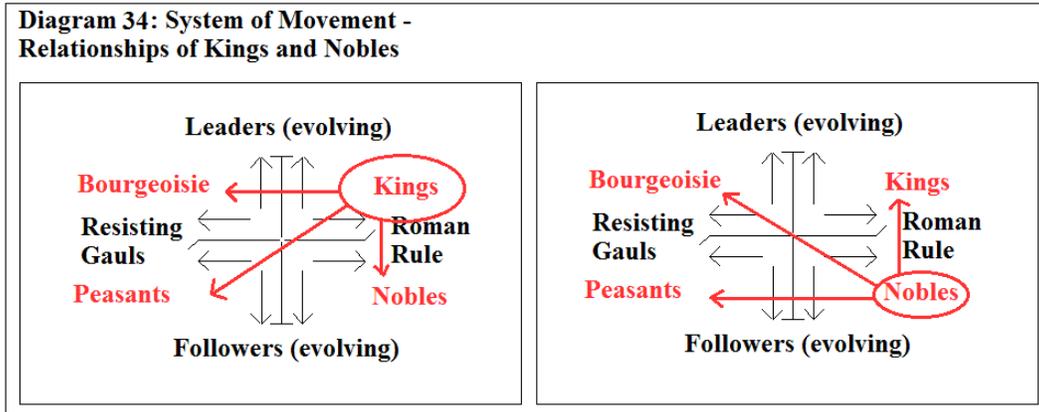
As this system is displayed in the foregoing history, we see that the "leaders" of the Romanized Gauls evolved a form of kingship surrounded by a noble court. On the other hand resisting Gauls throughout Roman times and into the Middle Ages succumbed to servant hood and eventually serfdom. From this basis arose the bourgeoisie.



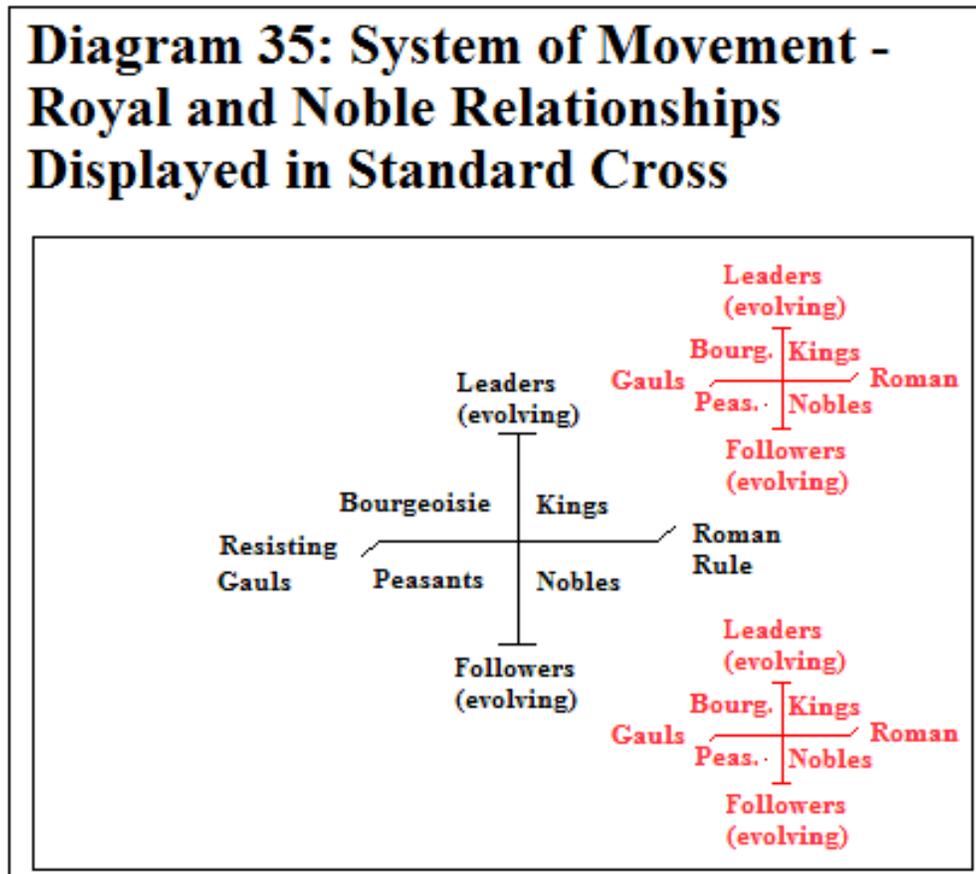
If we see these vectors as “forces” which operate on French culture with equal and necessary effect, we might draw a square delineating the extent to which this force plays upon the fabric of national life. The vertical blue lines represent the “secondary oppositions” or tensions between members of a common historic origin (Kings to Nobles, Bourgeoisie to Peasants) and the horizontal dotted lines represent a “primary opposition” which exists in France to this day (Romans to Gauls). These separate classes of people have developed relationships with each other over time.



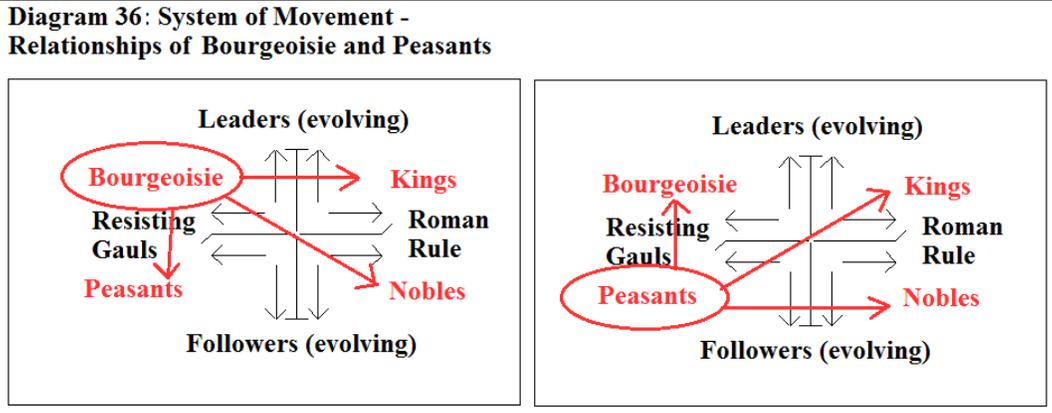
If we consider the development of French history, we must notice that the kings of France have historic relationships between each other, with the nobility, with the bourgeoisie and with the peasantry of France. Similarly the nobility has developed over time an historic relationship with the kings of France, between the nobles of their group, with the bourgeoisie and with the peasantry.



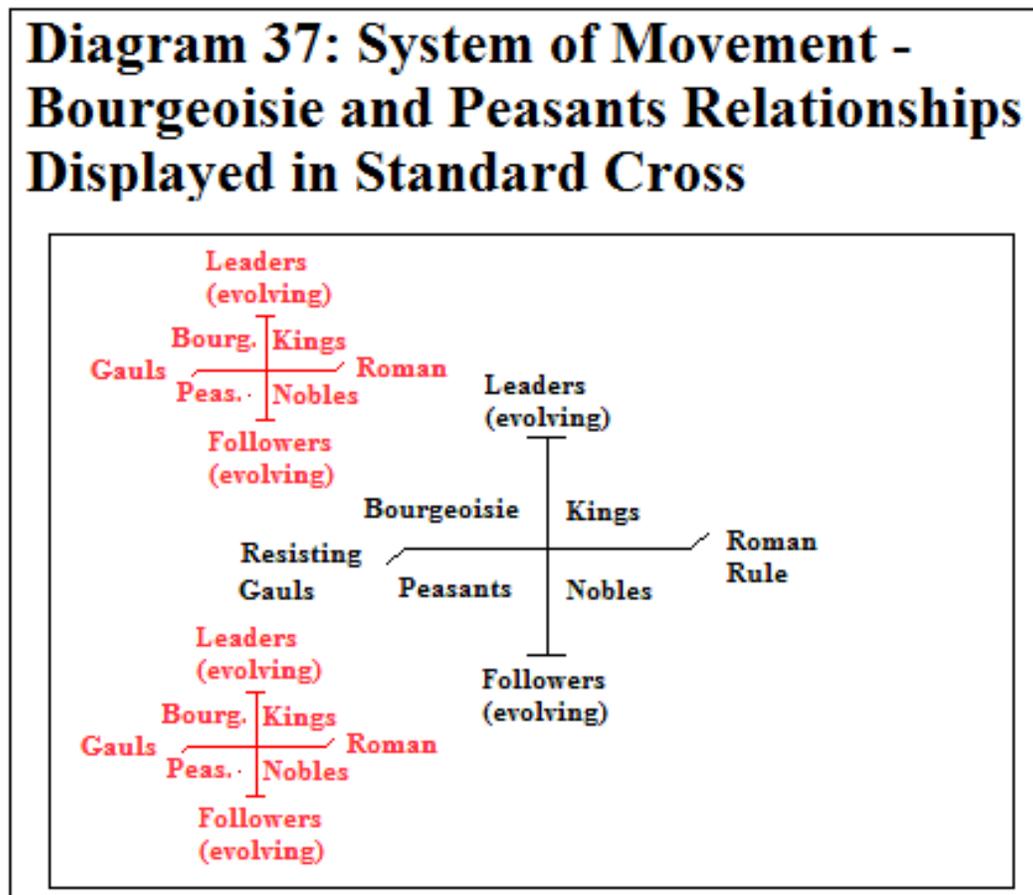
These two sets of logical relationships which are implied by the terms created may be written as:



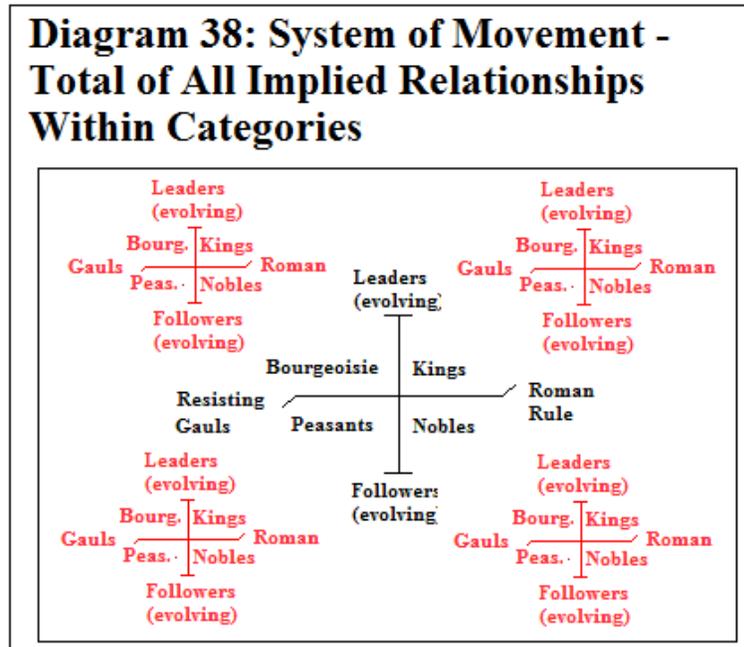
The bourgeoisie has also developed historic relationships between members of that class, with the kings of France, with the nobility and with the peasantry. Finally over time the peasantry has developed relationships between members of the peasantry, with the kings of France, with the nobility and with the bourgeoisie.



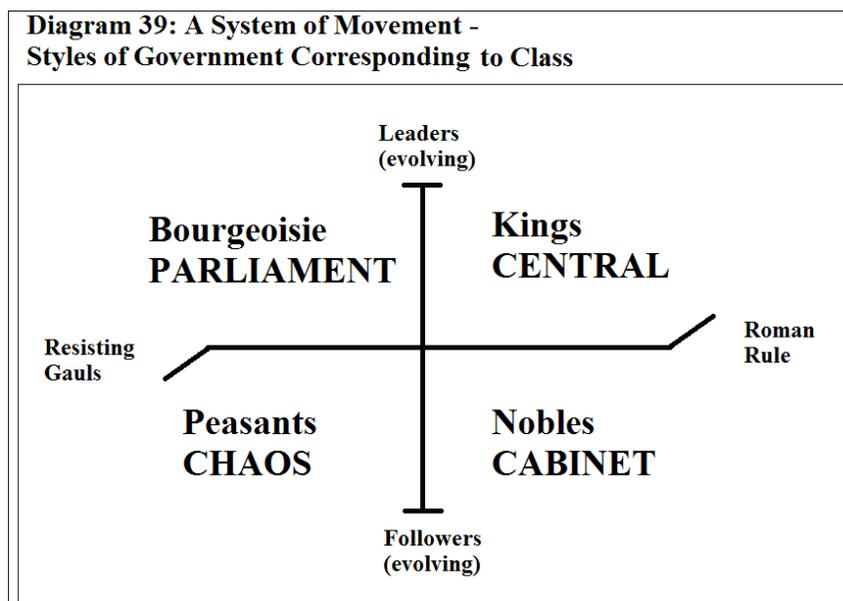
These may be written as:



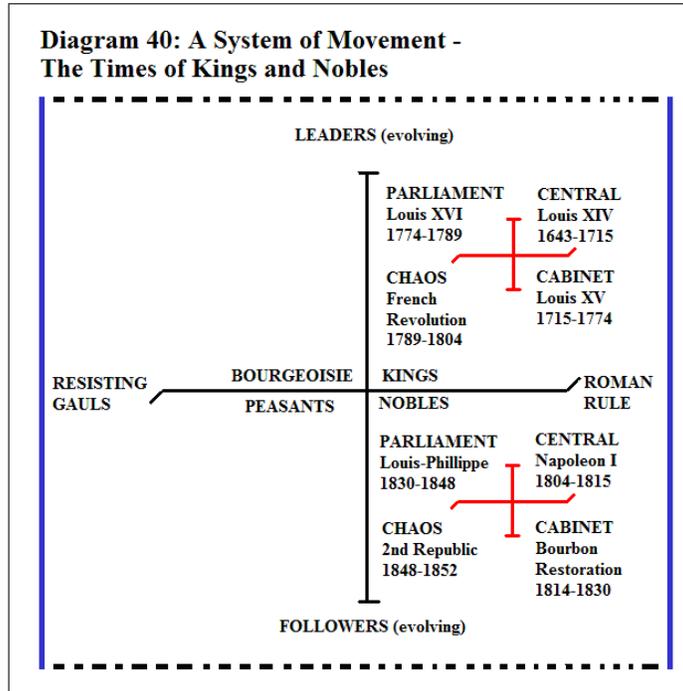
Collectively, each of these relationships can be placed around the initial classes as follows:



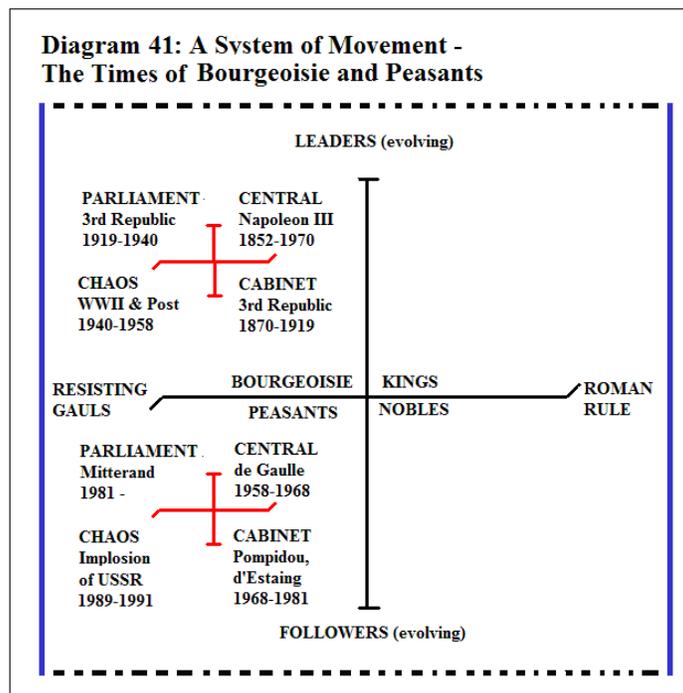
As these relationships have expressed themselves in modern post-Reformation government, we see embodied in the history of France each of four different points of view, representative of the tendencies and outlook of each class. To demonstrate the evolution of French governance, let us equate "kingship" with a centralized form of government; equate the "aristocracy" with a "cabinet" or "oligarchy" or "elitist" form of government; equate "bourgeoisie" with some form of parliamentary government; and equate "peasantry" with governmental chaos. We might delineate these four groups as political styles of leadership:



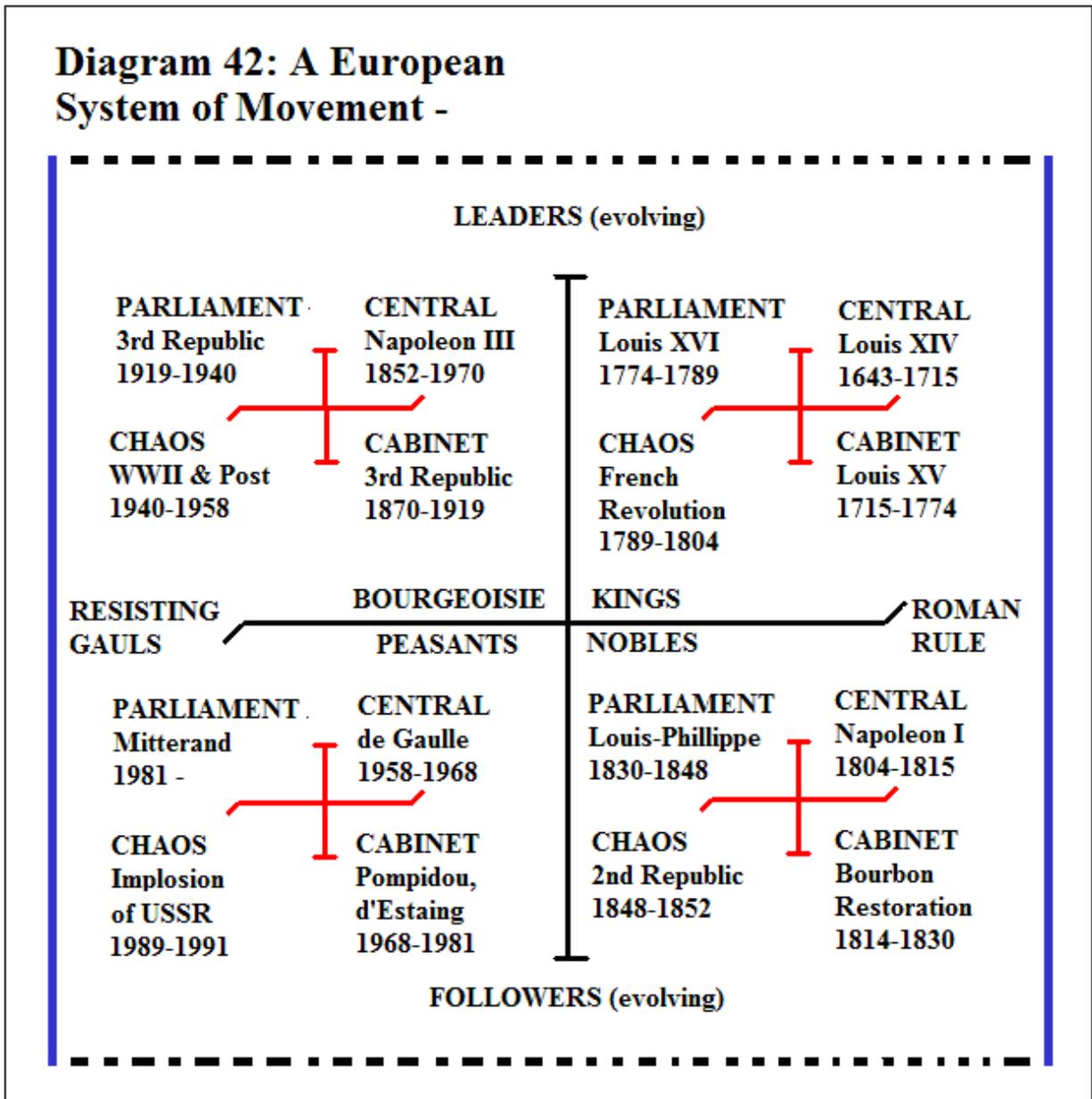
As demonstrated previously (see Diagram 25) this four-part division of style of governing has superimposed itself historically upon the original class system of medieval France, to wit the Romanized governing class, kings and nobles:



This in turn has been followed by the movement found within non-Romanized segments of the populace, the bourgeoisie and the peasantry of France.

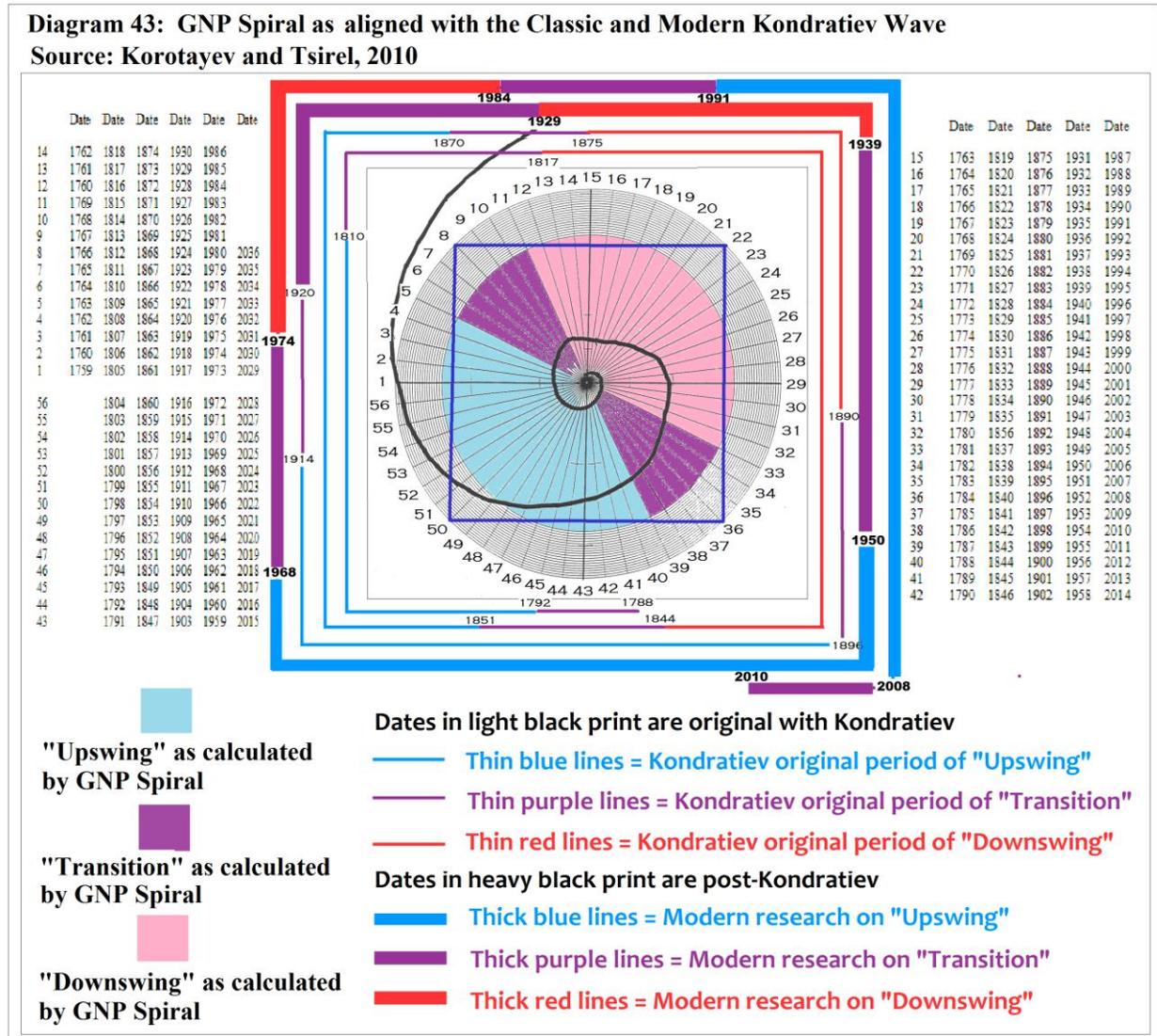


To add consideration of the early dichotomies more specifically, we can state the entire system as follows:



4.6 Comparison to Kondratiev Waves

The “system of movement” proposes a form of logic governing social development. In comparison, a chief difficulty facing Kondratiev Wave researchers is the consistency of dates for the cycle itself. The chart below aligns the GNP Spiral and the classic Kondratiev waves, with dates given by both Kondratiev and modern research.



If we juxtapose the aligned GNP Spiral / Kondratiev wave model with the European “system of movement” we may analyze three separate models simultaneously and potentially answer questions posed by each.

For example, let us consider the “periods of chaos” previously described in the European “system of movement” as periods of time during which European development:

(1) releases a great deal of money into the general stream of world commerce, simply because the controls necessary to keep it locked in Europe are lacking during this period, and

(2) finds more equitable, less restrictive ways of people living together, thereby consuming less energy with more efficiency and less waste.

Through the simultaneous juxtaposition of these three models we can see that the chaos of the French Revolution coincided with the general upswing of the period itself as noticed by Kondratiev. Referring to the diagram below:

1. The shaded yellow area within the European system of movement indicates the dates under discussion for events taking place in Europe and the model wherein they are found.
2. The shaded period within the GNP Spiral recalls the Phase A, Phase B and transition periods given previously for the period under discussion.
3. The increased heaviness of color in the square-based timeline connects the time period under discussion with the dates given by Kondratiev and their significance.

Considering the chart below, the rigid order imposed upon Europe by the royal prerogatives of the Bourbons ended in a “period of chaos” lasting from 1789-1804. During this period the energy liberated went directly into the “upswing” phase of the Kondratiev wave (see Kondratiev timeline) and the “revolutionary” outlook of the United States (see shaded portion in blue of the GNP Spiral). In particular, the United States benefited directly from the French chaos of this period in that the Louisiana Purchase of 1803 gave the United States uncontested French, Spanish and English claims to an enormous section of North America.

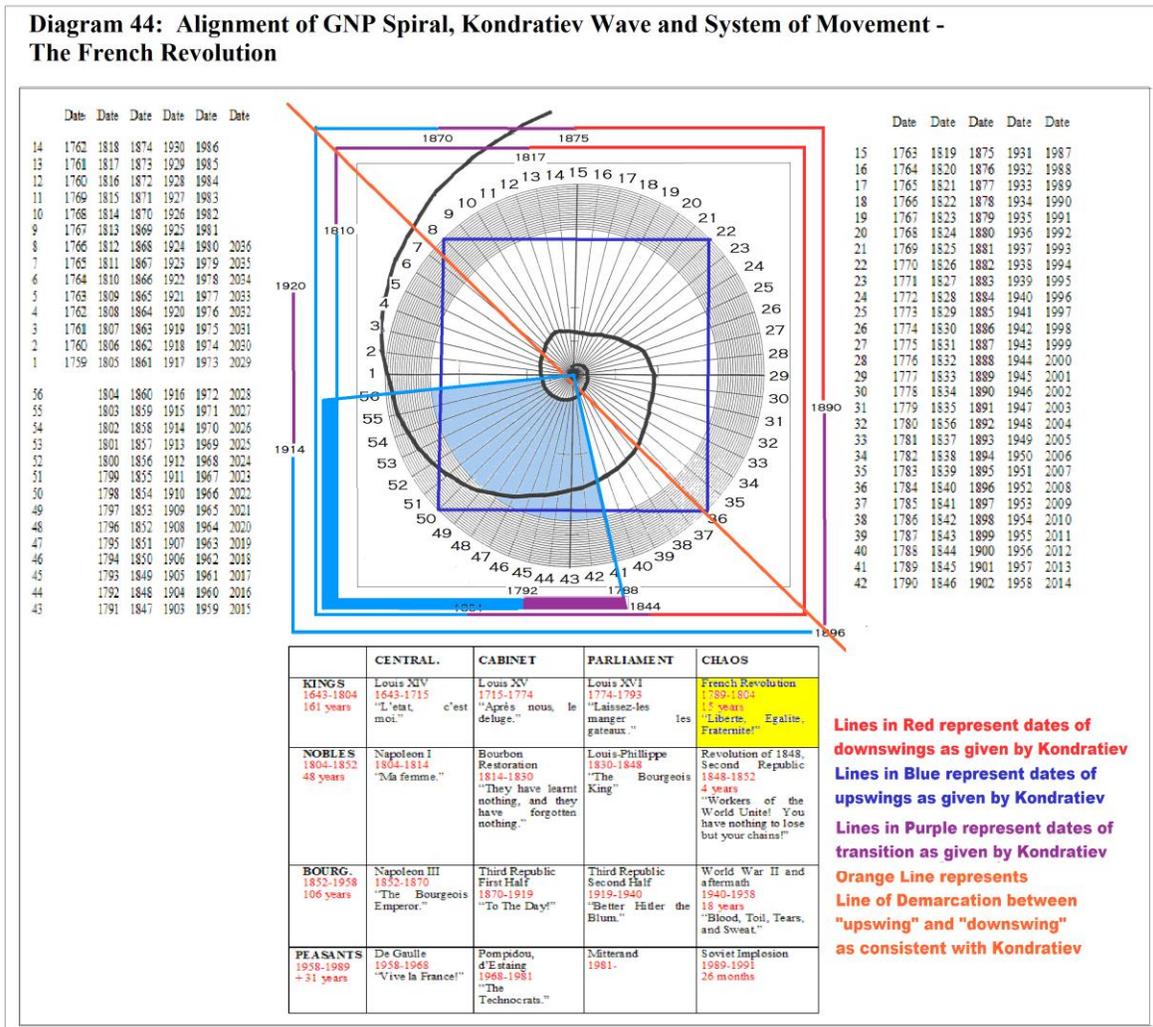
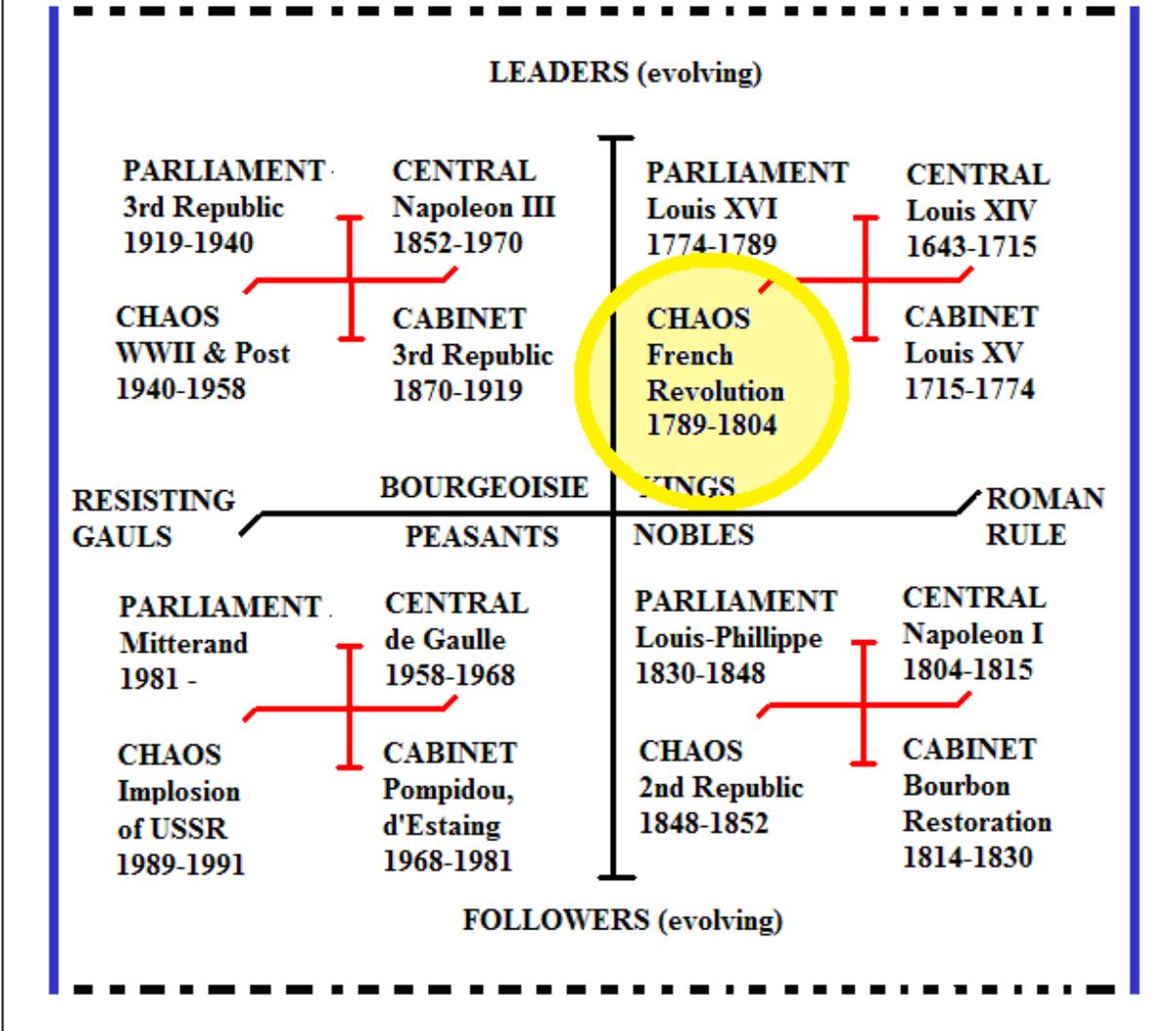


Diagram 42: A European System of Movement -



Similarly, if we consider the timing of the Revolution of 1848, the general liberation felt at the time coincided perfectly with the upswing of the period. Post-1848 ever-increasing immigration from Europe began the settlement of the vast interior of the United States. With this revolutionary and idealistic push came the rush toward the general enfranchisement of white landed farmers in the American West and the destruction of the Southern slave system in a bloody civil war.

Diagram 45: Alignment of GNP Spiral, Kondratiev Wave and System of Movement - The Revolution of 1848

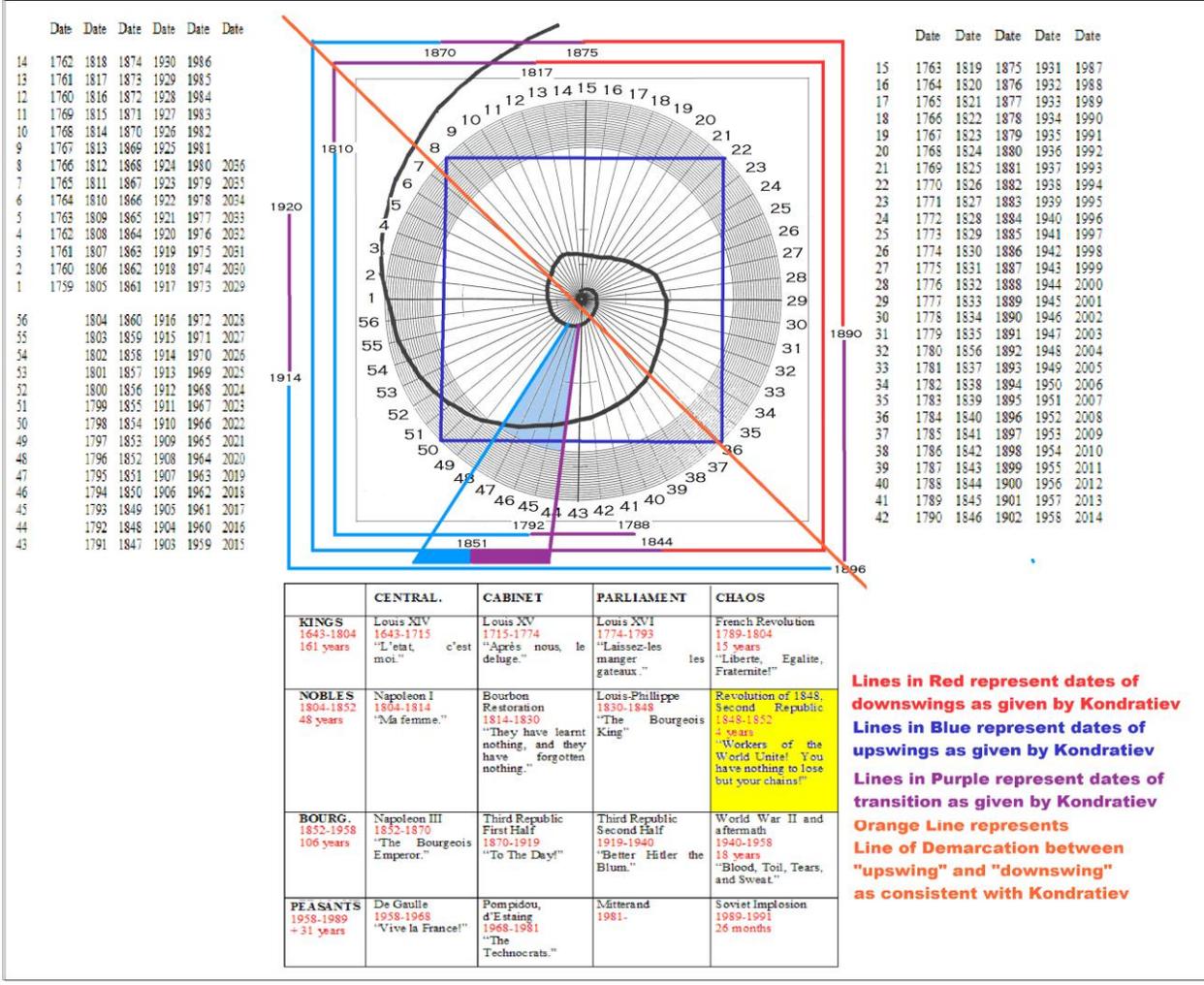
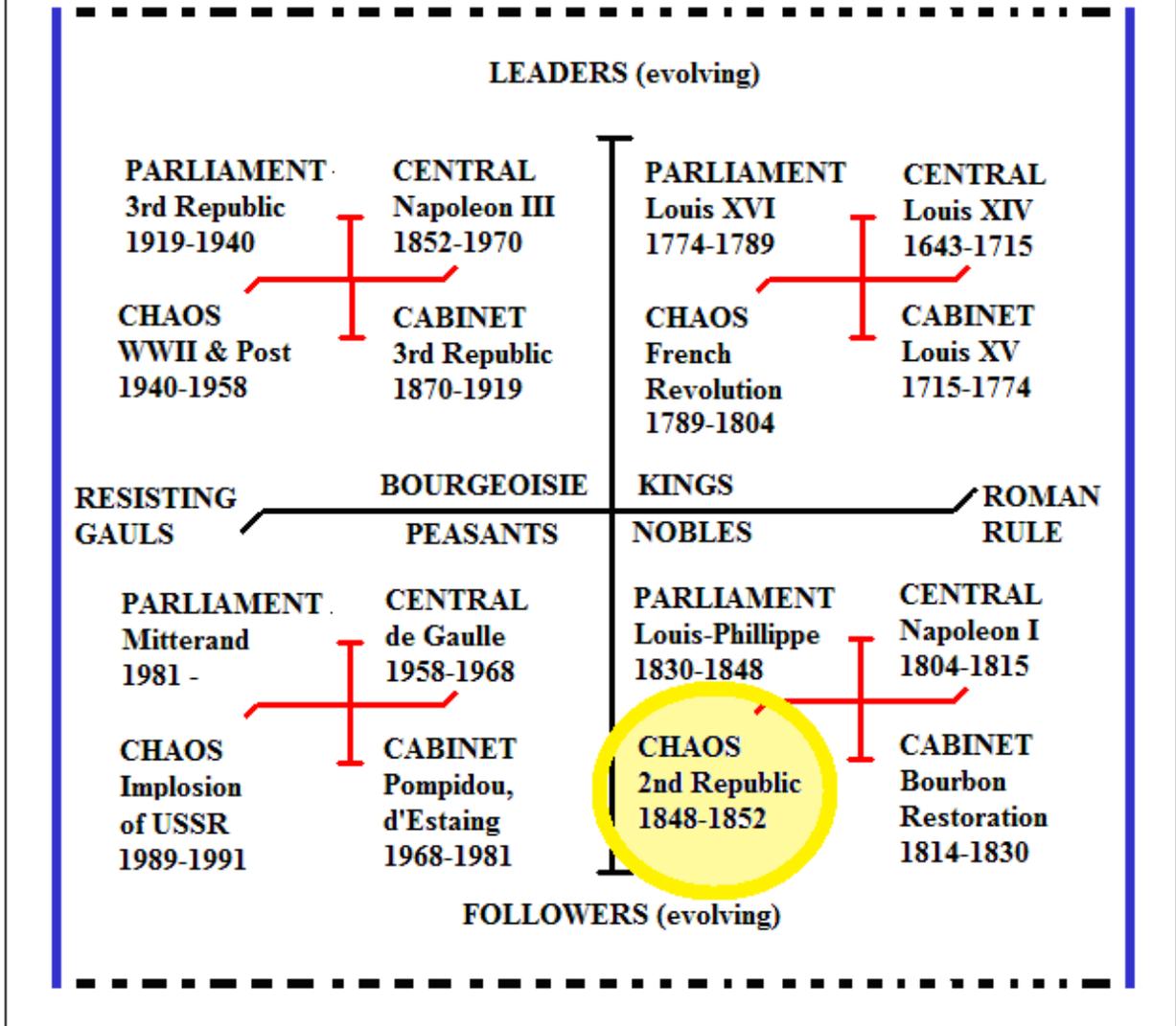


Diagram 42: A European System of Movement -



The situation is similar in the case of the Second World War and its aftermath. Modern research on Kondratiev Waves begins with a “transition period” at 1939, moving to an “upswing” at 1950. This “transition” period is quite contrary to the typical “downswing” under the classic Kondratiev thesis, as shown by the shaded red area within the GNP Spiral. Modern scholarship on Kondratiev waves brings the post-World War II period into an extended upswing period, as would be typical of the upswing period predicted by Kondratiev.

Diagram 46: Alignment of GNP Spiral, Kondratiev Wave and System of Movement - World War II and Aftermath - Source for Modern Kondratiev dates: Korotayev and Tsirel, 2010

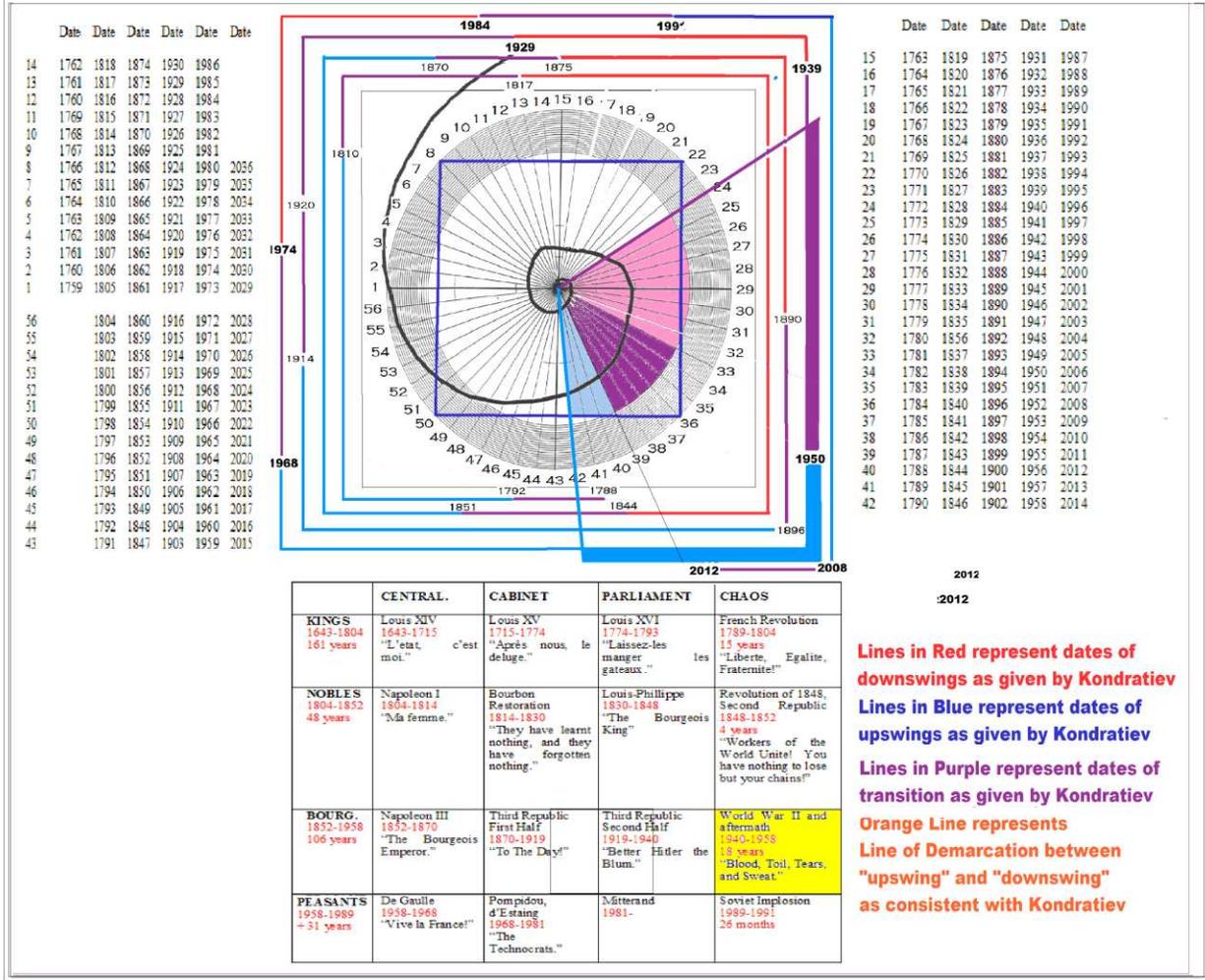
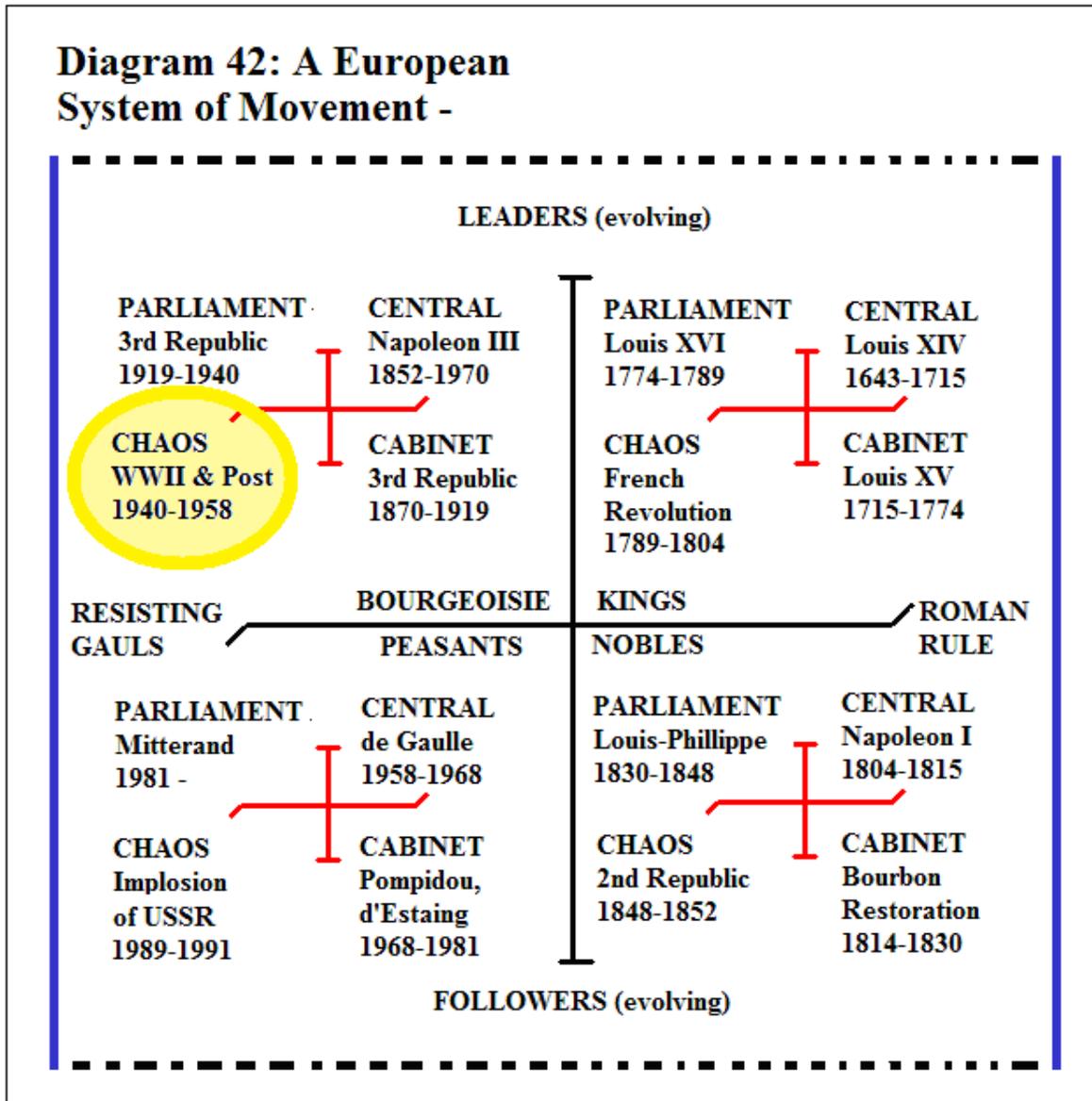


Diagram 42: A European System of Movement -



Viewing the matter from the point of view of the GNP Spiral, the European – and even global chaos – which engulfed the world during the Second World War and its aftermath brought about the collapse of much of the European imperial / colonial system. The monetary energy released into the global system during this period led to a wide variety of American alliances (NATO, SEATO, CENTO, etc.) to fill this void in counterbalance to Stalin and the Soviet Union. Not unlike previous periods of chaos, the disruption of the European global system contributed enormously to American power. And once again, the end of European chaos in 1950 coincided with a general upswing with a timing of dates in accordance with the classic Kondratiev wave.

In the previous three examples (Diagrams 44, 45, and 46) we have looked first to the European system of movement (highlighted in yellow), followed by secondary consideration of the relationships within the GNP Spiral (shaded areas of blue, pink and purple) and the classic understanding of the Kondratiev wave which may be affected by periods of European chaos (square surrounding timeline).

This approach may be reversed. In other words we may first investigate the dates given by modern Kondratiev scholars (the surrounding square-shaped timeline using thick lines) and look secondarily to the GNP Spiral (blue, pink and purple shading) and the European system of movement (in yellow) to obtain a more cogent insight with the use of these other models.

For example, the failure to recognize that two separate models are at work leads some modern research on Kondratiev Waves (Korotayev, Tsirel 2010) to hold that a very long period of “transition” runs between the period 1914-1929 wherein we move from “upswing” to “downswing.” This is a “transition period” of 15 years, more than one quarter of a 56-year cycle.

As this would be explored through the GNP Spiral and the system of movement model, this period coincides in Europe with the increasing decline of the bourgeoisie as it stumbles from World War I into chaos, while the United States lived out the end of an extremely revolutionary period. The denomination of this period as a “transition,” although accurate, is in reality an increasingly volatile situation wherein the three models are not in harmony with one another.

Diagram 47: Alignment of GNP Spiral, Kondratiev Wave and System of Movement - Post-World War I and Roaring 20's - Source for Modern Kondratiev dates: Korotayev and Tsirel, 2010

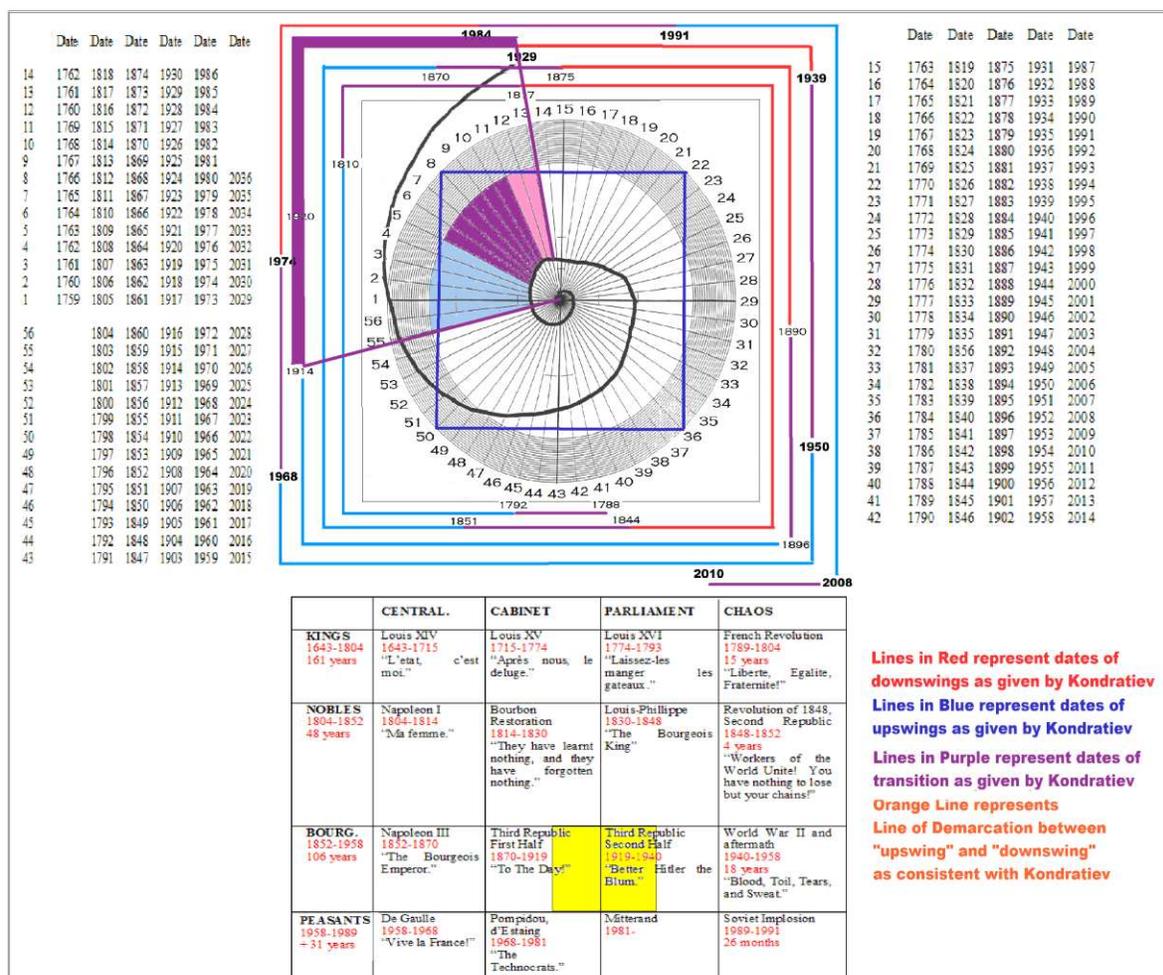
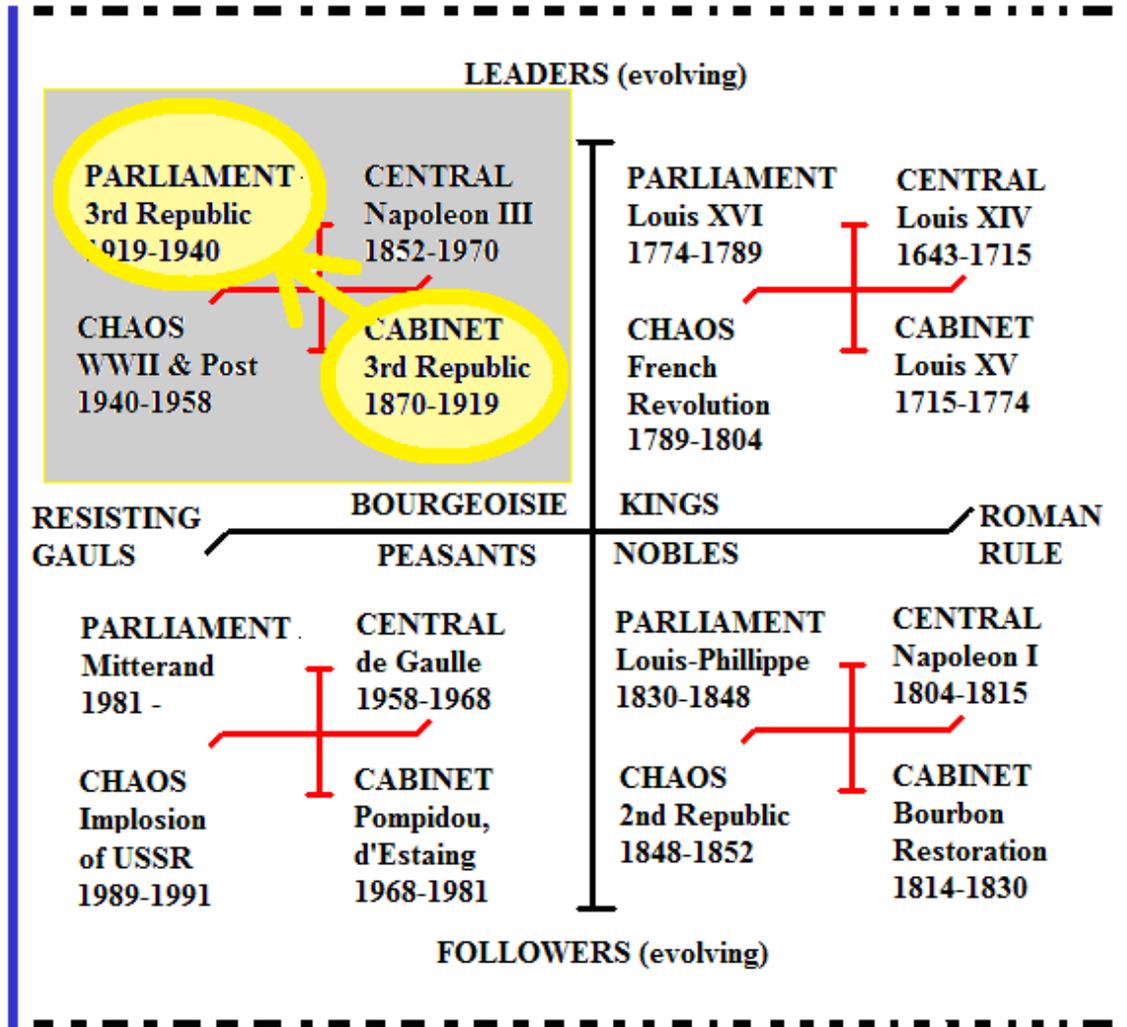


Diagram 42: A European System of Movement -



Referring to the 1970's, many Kondratiev theorists have dated a new downturn, this time beginning in 1974 and extending to 1984 (heavy red period of the square-shaped time line below). This is contrary to what one would expect during this period under the classic Kondratiev thesis (shaded area of blue, purple and red). As this might be considered in light of the GNP Spiral and the European system of movement, the revolutionary tendencies of this period in the United States given by the GNP Spiral (see supra, Introduction 1.B), coupled with the increasing divisions of Europe (below in yellow), indicate once again that we are considering three models which are not in harmony with one another.

Diagram 48: Alignment of GNP Spiral, Kondratiev Wave and System of Movement - Post-OPEC
 - Source for Modern Kondratiev dates: Korotayev and Tsirel, 2010

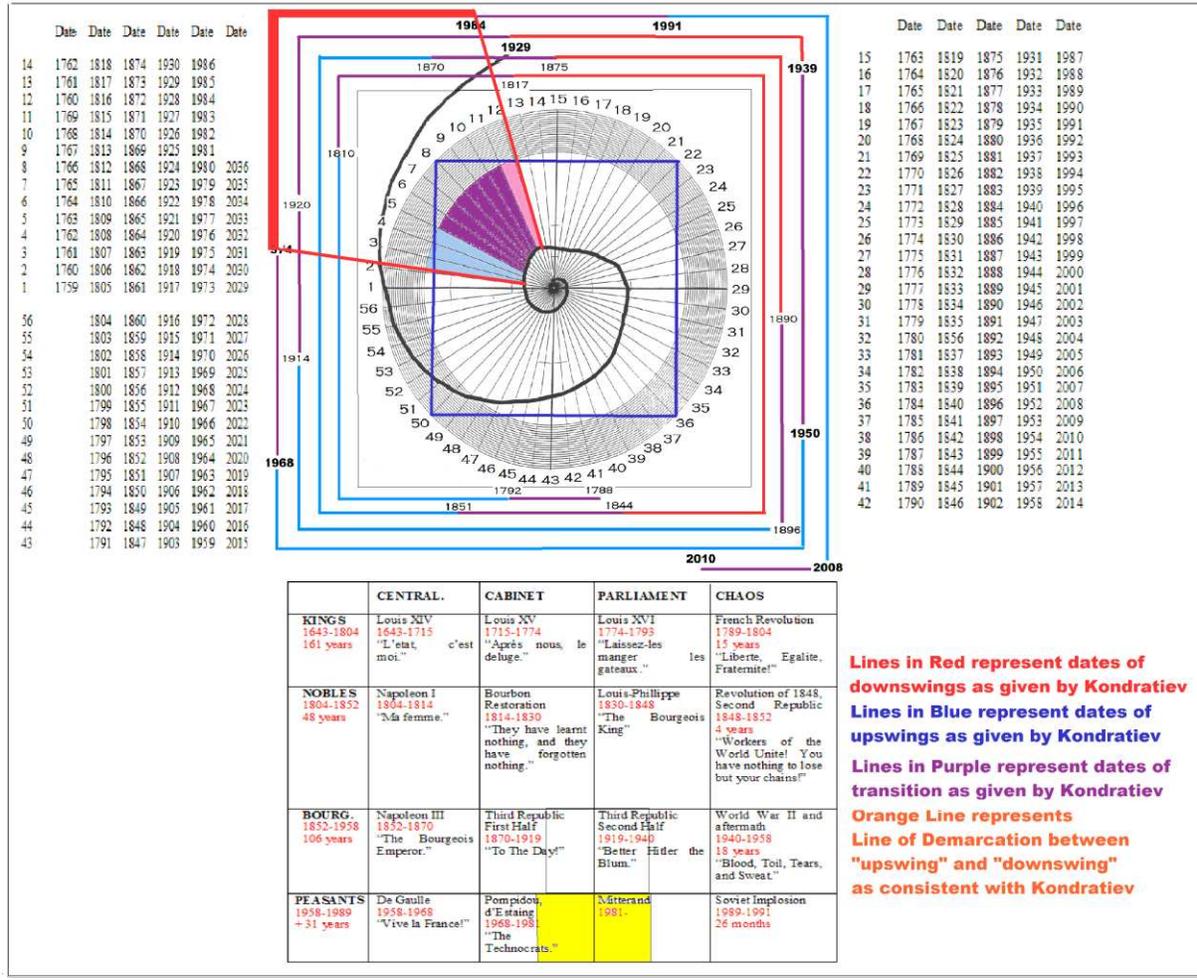
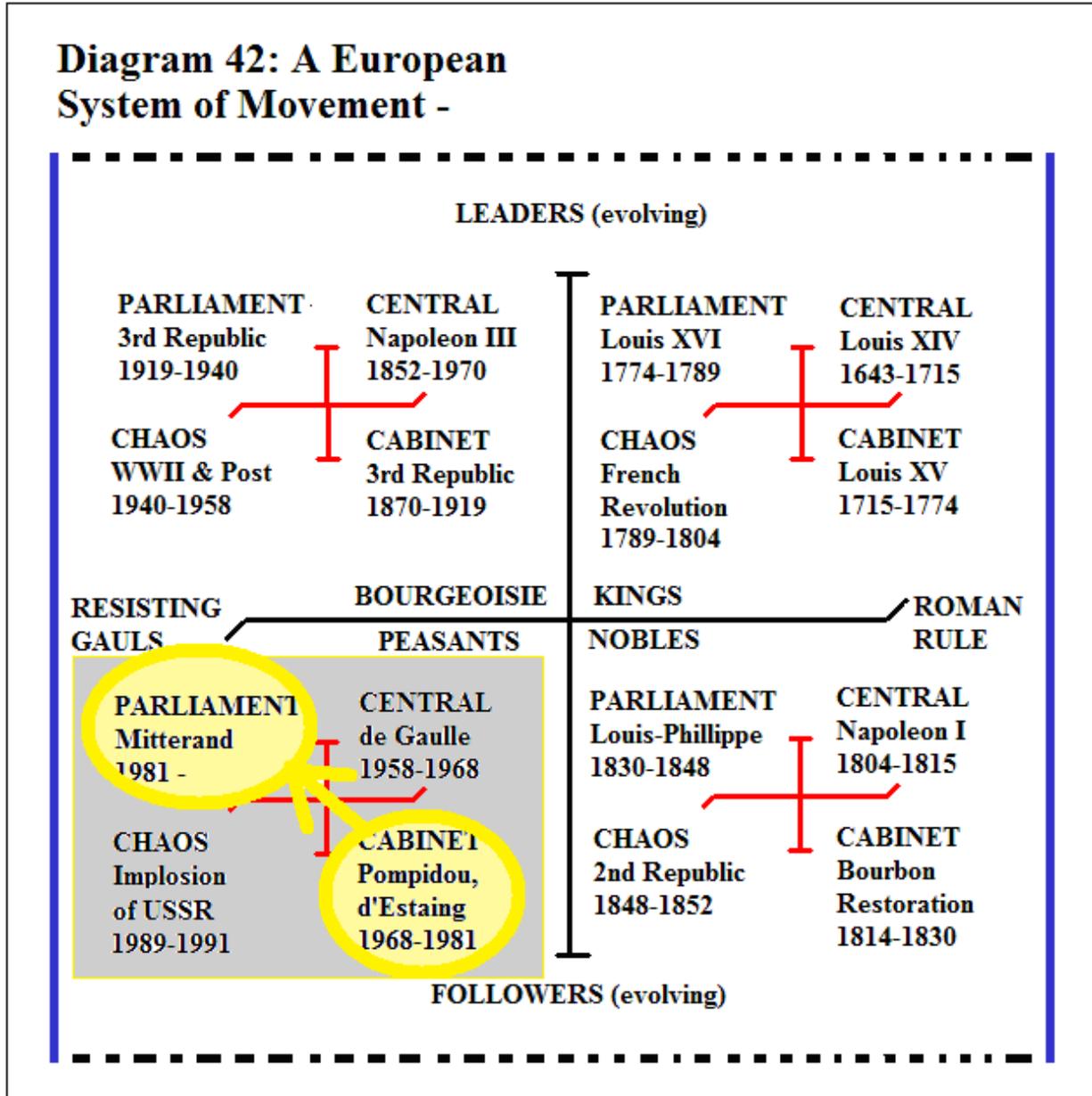


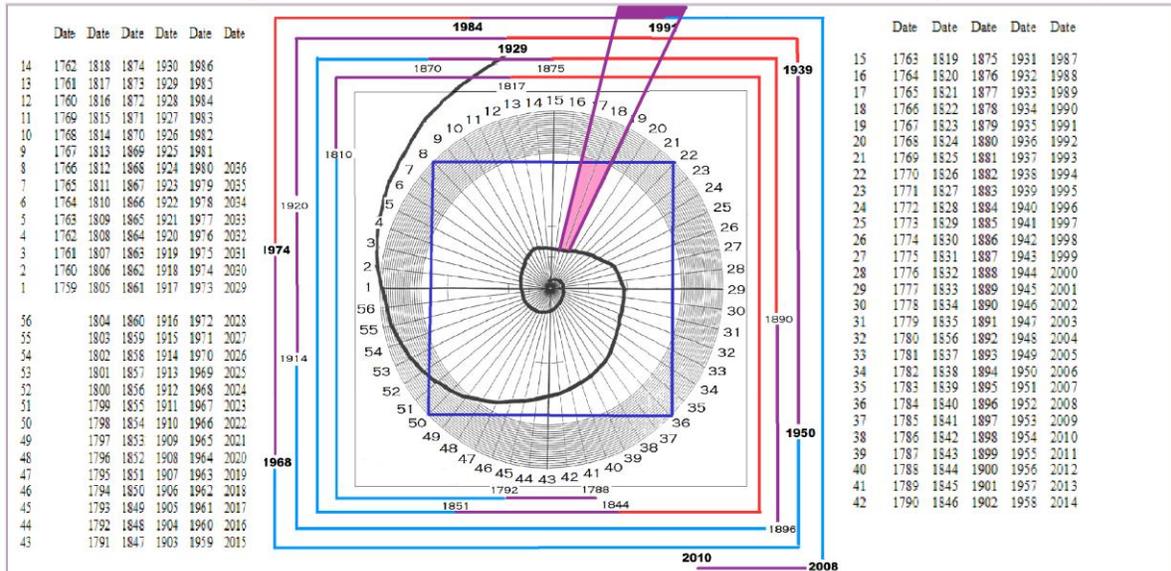
Diagram 42: A European System of Movement -



The implosion of the former Soviet Union between 1989-1991 is the last “period of chaos” we consider. Unlike previous periods of European chaos, the collapse of this government came just as the central depth of a projected downswing was beginning (shaded red area below).

At this juncture two periods – Medieval, Modern – of the European “system of movement” are complete. It is interesting that the last date of the system, December 25, 1991, Christmas Day, originated as the date of the Roman Saturnalia, the Festival of Saturn, the God of Time.

Diagram 49: Alignment of GNP Spiral, Kondratiev Wave and System of Movement - 1989-1991 Soviet Implosion - Source for Modern Kondratiev dates: Korotayev and Tsirel, 2010



Date	Date	Date	Date	Date	Date
14	1762	1818	1874	1930	1986
13	1761	1817	1873	1929	1985
12	1760	1816	1872	1928	1984
11	1769	1815	1871	1927	1983
10	1768	1814	1870	1926	1982
9	1767	1813	1869	1925	1981
8	1766	1812	1868	1924	1980
7	1765	1811	1867	1923	1979
6	1764	1810	1866	1922	1978
5	1763	1809	1865	1921	1977
4	1762	1808	1864	1920	1976
3	1761	1807	1863	1919	1975
2	1760	1806	1862	1918	1974
1	1759	1805	1861	1917	1973
56	1804	1860	1916	1972	2028
55	1803	1859	1915	1971	2027
54	1802	1858	1914	1970	2026
53	1801	1857	1913	1969	2025
52	1800	1856	1912	1968	2024
51	1799	1855	1911	1967	2023
50	1798	1854	1910	1966	2022
49	1797	1853	1909	1965	2021
48	1796	1852	1908	1964	2020
47	1795	1851	1907	1963	2019
46	1794	1850	1906	1962	2018
45	1793	1849	1905	1961	2017
44	1792	1848	1904	1960	2016
43	1791	1847	1903	1959	2015

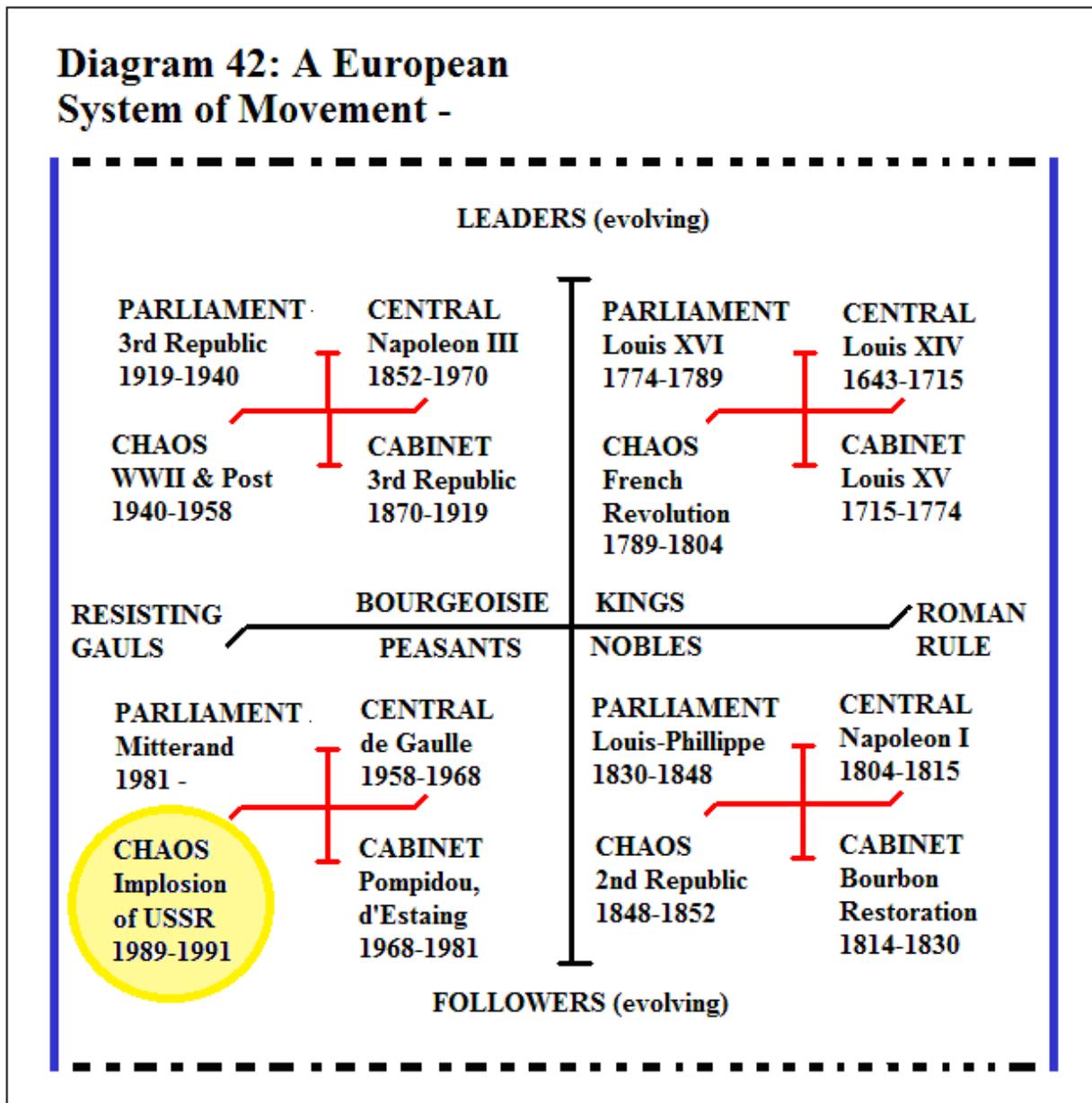
Date	Date	Date	Date	Date
15	1763	1819	1875	1931
16	1764	1820	1876	1932
17	1765	1821	1877	1933
18	1766	1822	1878	1934
19	1767	1823	1879	1935
20	1768	1824	1880	1936
21	1769	1825	1881	1937
22	1770	1826	1882	1938
23	1771	1827	1883	1939
24	1772	1828	1884	1940
25	1773	1829	1885	1941
26	1774	1830	1886	1942
27	1775	1831	1887	1943
28	1776	1832	1888	1944
29	1777	1833	1889	1945
30	1778	1834	1890	1946
31	1779	1835	1891	1947
32	1780	1836	1892	1948
33	1781	1837	1893	1949
34	1782	1838	1894	1950
35	1783	1839	1895	1951
36	1784	1840	1896	1952
37	1785	1841	1897	1953
38	1786	1842	1898	1954
39	1787	1843	1899	1955
40	1788	1844	1900	1956
41	1789	1845	1901	1957
42	1790	1846	1902	1958

	CENTRAL.	CABINET	PARLIAMENT	CHAOS
KINGS 1643-1804 161 years	Louis XIV 1643-1715 "L'etat, c'est moi."	Louis XV 1715-1774 "Après nous, le deluge."	Louis XVI 1774-1793 "Laissez-les manger gateaux."	French Revolution 1789-1804 15 years "Liberte, Egalite, Fraternite!"
NOBLES 1804-1852 48 years	Napoleon I 1804-1814 "Ma femme."	Bourbon Restoration 1814-1830 "They have learnt nothing, and they have forgotten nothing."	Louis-Philippe 1830-1848 "The Bourgeois King"	Revolution of 1848, Second Republic 1848-1852 4 years "Workers of the World Unite! You have nothing to lose but your chains!"
BOURG. 1852-1958 106 years	Napoleon III 1852-1870 "The Bourgeois Emperor."	Third Republic First Half 1870-1919 "To The Day!"	Third Republic Second Half 1919-1940 "Better Hitler the Blum."	World War II and aftermath 1940-1958 18 years "Blood, Toil, Tears, and Sweat."
PEASANTS 1958-1989 31 years	De Gaulle 1958-1968 "Vive la France!"	Pompidou, d'Eating 1968-1981 "The Technocrats."	Mitterand 1981- 1981.	Soviet Implosion 1989-1991 26 months

Lines in Red represent dates of downswings as given by Kondratiev
 Lines in Blue represent dates of upswings as given by Kondratiev
 Lines in Purple represent dates of transition as given by Kondratiev
 Orange Line represents Line of Demarcation between "upswing" and "downswing" as consistent with Kondratiev

Five hundred years prior to this date we come to December 25, 1491, the last Christmas of the Middle Ages before Columbus set sail to discover modern times.

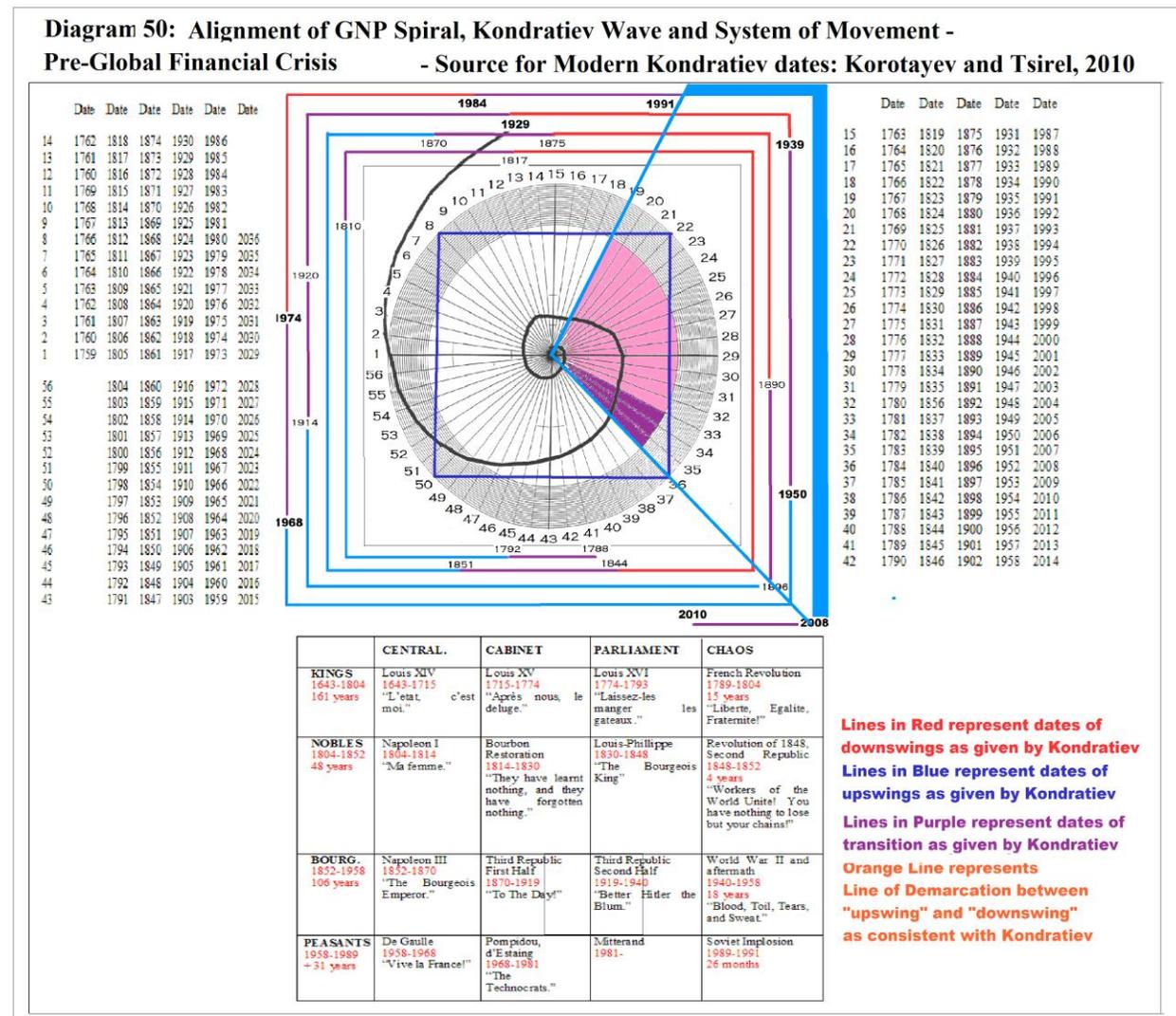
And 1500 years prior to this, 2,000 year to the day prior to the implosion of the USSR, in 10 b.c., the Emperor Augustus moved a 30 meter, red granite pillar topped by a pyramid point - the obelisk of Psammetichus II (595-589 b.c.) - to its central place in his Solarium Augusti in Rome. It is an amazing coincidence that exactly 2000 years to the day prior to the collapse of the Soviet Union on Christmas Day, 1991, using this ancient Egyptian obelisk as gnomon, Augustus constructed a sundial to keep time for the world, dedicated it to the Sun and celebrated its first Saturnalia. It stands today in the Piazza Montecitorio.



The American social, military and economic energy released from its mission of blocking the Soviet Union was “transitional” only in the most understated sense of the word. (see previous chart) Rather the Soviet implosion turned an expected downswing into an era of upswing, according to modern Kondratiev theorists.

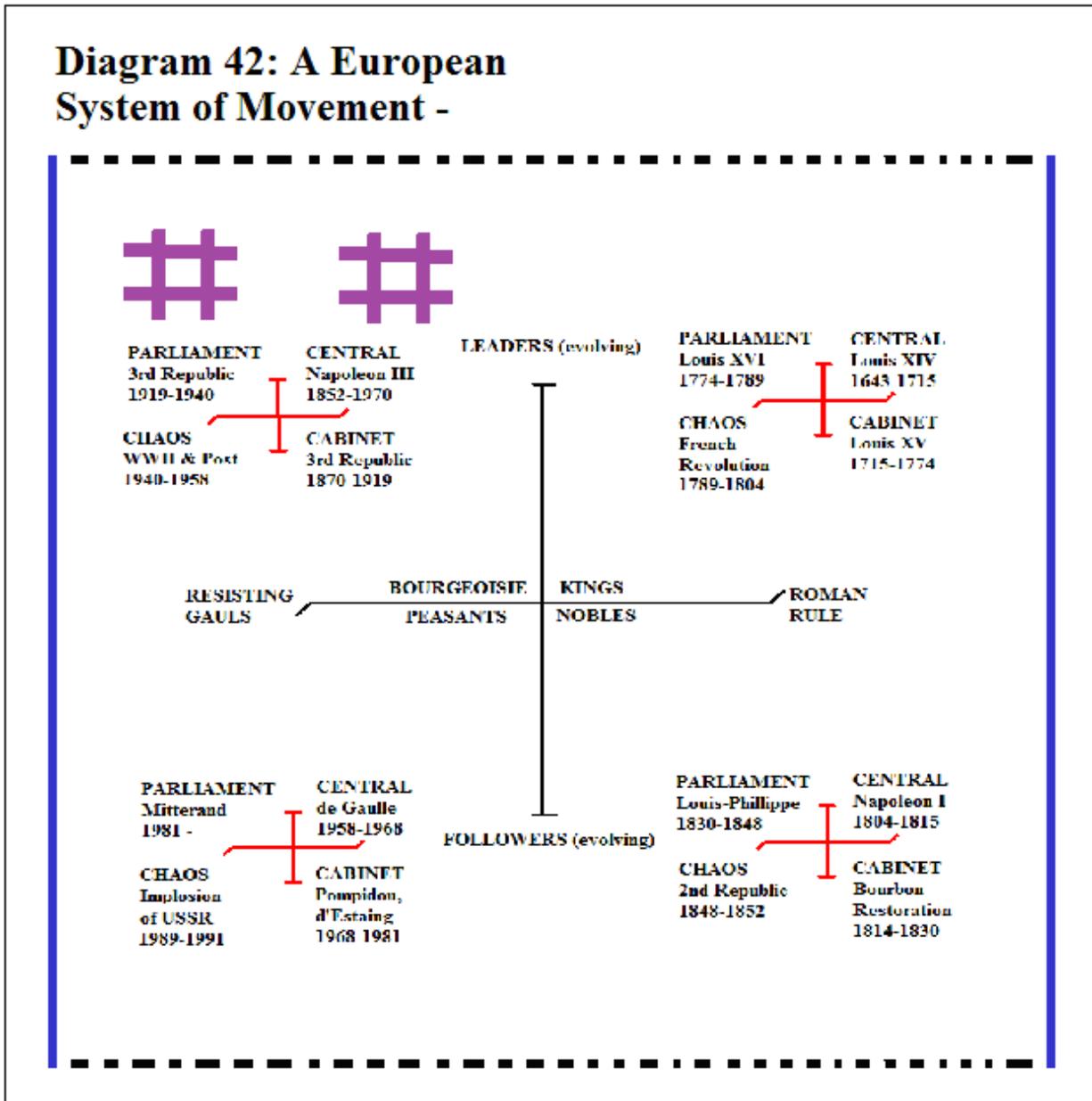
Considering Diagram 50, one result of the timing of this final European “period of chaos” is that the liberalized flow of money and the increased efficiency which are typically associated with revolution took place during an expected Kondratiev downswing and a consolidating period of American history. The sudden freedom usually experienced by Americans when chaos has engulfed the European class system turned in this case towards a dramatic push towards conservatism and aggrandizement in the United States.

This in turn has led to a willingness, or perhaps simply “need,” to super-charge the development of the economy during what typically would have been anticipated to be the end of a downswing economically. As these annual GNP figures exceed a 3.4969% annual increase over time (see Albers & Albers, 2011, footnotes 9 and 10), a balancing factor may be expected to set in 14-years later, i.e. sometime after 2005.



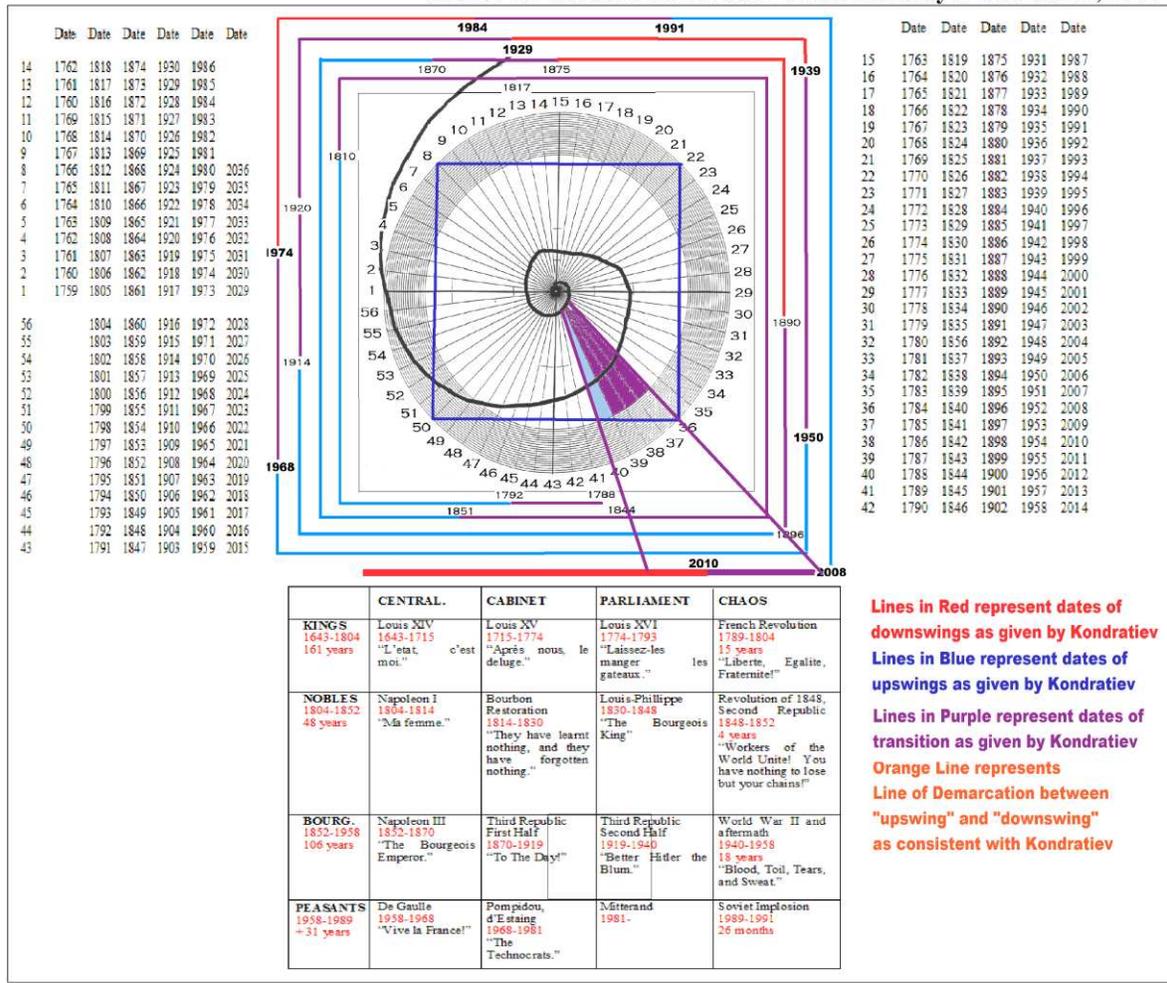
If we begin to analyze what may be the next “rhythm” of history, we might note that the first section of time, stemming from 10 b.c. to 1492, a period of exactly 1500 years is followed by a rhythm of time one third this amount, i.e. 1492 to 1991. It may be that the next “rhythm” of time may be of much shorter duration per term.

If we note that a period of 18 sections follows upon 1991, we might add $1991 + 18 = 2009$. If we are translating these patterns into years, we might note that the collapse of the Euro began with the Global Financial Crisis in 2008, and quickly turned into a European debt crisis. This would appear to be consistent with the pattern explored previously wherein the United States also passes through a set period of time wherein enormous expansion takes place, these being Years 1 through 7.



Considering Diagram 51 below, it is suggested today that we have now entered into a “transition period” of some unknown length. At this juncture modern researchers in Kondratiev waves present significant contradictions to the classic plan of Kondratiev. On the one hand, and according to the expectations of the classic Kondratiev wave, it would be presumed that we are transitioning to a period of upswing (see shaded area below). Nevertheless, in light of the previous extended run of “upswing” (1991 through 2008), we should – contrarily – be transitioning to a future downswing. Such a downswing is entirely opposite the expectations previously experienced at the southeast corner of the model.

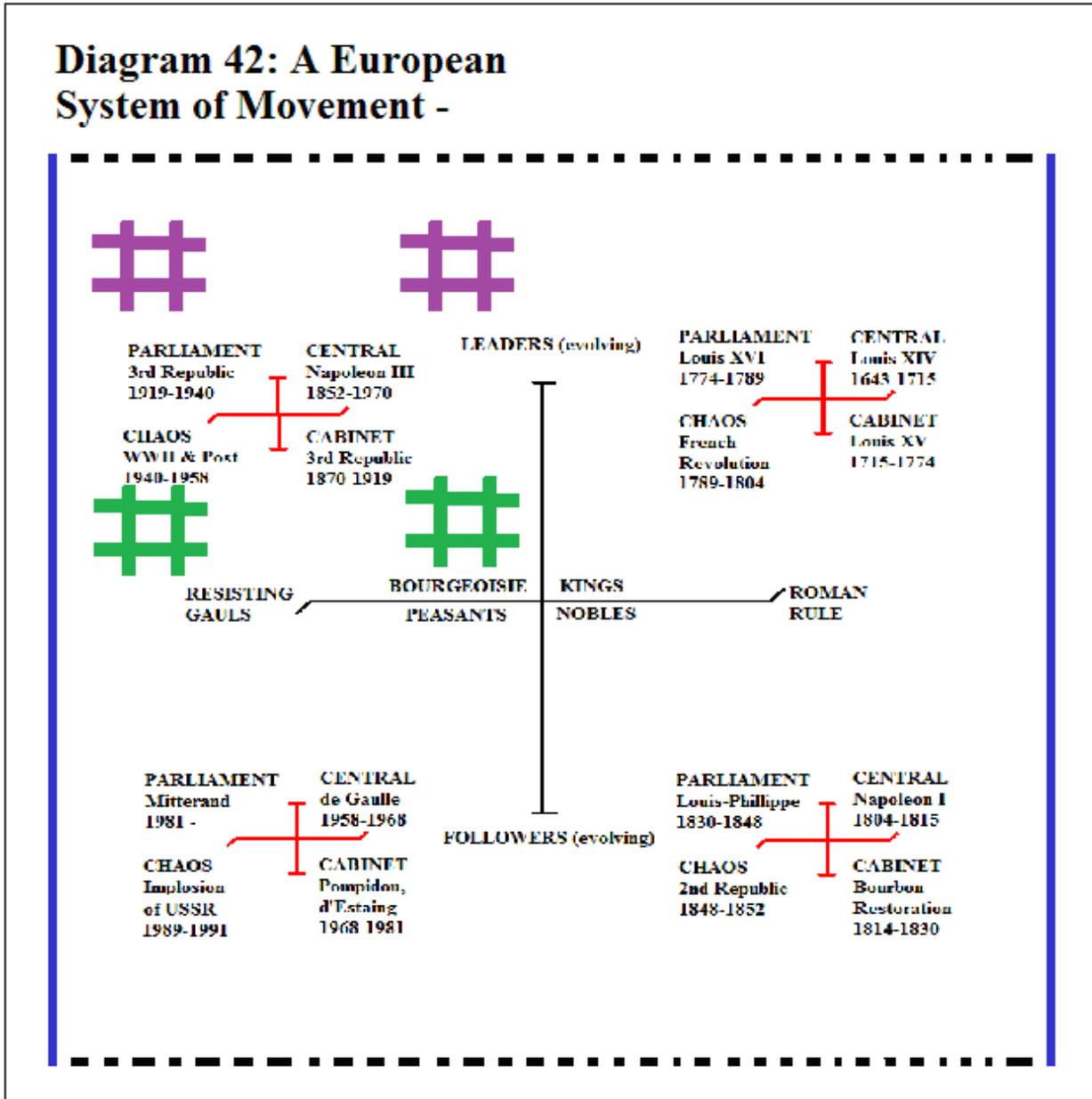
Diagram 51: Alignment of GNP Spiral, Kondratiev Wave and System of Movement - Post-Global Financial Crisis - Source for Modern Kondratiev dates: Korotayev and Tsirel, 2010



If it is true that we are now on a rhythm of time which goes from year to year, we might add 18 years to 2009 for a date of 2027. During this 18 year period one would expect a “meltdown” of the European system akin to the meltdown which accompanies Years 8 through 14 in the national economic history of the United States.

As this would be considered in light of GNP Spiral analysis in connection with the termination of this stage of the system of movement for Europe, it would appear that the inability to accommodate the downturn typically associated with this preceding period has pushed the melt-down date of 2005 to the very end of the 14-year period of consolidation, thereby bringing two terminating models together simultaneously. This confluence appears to be at the heart of the present Global Financial Crisis thereby confusing the present period of time.

Diagram 42: A European System of Movement -



Conclusion

If the year 2027 is the final year of the present European uncertainty, they it must be clear that a new and much more strict system is likely to be put into place. This is associated with the year April 9, 2029 in the national economic history of the United States. Perhaps, as these two years conjoin into the political and economic events of that period, Europe will approach a very great “coming revolution,” one which will clearly be different from those which have taken place to date.

As to the present and future status of Europe, it would appear obvious that further research in “systems of movement” are in order. As to the classic Kondratiev Wave, the Arab Spring and revolutions taking place throughout the Middle East since 2009 have reasserted the value of Kondratiev’s thesis in its original sense. The timing of these revolutions could not be more perfect as to the current predictions of the GNP Spiral or the original and still deeply significant work in 1925 by N. Kondratiev

These three models – The Kondratiev Wave, The GNP Spiral, and the “system of movement” of European culture – are used to analyze potential patterns in French history. More broadly, they provide a sense of European cultural development as a pattern. This history has shape, dimension, a plan, a logic. This logic was noted by Alexis de Tocqueville in his book *Democracy in America*, first published in 1835. In his Introduction he describes briefly the fundamental direction of French History from 1100 to his day.

In perusing the pages of our history, we shall scarcely meet with a single great event, in the lapse of seven hundred years, which has not turned to the advantage of equality. ... Nor is this phenomenon at all peculiar to France. Whithersoever we turn our eyes we shall witness the same continual revolution throughout the whole of Christendom.

The various occurrences of national existence have everywhere turned to the advantage of democracy; all men have aided it by their exertions: those who have intentionally labored in its cause, and those who have served it unwittingly; those who have fought for it and those who have declared themselves its opponents, - have all been driven along in the same track, have all labored to one end, some ignorantly and some unwillingly; all have been blind instruments in the hands of God.

The gradual development of the equality of conditions is therefore a providential fact, and it possesses all the characteristics of a Divine decree: it is universal, it is durable, it constantly eludes all human interference, and all events as well as all men contribute to its progress.ⁱ

If ratios and predictable dates may be associated with the rise and fall of governments; if revolutions may be anticipated as prolonged or rapid; if history repeats its patterns on a consistent basis with a clear logic; if these are true, then the “consciousness” of Europe - the history presented herein - may be part of an underlying logic applicable to all forms of evolution or change.

Epilogue on Zeno's Paradox

We began the introduction of this set of essays with an extended discussion of Zeno's Paradox. This discussion might include a number of philosophers, mathematicians, physicists, etc. who have suggested various proposals to resolve this Paradox. Roberto Torretti describes Plato's view of motion as follows.

... Plato obviously countenances a purely mathematical theory of motion, which it would be appropriate to call kinematics or phoronomy. He conceives it quite broadly. "Motion- he says- presents not just one, but many forms. Someone truly wise might list them all, but there are two which are manifest to us." One is that which is imperfectly illustrated by celestial motions.

The other is the "musical motion" (enarmonics phore), studied by Pythagorean acoustics. This science, says Plato, has been justly regarded as astronomy's "sister science." Exact observation- not to mention experiment-is completely out of place here too. Plato pours ridicule on "those gentlemen who tease and torture the strings and rack them on the pegs of the instrument." Generally speaking, "if anyone attempts to learn anything about the objects of sense, I do not care whether he looks upwards with mouth gaping or down-wards with mouth shut, he will never, I maintain, acquire knowledge, because nothing of this sort can be the object of a science."

Mr. Torretti describes Aristotle's view as follows.

Aristotle's solution of Zeno's paradoxes depends essentially on the premise that, even though a point can always be determined which divides a given segment into two parts in any assigned proportion, such a point need not exist before it is actually constructed. ...

Aristotle was well aware that his finite universe might appear to be incompatible with geometry. But, in his opinion, it was not. "Our account does not rob the mathematicians of their science," he writes "by disproving the actual existence of the infinite in the direction of increase. ... In point of fact they do not need the infinite and do not use it. They postulate only that the finite straight line may be produced as far as they wish. It is possible to have divided in the same ratio as the largest quantity another magnitude of any size you like. Hence, for the purposes of proof, it will make no difference to them to have such an infinite instead, while its existence will be in the sphere of real magnitudes."

Isaac Newton refers to Zeno's Paradox in the opening chapter of his *Mathematical Principles of Natural Philosophy*, Book One, Section I, Lemma 1.

Lemma 1

Quantities, and the ratios of quantities, which in any finite time converge continually to equality, and before the end of that time approach nearer to each other than by any given difference, become ultimately equal.

If you deny it, suppose them to be ultimately unequal, and let D be their ultimate difference. Therefore they cannot approach nearer to equality than by that difference D; which is contrary to the supposition.

Einstein similarly ignores Zeno's Paradox. Regarding the concept of a continuum Einstein writes:

The surface of a marble table is spread out in front of me. I can get from any one point on this table to any other point by passing continuously from one point to a "neighboring" one, and repeating this process a (large) number of times, or, in other words, by going from point to point without executing "jumps." I am sure the reader will appreciate with sufficient clearness what I mean here by "neighboring" and by "jumps" (if he is not too pedantic). We express this property of the surface by describing the latter as a continuum.

Davis and Hersch mention the contest between a mathematics of observation and a mathematics of logic using the same progression described in Zeno's Paradox.

The infinite is that which is without end. It is the eternal, the immortal, the self-renewable, the aperiion of the Greeks, the ein-sof of the Kabbalah, the cosmic eye of the mystics which observes us and energizes us from the godhead.

Observe the equation

$$1/2 + 1/4 + 1/8 + 1/16 + \dots = 1$$

On the left-hand side we seem to have incompleteness, infinite striving. On the right-hand side we have finitude, completion. There is a tension between the two sides which is a source of power and paradox. There is an overwhelming mathematical desire to bridge the gap between the finite and the infinite. We want to complete the incomplete, to catch it, to cage it, to tame it.

Mathematics thinks it has succeeded in doing this. The unnamable is named, operated on, tamed, exploited, finitized, and ultimately trivialized. Is, then, the mathematical infinite a fraud? Does it represent something that is not really infinite at all?"

One way of stating Zeno's Paradox in numeric form might be to recognize that the number "1" in Base Two is "1," and that fraction $\frac{1}{2}$ in Base Two is 0.1, and that fraction $\frac{1}{4}$ in Base Two is 0.01, and that the fraction $\frac{1}{16}$ in Base Two is 0.001, etc. Simply stating the number "0.000...0001 in Base Two" should be sufficient to indicate that the infinite number of zeros which can be placed between the first ".0" and the final "1" describes an infinitely small distance from the number zero on the positive side of the number line, thereby "proving" the validity of Zeno's Paradox. Since this small, positive number cannot be equal to zero or have the properties of zero, the number can never equal zero. Perhaps this idea condenses Zeno's Paradox in numeric form, i.e. that Achilles "*cannot even start running, for, before traversing the stretch to the starting point of the turtle, he will have to traverse half of it and again half of that and so on ad infinitum.*"

And yet, according to very accepted mathematic proofs, the inverse of the above number - "0.11111111... in Base Two" - is always deemed to equal 1 exactly despite the very different appearance of the numbers themselves. So it would seem that the first number "0.000...0001 in Base Two" is not recognized as a legitimate number, and the second number "0.111... in Base Two" is set equal to the very number intended to be set off as distinct.

The consequences attendant upon the philosophy of Parmenides and Zeno is significant. The encyclopedia article mentioned previously continues.

Parmenides had an enormous influence on the further development of philosophy. Most of the philosophers of the following two generations tried to find a way to reconcile his thesis that nothing comes into being nor passes away with the evidence presented to men by their senses. ...By far of greatest importance for the later development of philosophy and physical science was an attempt by the Atomists Leucippus (flourished mid-5th century) and (in the following generation) Democritus to solve the Parmenidean problem. Leucippus found the solution in the assumption that, contrary to Parmenides' argument, the nothing DOES in a way exist, viz., as empty space. There are then, however, only two fundamental principles of the physical world, empty space and filled space - the latter consisting of the atoms, which, in contrast to those of modern physics, are real atoms; i.e. they are absolutely indivisible because nothing can penetrate to split them. On these foundations, laid by Leucippus, Democritus appears to have built a whole system, aiming at a complete explanation of the varied phenomena of the visible world by means of an analysis of its atomic structure.

These essays have been written to advance the notion that the "fifth dimension" suggested by Kaluza is, in reality, the consciousness which ties together the frames of any reference.

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