POINCARE, SAUSSURE, AND STATIONARY LINGUISTIC SYSTEMS

> Method is precisely the selection of facts, and accordingly our first care must be to devise a method (Poincare 1914: 19).

Dedicated to Mentors Peter Roe (d. 2010) and Benoit Mandelbrot (d. 2010).

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Abstract

The last in this series has now been reached in our intention to place Ferdinand de Saussure at the centre of a dynamic, nonlinear linguistics, i.e., wave mechanics. This series has already outlined the influence upon the Third Course of General Linguistics of four figures, Albert Einstein, Heinrich Hertz, Richard Dedekind, and Hermann Grassmann. Henri Poincare is the last in our series.

Keywords

Attractors, Bifurcation, Cut, Four Dimensional Geometries, Frame, Homoclinic Tangles, Kinematics, Limit Cycles, Non-Integrable, Phase Space, Slice, Wave.

1 Introduction

The counter-intuitive properties of stationary linguistic systems are those of an elusive continent with a fractal shoreline in a lacunar universe. In reviewing the "Grammarian's Nightmare, the coefficient of the Weird, the measure of the murk," and the strange problems experienced by Applied Linguists and English Specific Purpose theorists, we come to Henri Poincare (1854-1912) who devised a method called dynamic chaotic systems modeling by which order finds a way to manifest itself in disorderly flow. Thus, dynamic chaotic systems modeling provides a formal method by which we can grasp the counter-intuitive properties of stationary linguistic systems.

2 Historical Background

Between 1870 and 1872 Cantor published five papers on Positive Number Systems, in 1872 Dedekind published Stetigkeit und irrationale Zahlen that dealt with completeness, gaplessness, and continuity (Grattan-Guiness 2000: 81-94), and in 1874 Saussure commenced his linguistic studies at Leipzig and Berlin. In 1887 Poincare published 'Sur les hypothesis fondamentales de la geometrie' and in 1889 he published Sur le probleme des trois corps'. In between Hinton published A New Era of Thought in 1888. During this period Saussure was working at the Ecole pratiques des hautes etudes, Paris, and active in the Societe linguistique de Paris (Culler 1985: 14-15). Then, in 1891 Saussure took up a professorship at the University of Geneva. H. G. Wells published the Invisible Man in 1897.

In 1902 a mathematical masterpiece in multidimensional hyperspace, Elementary Principles in Statistical Mechanics (Gibbs), was published followed by the popularist masterpiece The Fourth Dimension (Hinton 1904). In 1906 Boltzmann, who invented the first discontinuous probability function, committed suicide because no one believed in his atoms. Boltzmann and Wilheim Ostwald (Leipzig University) had been strong adversaries in the Energeticism/Atomism debate. Ostwald had argued for warps in fields, twists in space, knots in a wave, and fourth-dimensional squirts (Everdell 1997: 58-62).

In 1907 Analytic Cubism (1907-1911), pioneered by Picasso and Braque, commenced in France; Henri Bergson published Creative Evolution, and Hinton published An Episode of Flatland or How a Plane Folk Discovered the Third Dimension. On 9 July 1909 Einstein, Ostwald, and Marie Curie received honorary PHDs from the University of Geneva. Minkowski died in 1909. The next year Ostwald nominated Einstein for the Nobel Prize (Miller 2001: 225). Saussure commenced his third course devoting the first semester of the winter of 1910 to corpora, four-dimensional geometry, wave mechanics, and the study of large and small-scale deterministic chaos in the year

Germany, France, and Switzerland, Leipzig, Berlin, Paris, and Geneva, Saussure spanned the Metagenre shift from the old mechanics of Positive Number Systems and Dedekind completeness, gaplessness, and continuity to the new mechanics of Poincare and Einstein. His Metagenre shift from the geometric continuum trajectories of the Leibniz/Newton calculus to the arithmetized dimensions of the Dedekind/Weierstrauss calculus to Spacetime and the stroboscopic diagrams of Poincare's uncertain lines puncturing the equilibrium is evident when we follow the evolution of Saussure's three courses on General Linguistics 1907, 1908-1909, and 1910-1911 (Komatsu & Wolf 1996; Komatsu & Wolf 1997; Komatsu & Harris 1993).

The 1916 Cours de linguistique generale edited by Bally and Sechehaye has had a profound influence upon linguistic direction in the Twentieth Century. However, this posthumous, unauthorized version was edited by people who did not attend the 1910/1911 course, and it omitted essentially the entire first semester, a semester dedicated to dynamics and showing the influence of the new sciences. Saussure's Third Course, witnessed through the cahiers (Notebooks) of Emile Constantin edited by Eisuke Komatsu and Roy Harris (1993) reveals Saussure describing and utilizing two different scientific methodologies. It is this clash, contrast, and synthesis between the new sciences of four dimensional geometries, relativity, and deterministic chaos and the Nineteenth Century Discretization Program that make the Constantin, Komatsu, and Harris Third Course memorable and significant in the matrix of the history of ideas.

Kinematics in the 1910 Winter Semester, Statics in the 1911 Spring Semester, the semester outline from the Constantin notebooks displays the fundamental Hertzean bifurcation between dynamics and synchronism. Saussure commences with Poincarean science {Bifurcation, Poincarean cuts, sections, maps, and four-dimensional geometry} and a fusion of space and time following in the model advanced by Minkowski. Then he switches to a discretization program. Saussure's linguistic point is the Dedekind Point, his linguistic line is the Dedekind Line, his cut is the Dedekind Cut, his chains are Dedekind Hertzean chains, his entities and values are Weierstrauss neighbourhoods, his system is the Hamilton Hertzean machine, and the entire direction of his static mechanics is discretization. It is the Dedekind Linear Cut and its chain of numbers, which removes gaps and makes the Numerical Continuum possible. Saussure expects his linguistics can become an arithmetic and algebra because Weierstrauss Limit Points, or neighbourhood of values, define his irreducible units, because Cantor's Set Correspondences form links between the Number Line and the Poincarean Plane, and because of Cantor's Well-Ordering Principle. But a number of anomalies, especially Schmidt's 'fragmentation on the spot' phenomena, appear in his analysis.

3 The Problem

The Messier objects are a set of astronomical objects catalogued by the French astronomer Charles Messier (1771) that document the "Vermin of the Sky" interfering with his search for comets. These 110 "Vermin of the Sky" are now recognized to be double stars, galaxies, globular clusters, HII Clusters, Planetary nebula, and supernova explosions. In other words, the vermin were more interesting than the original objects of study. Analogously, we have focused on "Vermin of the Text" observed in the parameter space of disabled static states.

Schmidt's 'fragmentation on the spot' phenomenon has been the focus of our five part series. For the frame of stationary linguistic systems, counter to the Prisoner of a Metagenre expectation held by Mesopotamian masons, does not actually demonstrate evidence of reduction to Root, convergence to Ratio, and extension via calculus, concatenation, and correspondence to a unified system, i.e., the Age of Reason is over.

General Linguistics, disconnected from circulation, dissipation, external energy sources, human will, and Time displays hairsplitting, squishiness, muddlement, a continuum of grammars, a bottomless pit, and total mush. An unexpected result from a positivist integer science perspective, such static in the system may seem to be a failure of method, and to the second language community, such white noise phenomena may have zero interest. However, in the study of emergences, such data-driven discourse does provide descriptions concerning the details of disabled static states.

In the first place, Dust Discourse is a product of hairsplitting. In the second place, hairsplitting does not remove description of analytical intractability, variation, vagueness, incompleteness, and elusiveness, which remain a constant phenomena associated with the hairsplitting process. These constants of the Binary Principle are an interesting measurement of the dynamics of disabled systems, an exploration of Mandelbrot's elusive continent, and an examination of Lorenz's chaotic sea.

In other words, integrity does not exist within stationary linguistic systems, ratio is an illusion, and reductionist modeling does not work. Therefore, if a rational-legal grammar at equilibrium with coordinated fixed values and relationships, counter-intuitively, displays open-ended chaos, then perhaps, counter-intuitively, a discontinuous space of broken rhythms and symmetries can provide finite order. Or, to put it another way, the Dot Effectors of the stationary linguistic system actually represent convergences and emerges of a dynamic system and not the converse. Thus, as a by-product of this reversal, we can declare Generative Linguistics to be complete nonsense.

4 The Solution

The solution is to regard the Binary Principle as NONLINEAR TWO, a tree dynamic. Taking a multi-dimensional Poincarean approach, the Binary Principle becomes a Cantor Dust, a Koch Curve, and a Menger Sponge as we factor in higher dimensions. Here we have the lacunar universe with its gaps and vague curves, i.e., Schmidt's 'fragmentation on the spot' phenomena, the "Vermin of the Text".

5 Poincare and Saussure

Poincare and Saussure both lived in Paris at the same time, both worked in the neighbourhood of the Latin Quartier of the Rive Gauche, and both received the Legion d'honour at approximately the same time. In 1891 Saussure returned to Geneva just after Poincare published the first mathematical descriptions of chaos (1890).

5.1 Poincare

The modern study of nonlinearity, the coexistence of stability and emergence, contrary phenomena, and attractor theory can be attributed to Henri Poincare.

> Henri Poincare, the great mathematical genius at the turn of the century, invented the modern theory of dynamical systems and set as an objective the exploration of the types of behavior that can be expected from systems described by coupled nonlinear equations (Nicolis & Prigogine 1989: 79).

Poincare wrote several best selling books on the philosophy and methodology of science; Science and Hypothesis (Poincare 1902), The Value of Science (Poincare 1905), and Science and Method (Poincare 1909). Poincare 's 'On the problem of Three Bodies and the Equations of Dynamics' (1890) won the 1887 King Oscar II of Sweden Prize. The revised published paper (Galison 2003: 68), led to the first mathematical descriptions of chaos and to 'homoclinic tangles' (dynamical spaghetti, dynamical Bolognaise) demonstrating complex dynamics occurring in simple systems (Stewart 1987: 57-72, 149). Poincare's work on celestial mechanics indicated that intractable chaos remained in planetary and stellar movement despite Newtonian mechanics. In his 'The World Of Four Dimensions' (Poincare 1905: 52-53), Poincare again discusses the notion of geometric space and the possibility of taking several perspectives from several different points of view of the same picture.

In Science and Hypothesis, Poincare wrote of chess (11), cuts of the continuum (32, 33), displacement (60-64, 85, 87), laws of homogeneity (63), the non-Euclidean world and four-dimensional geometries (64-71), ideal bodies being entirely mental (70), aggregates and groups (87), adjustment of the system (94-96), Bacon (141-142), and the plane (199).

In Science and Method, Poincare wrote of the methodology of selecting facts or making selections (9, 15-24, 25-45), the physics of chance in representation (10, 64-90), the abstract notion of relative space (10), the deceptive illusion of reducing mathematics to the rules of formal logic (11), four dimensional geometries (42-44), need to return to first principles (44), chess (48, 49), unstable equilibrium (67), the theory of

errors (80-81), and 'the permanent motion in which internal currents rule'; 'too rapid for stable equilibrium;' the (unstable) celestial balance of centripetal and centrifugal currents, attraction and divergence, swarms, unstable equilibrium; 'What I have just said about internal currents shows there might be some interest in a systematic study of the aggregate of the individual motions (265-267).

Poincare used a plane to cut the phase trajectories of a dynamic system transversely, so that he could study three dimensional phase space in two dimensions (Nicolis & Prigogine 1989: 110). A plane that cuts the phase trajectories transversely so that the succession of points in real time intersect the plane, is known as a Poincare surface of section, and the dynamics of the points are known as the Poincare map.

The Poincare surface of section maps real time recurrence in a discrete manner on a two dimensional plane, thus eliminating the need to consider the three or four-dimensional system (Nicolis & Prigogine. 1989: 110-111). A Poincarean surface or section acts as a photographic plate developing and fixing the regularities of the winding trajectories of the closed circles of linguistic items hidden in the chaotic flow of masse parlante and time. To put it another way, the Poincare surface of section captures time series data by a process of averaging and displacement from the flow.

> Its great virtue is that it throws away a lot of confusing junk, thereby simplifying the problem of observing the dynamics (Stewart 1990: 69-70).

It was in the use of this methodology that Poincare observed the 'footprints of chaos....homoclinic tangles in the three body problem' (Stewart 1990: 70-71).

Non-Integrable systems analysis based on the work of Poincare and Birkhoff led in the 1950s to a new mechanics based largely on the work of Andrei Kolmogorov. This particulate mechanics of non-integrable systems analysis is based largely on the torus.

The Kolmogorov-Arnold-Moser Theorem, KAM, is often described as the VAK, the Vague Attractor of Kolmogorov (Stewart 1990: 253-255). The Vague Attractor of Kolmogorov displays self-similarities of islands or resonances as well as continuous variation similar to Mandelbrot's scaling fractals. It is an example of 'twist mapping' (Stewart 1990: 151) and displays a combination of stability and instability.

5.2 Saussure and the Third Course of lectures 1910-1911

The Third Course of lectures 1910-1911 divides naturally into the Winter Seminar, Wave and Time, and the Spring Seminar, Particle and Statics; in other words, the

Winter semester of 1910 covered continuous dynamics and the Spring seminar of 1911 covered discrete dynamics. The changing lexis in Saussurean text and the hybridization of wave and particle, rationalism and chance, principle and convention, suggest that a genre shift was occurring in relation to Science and Hypothesis (Poincare 1902), The Value of Science (Poincare 1905), and Science and Method (Poincare 1909).

The Constantin notebooks show Saussure in the first semester using four dimensional geometries, Poincarean maps, and wave models to explore deterministic chaos and to demonstrate how the historical force, or time, leads to free path, or random change, in linguistic items, a phenomenon Saussure termed 'fragmentation on the spot'. In his bifurcation approach, use of geometric diagrams, emphasis on Convention, and study of the phenomena of chaos and fragmentation Saussure appears to have been a Poincarean.

The first key to Saussure's genre shift towards Poincarean science is the term 'Bifurcation'. Bifurcation, like emergence, is not a member of the set of the Newtonian Corpus of Effective Vocabulary and Phraseology. The mathematician Jacobi invented the word 'bifurcation' in 1834, in a study of the mechanics of the orbiting Earth. In 1885, Poincare, extending the work of Jacobi, discovered two types of mathematical bifurcation, and introduced 'bifurcate' to describe broken rotational symmetry. Bifurcation belongs to the corpus of nonlinear dynamic systems pioneered by Poincare, a corpus set of discontinuities, broken symmetries, heterogeneities, disorder, and degrees of freedom. The properties of this set include emergences, novelties, autopoesis.

The second key to Saussure's genre shift is the Poincarean term 'Convention' which appears with increasing frequency throughout the 1907/1911 lectures.

Other keys concepts include Poincare's use of images, e.g., the train (Poincare 1905: 83-84); the chessboard (Poincare 1907: 22), and the sheep (Poincare 1907: 45).

Key lexis, phraseology, and diagrams in Saussure's Winter semester of 1910 would seem to be related to Poincarean lexis, phraseology, and diagrams: e.g., phases, absolute limits of mathematical impossibility, highly complex layers on the map, crossing boundary lines, isoglossematic bands, imprecise boundaries, 4 dimensional cube and cylinder, delimitation is somewhat intermingled, the tricky matter of the precise point, bifurcations, Astronomy, Dynamics (Kinematics), Forces in movement, Forces in Equilibrium, If one day the solar system has to alter, a machine which keeps going regardless of the damage inflicted on it, the mechanics of optics and projection, The horizontal section is a slice across the fibres from the vertical section, still borrowing

from the language of optics, proceed as mathematicians do with planes by ignoring infinitesimal change, surrounded by constellations of associations, the shapeless nebula, the contours of the schema.

5.2.1 The 28 October 1910 Winter Semester

Saussure opens the 28 October 1910 winter semester by reviewing the three phases of linguistics. In the 8 November lecture, after discussing 'circulation of the sap', variation in space and time, the Tower of Babel, and 'bridging the gap', Saussure speaks of the absolute limits of mathematical impossibility and the emergence of facts that cannot be tracked back to origins. He notes that there is 'a whole scale of diversity'. The 11 November lecture begins with the observation, 'The linguistic unity I had assumed...is often not borne out by the facts, and continues with the comment, 'a language left alone is doomed to endless fragmentation' (A metaphor for Modern Linguistics). On 15 November Saussure discusses the phenomena of splitting branches and introduces his first Cartesian geometry of a time space axis. Here, unlike the influential Bally & Sechehaye Cours de linguistique generale (1916), Saussure is introducing the time space axis to SHOW THE IMPORTANCE OF INCORPORATING TIME INTO LINGUISTIC ANALYSIS. In the 19 November lecture Saussure introduces his diagram of the twin planes in Time showing that change is inevitable.

> Even confined to a single point, time will bring change (Komatsu & Harris 1993: 23a).

Saussure then introduces the concept of the area stating that, while minor and major elements can be distinguished, elements that may be quite varied, the area cannot be predicted in advance, and that the areas make very varied patterns formed by 'highly complex layers on the map' (Komatsu & Harris 1993: 24a). Saussure rejects the concept of closed, determinate, circumscribed linguistic types (Komatsu & Harris 1993: 25a), and introduces his diagram of crossing boundary lines.

On 18 November 1910, Saussure states that there is NO EXAMPLE of a static language in reality, and inserts a geometric two-strata diagram to illustrate real time evolution in time with unpredictable results throughout the area. This geometric two-strata diagram is an example of a four -dimensional geometry because it includes time. Its function is to demonstrate chaotic yet orderly change. Today this phenomenon is known as deterministic chaos.

> Even confined to a single point, time will bring change.... The area cannot be determined in advance....As you go through the list, it becomes impossible to

> confirm any unity....There are only transitions...between two others, and that applies in all respects....There are no precise boundaries (Komatsu & Harris 1993: 23, 24, 29, 30, 31).

On 22 November Saussure continues to discuss his crossing boundary lines based on the corpora evidence contained in Linguistic Atlas of France (Gillieron) and Linguistic Atlas of Germany (Wenker). Saussure rejects lines, and stresses the importance of areas, isoglossematic bands, and linguistic waves. In the lecture of 25 November Saussure discusses the scalar properties of linguistic waves, and again stresses the lack of precise boundaries. He again states that dialects are open on all sides formed by the waves in which they participate.

The lecture of 29 November 1910 opens with Saussure observing that the linguistic waves he has been discussing also holds true for every kind of human habit, such as fashion. He describes two cohesive forces, the force of parochialism and the force of intercourse; the first is an inward force, the latter is an outward force. The first force promotes linguistic divisions across areas while the second force promotes linguistic unification across areas. He then introduces his four-dimensional geometries, a 'hypercube' and a 'hyper cylinder', to demonstrate that historical development be can be free at any place, yet simultaneously constrained by the two forces discussed previously, although which chaotic force would be the fore grounded is not predictable. These two four-dimensional geometry diagrams, a temporal spatial twist-map, display the phenomena of uncertainty constrained and shaped by the interplay of contradictory forces. Not only is Saussure applying the geometric, dynamic, and chaotic theories of Poincare, he has also accurately described the properties of a Strange Attractor.

In the 2 December 1910 lecture, Saussure rejects 'migration theory' and again emphasizes the importance of 'Wellentheorie - wave theory, citing Johannes Schmidt of Berlin (1877) in connection with the effects of discontinuity in a compact area, and noting that CONTINUITY ITSELF HAS DIFFERENTIATING EFFECTS. 13 December Saussure states that it is not important to know how the threads of the linguistic tapestry have been formed, and introduces the metaphor of the chess set.

5.2.2 The 25 April 1911 Spring Seminar

Saussure opens the 25 April 1911 Spring Seminar by introduced the speech circuit and the social fact of 'capitalization' or 'crystallization'. On 28 April Saussure introduces the notion of apprenticeship in learning a language. He states that the 'dictionary' and 'grammar' in the brain are deposited like 'photographic plates', can be studied

like 'butterflies arranged in a collector's case, and exist because of 'the total number of performances'. However, he qualifies his state code position by adding that the language code contains a certain vagueness, and that delimitation is 'somewhat intermingled'. 2 May 1911 Saussure discusses the dimensions of the sign. On 5 May Saussure begins the study of the linguistic object by beginning with the entity of 'linguistic water'. On 9 May 1911 Saussure discusses the 'subjective, indefinable element' and the 'tricky matter' of the precise point' (Komatsu & Harris 1993: 82a). The device Saussure uses to explore the tricky matter' of the precise point' is the single dimension of Time. His linguistic abstractions only exist through an operation carried out by the speakers. On 12 May 1911 Saussure states that language in Time is a balance between the 'entirely unmotivated' and the 'relatively motivated', i.e., absolute arbitrariness and relative arbitrariness.

19 May 1911 Saussure introduces his first major bifurcation, the domain of speech or the domain of a theoretical abstract. He discusses the linguistics of speech and the linguistics of abstraction and states that every language state has a historical fact in its origin. On 30 May Saussure states that the social fact gives his abstraction 'a centre of gravity' and that language is <at all times> bound up with the past. He further states that language can only be controlled when it is not in circulation, i.e., functional language alters relations. He concludes that his bifurcation, his separation of abstraction from speech, his schema, permits the study of an isolated logical free system of relations. This thesis has taken the view that language is not possible to control out of circulation, and that the isolated logical free system of relations is not only extremely dynamic but also filled with noise. It is the internal noise and dynamics of Saussurean stationary systems, and its details separated from Externals, which provides the central investigatory topic of this thesis.

On 2 June 1911 Saussure discusses dynamics beginning first with the science of Astronomy, then Geology, and then Political Economy {Poincare? Lyell? Marx?}. He states that evolutionary facts and static facts can be compared to the two parts of mechanics concluding, Dynamics (Kinematics) represents Forces in movement and Statics Forces in Equilibrium, i.e., a conservative Hamiltonian system conserving energy. On 6 June 1911 Saussure invites his students to 'IMAGINE A MOVING OBSERVER', and concludes that the 'moving observer' can only focus on a certain state.

> If one day the solar system has to alter, there will be an adjustment at some point in the system (Komatsu & Harris 1993: 108a).

> The language is like a machine which keeps going regardless of the damage

inflicted on it (Komatsu & Harris 1993: 113a).

16 June 1911 Saussure, having stressed the importance of Time continually, now makes his second great bifurcation and excludes time from the study of the linguistic object. He intends to study the axis of contemporaneity and the relations of coexisting values. This bifurcation is continued on 20 June 1911, with a discussion of the mechanics of optics and projection. The historical reality is the body and the synchronic reality is the plane. The plane is a transverse cross section of the projecting historical reality, i.e., synchronic reality is an aspect of diachronic reality projected onto a given plane. This seems Poincarean. The horizontal section is a slice across the fibres from the vertical section. The 20 June lecture ends with Saussure still borrowing from the language of optics and choosing static linguistics. The 23 June 1911 lecture continues with the bifurcation of Static linguistics. The limits of a state will necessarily be imprecise. The linguist will proceed as mathematicians do with planes, by ignoring infinitesimal change. 27 June 1911 introduces syntagmas that are extended like the parts of a machine in one direction, and are surrounded by constellations of associations. 30 June 1911 discusses the functions of structures in a system. Saussure warns of Bacon's Trap in the Cave {the idols of the individual man, a thing variable and full of perturbation, and governed as it were by chance}and cautions 'Tricky Area...So let us be very wary'.

6 Hypercube Modeling

In the winter seminar of 1910 Saussure abandoned State modeling and experimented with hypercube dynamic modeling and advanced wave theory, the most advanced example of hypercube and wave modeling in the Twentieth Century Linguistic Corpus. His division of the 1910/1911 Course of General Linguistics into Kinematics and Statics, into Wave and Atom, may have reflected the influence of Einstein, then perhaps one of the most famous and discussed scientists in Switzerland.

> A Swiss mathematician Schlaefli developed the first geometry of a many dimensional space in 1852 (Aleksandrov 1999b: 143).

> It would be possible to translate our physics into the language of geometry of four dimensions .…four dimensions…hyperspace (Poincare 1914: 113-114).

In the 29 November 1910 lecture of the Winter seminar, pages 33-36, on the topic of linguistic waves and geographic propagation, Saussure introduces first a box containing two boxes, and then a cylinder or tube containing ellipses. These geometric objects represent the first attempts at linguistic modeling in hyperspace dimensions. In

these two geometric objects Saussure is exploring the 'host of accidents' (4 November 1910), or 'the circulation of the sap' (8 November 1910) 'in the vertical axis of time', in the time column of the Cartesian coordinate geometry. In Saussure's hypercube experiments, using the latest corpus material available, Gillieron's Linguistic Atlas of France and Wenker's Linguistic Atlas of Germany, he studies items unfolding in time, and he notices that the items unfold in noticeably different ways which are not predictable in detail. i.e., the trajectories diverged in unknowable ways. This indicated that the system was fundamentally open, and that anything was theoretically possible including the impossible, i.e., the universe was indeterminate and irrational.

Saussure's hypercube represents the study of language as a chaotic system placed within a simple and reduced system; one box and one word BIFURCATING INTO TWO. A chaotic system does not mean that such a system is totally unintelligible. It simply means that such a system can neither be modeled in fine detail, nor predicted to a high sense of accuracy. This vague, unstable, variable broad-equilibrium feature of chaotic systems means that two trajectories or two clusters or two systems sharing initially the same trajectory can, often very quickly, move very far apart through a series of independent bifurcations. Furthermore, the residual inaccuracy will eventually lose information concerning initial conditions. However, at the same time, the two diverging objects under study can both be operating under simple Newtonian mechanics. Hence, rather than the modeler aiming at precise numerical clarity, the nonlinear modeler is aiming at describing orderly disorder and disorderly order. Saussure's four dimensional geometry shows language as a real-world system connected with its environment, with linguistic data not staying in a single state as time varies but being perturbed, and bifurcating in relation to time, i.e., a non equilibrium system. This is to state that Saussure was demonstrating, from real-time data, that linguistic data is neither controlled nor predictable with precision, but deviates or fluctuates in a random manner.

The Saussurean Cube is best explained as a four-dimensional geometry mapping out the trajectory of a linguistic flexion in probabilistic time. In this gedanken, the trajectory of a single linguistic flexion undergoes a dynamic bifurcatory event (Poincarean); the logical relationships of the flexion's inner principles, an algebra, a steady state in equilibrium, being torn apart by time, fragmenting on the spot. Time and accident in the dynamic event are responsible for the bifurcation, the fragmentation of the spot phenomena, which is exposed by the Saussurean cut of State, and this dynamic split of the flexion can be best explained by a Cantor Dust, and its trajectories by a Koch Curve shaped by Brownian Motion and pruned by omission.

The Saussurean Cube combines the dynamic and the static, the trajectory and the

state, the blurred and the visible, the event and the fact, the flexion and the element, the variable and the stable in a broken rhythm. It is a four dimensional geometry Cartesian coordinate and the drift trajectory of the variable, propagating flexion demonstrates the force promoting linguistic divisions and the fragmentation of the spot phenomena, the Babel Effect. This reductive approach and four-dimensional geometry Cartesian coordinate, which demonstrates a single bifurcation and three discrete points, the original 'medio' splitting into 'mejo' and 'medzo', holds true for the dynamic ensemble of flexion trajectories. In this Saussurean Cube the original 'medio' and the bifurcated 'mejo' and 'medzo' are stabilized in their linear extension by the one dimensional, translating logical relationships of Linear Linguistics and stabilized in their real-time trajectories by the mediation of External Linguistics. The Saussurean Cylinder demonstrates the inevitable chaotic wave effect of the tree dynamic.

7 Nonlinear Saussure

Through the notebooks of his student Emile Constantin, Saussure is surprisingly nonlinear. In the continued recovery of Saussurean linguistics from the 1916 rhetorical machining by Bally and Sechehaye, this chapter has recovered a Dynamic Saussure; a Poincarean Saussure deeply involved in deterministic chaos, four-dimensional geometries, waves, and open systems.

During his investigation of static linguistics, Saussure is puzzled that his linear and planar dimension Cuts never land precisely upon a Dedekind Point, nor upon a Weierstrauss concept of a neighbourhood of values. Despite expectation, points, elements, entities, identities, and values in Saussure's world are variable, incomplete, elusive, plastic, flexible, untidy, imprecise, and vague. He terms the phenomena fragmentation on the spot, slippery, phantom, subjective indefinable element, always a tricky matter, one side of the divide or the other or both at the same time, Hobson's Choice Phenomena, does not seem right to call it a concrete entity, we take it with all its clarity and obscurity, tricky area, indeterminacy of concept, no positive term, no positive idea.

> We may (then) presuppose, <speaking of the continuous chain, > all kinds of displacements or of suppressions of linguistic unities within the chain (Komatsu & Wolf 1997: 96).

> A language is very fixed and very changeable down to the minimal detail (Komatsu & Wolf 1997: 110).

> ...There is no object comparable to a language (Komatsu & Wolf 1997: 110).

> ...Language is a double object....This duality is a trap... (Komatsu & Wolf 1997: 110).

Saussure is aware that not only is he observing a non-Dedekind (non-Weierstrauss, non-Cantorian Correspondence) reality but also a scalar phenomenon. However, he believes that the immobilized language of his linear Dedekind discursive system can be controlled because it is not in circulation (Komatsu & Harris 1993: 100). But, counter-intuitively it is immobilized language itself that rapidly spirals out of control into slippery, elusive instability precisely because it is removed from the stabilizing dynamo of External circulation. Spacetime prunes the chaos by its broken rhythms.

8 The Elusive Continent

The noise in the system is not an unfortunate limitation of the method but evidence of an interesting phenomenon we have labeled Dust Discourse driven by NONLINEAR TWO.

The great virtues of Dust Discourse, NONLINEAR TWO, tree dynamic, and its Vague Curve are that they throw away a lot of confusing junk, thereby simplifying observations of the dynamics of stationary Dedekind systems. A decentralizing, displacing, disjointing system, the Binary Principle provides example of twist mapping, passing in and out of chaos again and again, yet another ubiquitous feature of families of dynamical systems. In contrast to the positive, hard, closed Euclidean objects of the Nineteenth Century Discretization Program, NONLINEAR TWO tends to be somewhat more resilient, more shock-resistant, 'more forgiving of mistakes, more able to absorb unexpected fluctuations' (Casti 1994: 272).

It is the irregular, self-avoiding dynamics of the Koch and Peano Curve family that provides the fractal basins allowing for chaotic capture and spontaneous localization from seemingly disparate factors. Calls for more detail, precision, and rigor by linguistic scientists simply overload the search space and factor in obscuring, and obfuscating agendas. The language system and its categories and entities are ill defined by their very essence. The great advantage of an ill-defined system is that only a fraction of the search space constructed by a Cantor Dust needs to be covered in order to carefully capture the broad and simple outline of the 'complete' fractal. Additional detail, precision, and rigor to bridge the gaps do not add more information to the picture of the fractal curve.

> It seems that it is at least partly its inherent imprecision which enhances its utility. Some who employ it in an imprecise and ill-defined way do so, moreover,

> wittingly, and would argue very strongly against any attempt at greater definitional rigor on the following grounds….as to be, of necessity trivial….conti ngency (Lane 1970: 20).

The anatomical reality of the Cantor Dust creates its own weather. What passes for information, knowledge, and language is an encounter with the weather of the Cantor Dust. Stationary linguistic systems are not discrete physical systems. Instead, they are a 'Belimed Twig Trap' a labyrinth, a maze, a rhizome, an enchanted castle. NONLINEAR TWO and its Vague Curve have the longest undefended border in the universe. Dust weather, dustscapes, dust maps, dust discourse, dust showers, and dusty answers are the physics of the geometry of a Cantor Dust and the Lacunar Principle.

9 Review

"Stationarity" of text systems is a concrete fact of certainty in the mindset of the Mesopotamian mason. But, once the Linguistic Relativity is removed, the inventory of disabled stationary systems can be seen to be a Cantor Dust, a systematic anomaly, a troubled kingdom, and the most accident-prone country in the universe. Stark choices in the two-valued Cantor Dust machine lead to the effects of serious dilemmas, lock-outs, side-lining, by-passing, side streaming, no epicenter, multi-prongs, random moves, un-plugging, derailing, complicated situations, wide-spread irregularities, razor-thin logic, the hair-breadth, the defining point, the choice of mechanisms, the diverse calculations, the confusing figures, shattered consensus, dogged issues, counterbalances, alarm bells ringing, flip-flopping, fumbling, far from resolved issues, arduous tasks, results tricky to interpret, symptoms hard to measure, mix-ups, undermining, widening losses, surprise moves, risky areas, walking the tight rope, flirting with danger, the rag-tag, the shaky logic, the transitional phase, works in progress, questionable practices, falling by the wayside, lawless areas, left-out-of-the loop, dispossession, disenfranchisement, disappearances, non-documentation, untruths, widespread irregularities, ticking time-bombs, fact-smudging, fact-smearing, fact-shuffling, cooked data, murky data, white-washing, wool-pulling, wool spinning, spin, dirty tricks, repackaging, vague detail, reading between the lines, and indeterminate status.

10 Summation

Our five part series has studied the deceptive illusion of Stationary linguistic systems, the Flatland of the Mesopotamian mason, with our target being the phantom of Stationary linguistic systems, i.e., fragmentation on the spot, "Vermin in the Text".

The phantom of the Flatland platform, i.e., Text, has been captured by the hypercube dynamics first expressed in the 29 November 1910 lecture by Ferdinand de Saussure on linguistic waves, a hypercube dynamics originating from Poincare, Minkowski, Schlaefli, and Riemann. Within our hypercube camera, which captures phase spaces in Spacetime, we can identify the phantom of the ages to be a tree dynamic. NONLINEAR TWO is the integrative number we have assigned to the phantom, a non-positive number.

Morphing through dimensions, the phantom displays the signatures of Cantor Dust, Koch Curve, and Menger Sponge, pathologies to the Nineteenth century. Benoit Mandelbrot first captured the signature of this phantom in his work for IBM on noise in telephone lines used to transmit information from computer to computer (Gleick1987: 91), and he developed the capture of the phantom in his landmark work on the elusive continent, fractal shorelines, and the lacunar universe.

Discontinuity and incompleteness were the anathema of the Mesopotamian mason. However, discontinuity and incompleteness are the medium, the message, and the massage (Godel 1932; McLuhan 1967). Langston (1992) terms this zone "Life at the Edge of Chaos" and Kauffman and Johnsen (1992) write of coupled fitness landscapes, poised states, and co-evolutionary avalanches at the edge of chaos.

With its momentum Wave Mechanics can bring order to the longest undefended border in the universe and tame dust weather. The particular phase space that produces shrinkage and stability at the edge of chaos is Standing Wave. Commonly observed in rivers, in perturbed flows, and in the vicinity of massive compact objects, standing waves are constant, durable, powerful, and predictable. The vector space of Wave Mechanics can build standing waves in society, a broken rhythm maintained by the 5 Rs, i.e., Reboot, Recursion, Redundancy, Repair, and Resend, with the phase dynamics of Standing Wave Mechanics each year bringing a new pulse of population into Standing Wave, thereby providing power without accumulation and concentration. As each year passes, the constituents of the Standing Wave pass by but the default framework remains in place.

Saussurean stationary systems dominated twentieth century anthropology, education, linguistics, psychology, and sociology. Switching to kinetic Saussurean wave systems is a circuit switch to the external dynamic. Circuit switching to the external dynamic abandons the Old World Order of disabling grammars, the rational-legal grammars that maintain elites through linguistic abuse of democrats, parliaments, and presidents, in favour of Hertzean Enabling grammars, which overcome the crisis caused by disabled systems. Dice is played within the frame of the standing wave, i.e., the

tumbling dice is the wave and the wave is tumbling dice. Civil peace based on a Standing Wave mechanics is a standing peace, and a civil society based on a standing peace is a stable society. At the same time, the return of emotional intelligence to thought as a human system heals the Cartesian Disjunction.

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