

# Shaping Mind

## Psychoanalysis works out in accordance with the non-linear dynamic system theories

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*Now psychoanalysis demands nothing more than that  
we should apply this method of inference to ourselves.*  
**S. Freud**

### **Introduction**

This Freud's statement enlightens his desire for a Scientific Psychology. He wrote this sentence in his small but intense paper on *Unconscious* in 1915 (1). His struggle for his first never realised project continues to reappear in his mind. Freud never ceased to try to perform his unaccomplished dream. Now, this dream is part of his legacy. But, before starting to argue about what I think has been a deep crisis of Freud original scientific paradigm, I briefly underline my view on psychoanalysis.

Psychoanalytic relationship is a holistic system that can be metaphorically represented by the image of the bath-tub (2-3). During the analytic interplay, the analyst is busy in feeling, understanding and catching the unconscious meanings while he is building an intimate and vital relationship with the patient. Psychoanalytic research starts when the patient goes out of the consulting room.

Starting from this moment the analyst finds himself in contact with his conscious and unconscious knowledge, i.e. his personal background, counter-transference, scientific views, historical and actual researches, cultural exchanges, etc. Usually the analyst reconsiders the session's contents and experiences and tries to recognise the direction of the development and progress of the analysis. Yet, he focuses on defences, anxieties, state of processes, new understanding and the patient's mental functioning, building up some theoretical aspects or adding some new ideas to his personal knowledge. It is exactly what all of us do after Freud's experience and suggestion.

## **A - On Freud's "Project for a Scientific Psychology"**

I would like to start recalling some questions from the last chapter of Freud's book *The Wolf Man*, following Strachey's (4) suggestion that it "*has been the most elaborated and doubtless the most important of Freud's clinical cases*" – and also the most difficult, as Mrs Brunswick clearly showed. He titled this chapter: *Outlines and problems*.

Freud asked different questions, but I chose one of them, related to the controversy with Jung, in which the two old friends seem to be involved in a discussion like two physicists. Freud debates Jung's idea of Inertia and proposes the term of Entropy (5), that means he preferred the modern thermodynamics to the old physics.

As we know, Freud's university studies and laboratory experiences were under the umbrella of E. Brucke who, with Helmholtz and Du Bois-Raymond, sustained "*the need of studying the living systems purely in terms of chemical and physical reactions*" (6). Physics dominated the scenario, especially from 1851 when Thomson published his classical paper on thermodynamics. The concept of Energy became the frame and key of any advancement in physics. Freud never abandoned this concept, introduced in *Project for a Scientific Psychology*.

From his earliest papers to the last one, Freud periodically used concepts that he borrowed from natural sciences, such as energy, phases, quantity, process, motion, frequency, constant, factors, mechanisms, etc., in his effort to try, again and again, to build up a scientific psychology. As we know this project has never been realised, above all because the contemporary sciences had no instruments to understand and describe the dynamic of '*the whole variegation of the phenomena of life*' (7).

While modern science is holistic, probabilistic, non-linear and dynamical, Freud's Metapsychology was a slave to old-fashioned ideas such as reductionism or deterministic views, based on last century's hydrodynamics. Instead, for us, the '*rules of evidence*', the '*universal laws*', the problem of '*the measurement*' and predictability, the frame-concept of the '*System*' and its subsystems, have to become some of the basic principles of our inner and outer scientific debate.

Probably, the reason of the destruction of part of his Metapsychology papers could be an inner conflict and the consequent perception of the impossibility of going on with this Project.

### ***Freud's scientific bias***

Freud was animated by an authentic scientific passion from the beginning of his university courses. Bernfeld wrote in Freud's biography: '*From that moment he was interested in the knowledge and dominion of nature by the practice of science*'

(8), and, over the all time of his life he has always been pushed by need to '*build up on clear and sharply defined basic concepts*' (9).

Inside this construction, as any scientist of his time, he brings the concepts of his teachers and his Époque. '*An instinct, on the other hand, never operates as a force giving a momentary impact but always as a constant one*', he wrote at the beginning of *Metapsychology* (10).

He totally agreed with the principles of the Vienna School: the conservation of energy, the constant of forces, the indestructibility and transformation of forces and energy. (11-12).

Freud looks at the problems of the scientific bias of his work in the first page of the *On Narcissism: an Introduction* and repeats in *Instincts and their Vicissitudes*. He wrote that it needs: "*a speculative theory of the relations in question would begin by seeking to obtain a sharply defined concept as its basis*" and that "*that foundation is observation alone*". He goes on: "*They are not the bottom but the top of the whole structure...The same thing is happening in our day in the science of physics*" (13).

These three papers, *The Wolf Man*, *The Introduction to Narcissism* and the *Metapsychology*, have been written during the same period. Freud writes the *Introduction to narcissism* on March 1914, *The Wolf Man* on October and *Drives and Their Destiny*, a paper part of *Metapsychology*, on March 1915. In this writing Freud offers us a clear and coherent essay of his scientific biases.

Using the concepts from thermodynamics doesn't mean that there were in his mind some concepts connected with the new developing fields and ideas. Freud was a son of Laplace determinism and his teacher's radical reductionism. He was shaped by this vision of science and he couldn't escape from an inner compulsory obligation to use the principles of physics in studying living systems. But some questions turned my attention away from this rigid 'linear' paradigm.

When Freud was on the wave of his 1915 creative period writing his *Metapsychology*, he was thinking of a high theoretical vision of his science, psychoanalysis, but unexpectedly he destroyed his work. Why?

He was a very alert and curious man about what was happening in the science's fields; he had lots of connections in many important countries; he had been in Paris when Poincarè was already famous and was making and submitting his ideas for discussion. It is possible that he didn't take into consideration some important novelties that were part of a common knowledge in the academic world?

It is possible that, such a curious man, who was building up a theoretical system totally based on the importance of the initial conditions, completely ignored the terms of a new way

of understanding scientific knowledge as Poincarè did in his 1903 paper? Later on, in 1908 he wrote:

*"But, even if it were the case that the natural laws had no longer any secret for us, we could still only know the initial situation approximately. If that enable us to predict the succeeding situation with the same approximation that is all we require, and we should say that the phenomenon had been predicted, that is governed by laws. But it is not always so; it may happen that small differences in the initial conditions produce very great ones in the final phenomena. A small error in the former will produce an enormous error in the latter. Prediction becomes impossible, and we have the fortuitous phenomenon" (14).*

It could be a very interesting question for a man who was organising the foundations of psychoanalysis. Following Poincarè's principle of dependence on initial conditions the Freud's statement *"is indifferent to consider the scene itself as a primary scene or as a primal phantasy"*(15) could be **not** indifferent.

J. Gleick in his famous book on *Chaos* reminds us that: *'Poincarè's warning at the turn of the century was virtually forgotten'* (16). We also know that unfortunately Freud anchored psychoanalysis to *"some mechanical theoretical tools that will reduce further development"*(17). Why does a man, open to novelty and research, anchor his work in progress to some instruments that lock his success? I think that there was something that made him very careful in the face of such novelties, something that was making him worry, that means something that he did not understand, about the future of psychoanalysis.

Probably Freud was realising that part of these novelties were radically questioning the deterministic vision of Laplace and the current psychoanalytic thinking too: *"Chaos eliminates the Laplacian fantasy of deterministic predictability"*(*idem*).

Another aspect that catches my attention is the problem of psychosis and the difficulties in front of which Freud too struggled. He was writing the *Introduction to Narcissism* in which he looked at the Narcissistic Neurosis, that means the psychosis, at the same time in which he was in a state of impasse with his famous patient: The Wolf Man. [Mrs Brunswick, who helped this patient after Freud, wrote: *"hypochondriacal type of paranoia; it belongs more nearly to the psychoses"*(19).] Freud writes of having driven the situation saying to the patient that analysis should finish in a few months. Freud seems to be escaping from something that blocks him, like a prison.

Now I would like to put myself in front of some observations.  
1. Freud has been abandoned by Adler and above all by Jung and he seems to be very busy in reorganising the

theoretical apparatus of psychoanalysis. Why does he need to think of Entropy? It means, in my opinion, that he had some struggles and troubles related to the conceptual and scientific frame of psychoanalysis.

2. The First World War, as a wave, was destroying Europe, while he is busy in writing some hypothetical papers that he destroys. Why? Could it be a worry about the destructiveness of new technology derived from an untested scientific knowledge?
3. He was in an impasse situation with his most famous patient and he dedicated his time writing theoretical models, instead of spending his time to a deeper understanding of what was going on. What is he looking for? Psychoanalytic theory was requiring new tools and frames, but which?
4. Further, it is possible that all these – and many other – events are the mirror of a very deep crisis of Freud's scientific paradigm? Maiocchi writes that at the end of XIXth century there was *“a strong return of vitalism helped by the cultural climate due to the crises of the positivism and a new interest, inside the group of German biologists, toward philosophers like Schopenhauer, Nietzsche and Hartman' (20).* Freud was in the middle of this movement with his particular background; probably his inner conflict between positive science and a new explosion of ideas had been very hard.
5. Following Freud, the Wolf Man case suggests another consideration. Freud puts under investigation the mythologic paradigm, the central nucleus of his construction and interpretation of psychic reality, underlying that knowledge comes from instincts, and is at the core of the unconscious. Freud had embraced E. Haeckel's principle of recapitulation by which the ontogenesis repeats the phylogenesis.

Why radically discuss again the entire mythological paradigm, on which he was building his psychoanalytic theory, if he was not in the middle of a crisis of his scientific paradigm? Why needs he to emphasize so strongly his biological bias? It seems that he is proclaiming a belief as if he has to show where he comes from. It seems to be a very unsafe ground.

My personal view is that Freud was in the middle of a crisis about his scientific bias and contents. But, because of the isolation of the war, or of a fear of a new spilt into the psychoanalytic group, or of a need to be accepted by the academic world, he was unable to organize a new personal scientific vision.

I am only a passionate reader of the History of Science and I find myself in front of these questions following my research on the treatment of schizophrenia, my everyday job. My feelings are that Freud, thinking of psychosis, found himself in front of some difficulties, which came from his scientific bias. As Terni pointed out in his degree: *“psychoanalysis has to mirror a hydrodynamic model with anthropomorphic characteristics: it is very limiting”*(22). Probably Freud perceived this new scientific paradigm as too strong and full of uncertainty. As R. Show wrote: *“You don't see something until you have the right metaphor to let you perceive it”*.

Anyway, all of us know how, at the beginning of the 20s, Freud wrote some of his masterpieces, *Beyond the Pleasure Principle* and *The Ego and the Id*. These works signalled the end of a turning point and locked the development of the quantitative branch and related outlooks. Freud withdrew into his previous route of mythology and symbolisation and left, definitively, psychoanalysis inside the field of human sciences.

Psychoanalysis grew rapidly, unfortunately without ever turning its eyes back, looking for what it was missing. I think, following Bion and Tustin that we have to turn our attention into the parallel field of natural science, the field in which psychoanalytic seed was born and nourished.

But, before starting to talk about what is missing in psychoanalysis – of course in my view –, let me tell you what Prof. Casati, an Italian international expert in Chaos and Quantum Physics who had his training with Prof. Kolmogorov, writes in the introduction on *Chaos* book: *“one of the most important features of the study of chaotic phenomena is the huge potentiality of cultural unification that concern all disciplines”*(24).

## **B - The Psychoanalysis scientific field**

Many authors from different fields agree with Casati's assertion. From my point of view, psychoanalysis needs to face the scientific criteria that modern philosophy of science elaborated in the last decades. Others have discussed these aspects. Now I would like to briefly introduce the scientific method.

### ***The scientific method***

If we give a glance to the scientific method as recently illustrated by Wynn & Wiggings, (25) it involves:

1. Observation: one notices the existence of specific realities or events;
2. Hypothesis: one develops an assertion on the general nature of the phenomena;

3. Prediction: one predicts a future event, coherent with the Hypothesis;
4. Experiment: one carries out a test to see if the predicted event verifies itself;
5. Scientific conviction: if the results agree with the prediction, the hypothesis is supported.

The authors comment: *“Each scientific conviction is, for its own nature, approximate and temporary; each scientific opinion is at risk of mistake and is subject to continuous revisions”* and they conclude: *“Science is an authentic never ending story, a research without an end...”*. It seems like reading *Analysis Terminable and Interminable*.

I think it is not difficult, following the method here described, to find the stages of the work carried out during each session and during the course of each therapy. Somebody maybe does not agree on the fact that psychoanalysis and psychoanalytic oriented psychotherapy can be considered an experimental science; it presents:

1. a rigorous setting, the environment in which the observations are collected and where the reactions to the modified inputs are recorded; in its inner, very different space-temporal and historical-cultural facts and experiences are gathered and noted;
2. for each set of observations an hypothesis is made, it means a generalisation, continuously subject to verification; the same original hypothesis can be radically modified by new acquisitions;
3. several theoretical models born from the evolution of an original theory and from the non-concordance (if one prefers: falsification) of the previous hypothesis with reality; we are usually able to predict a long-term attitude and/or a brief term behaviour. It is also important to note how, the aim of psychotherapy, is exactly to reduce a high predictability, due to an excessive dependence from the external reality, for a lower predictability linked to the inner reality. This reduction of rigidness of predictability in the attitudes and behaviours is, maybe, the most pronounced prevision coherent with the hypothesis;
4. a methodological convergence technically rich, universally repeated and carried out by a numerous group of scientists in continuous contact with each other. Each session is a test, repeatable in the method, but not in its contents;
5. the psychoanalytical theory has modified many of its concepts that revealed non-coherent with the data from the observation. It also needs to be underlined the fact that, for its intrinsic conception linked with the environment where the person develops, the cultural evolution is faster than any other natural evolution. The various psychological theories have been able to adapt their answers to the changes in the bio-psychosocial interaction.

The aspect, which characterised psychoanalysis as an integral and inalienable part of the scientific apparatus, is the use of the mythological code as an instrument of representation. The two authors write: *“The passage from observation to hypothesis implies a representation of the physical reality through symbols as letters, numbers or words”*.

## **C - The problem of measurement in psychoanalysis**

I can't agree with Steiner's quotation "*scientific efforts in psychoanalysis deal with meaning*". Meaning is just an aspect; science requires an inner coherence, as Kuhn proposed, and communication with other scientists, as Popper stated. It requires rules, laws and measurement. Psychoanalysis has many good tools that can be used as measurement for ongoing behaviour during a session. If we would like to understand better what happens during a session or the interaction between the sessions or if we would like to communicate with other colleagues, we have to use these tools, not only the meanings.

Bion was clear on these aspects, as you can read in "*Cogitations*" (26), while F. Tustin reminded me that maths could help psychoanalysis in many aspects. At least, it is exactly what we do when, writing our clinical papers, we speak in terms of theoretical views. In my opinion the most important effort we have to make is to try to open our scientific mentality, to change the basic paradigm, or to add a new paradigm, to define new basic assumptions and to internalise them. This new scientific paradigm has to become, first of all, part of our counter-transference. Then, we must use the new tools in everyday practice.

Another aspect that we have to include in our research, and which is one of the main points of this proposal, is the construction of models able to explain the dynamics of treatment in terms of the structure of the holistic system, its oscillation between the observer -the analyst- and the environment, and the inter-action between the subsystems, together with their evolution along time. These models will include rules, concepts, features and laws of psychoanalytic treatment, in order to communicate with others, colleagues or not.

## **D - Structure and States of mind**

In *Analysis Terminable and Interminable*, which Sandler (27) recognizes as Freud's legacy and his real book of Metapsychology, Freud rethinks the limits of analytic experiences and feels the need of a synthesis after his failure to build up a scientific psychology. From the beginning of this book Freud poses some questions about the real improvement and effectiveness of psychoanalysis as therapy and he introduces, underlining that this does not depend only on the duration of the therapy, some new epistemological ideas regarding the scientific method, frame and principles or regarding the link with other scientific fields.

### **1 - The Binaries**

To do this, he goes back to the Greek civilisation, as he did with Oedipus, asking help from Empedocles, the man who seems "*to have united the sharpest contrasts, to whom many a secret was revealed, the theory which approximates so closely to the psychoanalytic theory*"(28).



He definitively signed the second meta-pattern of his scientific project: the psychoanalysis as a *dualistic theory*, based on “two fundamental principles’ and on ‘the process as a continuous, never-ceasing alternation of periods” (29).

In all the world and cultures the binaries male & female, up & down, in & out, left & right etc., are the basic description of any elementary relationship in nature and philosophy, in logic and language, which promotes a frame of mind. Many words are used to shape related things in the mind: parallel, oscillation, dyad, opposite, alternation, bifurcation, polarity, dualism, mutually, balance and so on. We have woven this simplest complexity...(34) into conceptual systems, into debates of meaning, into tools for describing. ...An intimate pair is form & function: form is thing, function is form’s relation, ... while the dynamic balance is the key to encompass co-operation between opposites and to avoid the risk that the polarities slip into conflict.

Freud underlined his choice of this frame of mind first in *The Theory of the Instincts*: “*This concurrent and mutually opposing action of the two basic instincts gives rise to the whole variegation of the phenomena of life*”(35) and later in *Analysis Terminable and Interminable*: “*concurrent or mutually opposing action of two primal instincts - Eros and Thanatos, Life and the death-instinct - never by one or the other alone, can we explain the rich multiplicity of the phenomena of life. Later on - two principles governed events in the life of the universe and in the life of mind* (36). This alternation of periods is one of the basic assumptions of non-linearity and it is called bifurcation. What is bifurcation?

A brief quotation from *Chaos & Fractals*, just to introduce the concept of “bifurcation”(37): “*One of the great surprises revealed through the studies of the quadratic iteration*

$$x_{n+1} = ax_n (1-x_n), \quad n = 0, 1, 2, \dots$$

*(where  $X_n$  is intended to mean the ‘value’ of a certain observable at certain time,  $n$ , and  $X_{n+1}$  the value of the same observable at the successive inspection, at time  $n+1$ ) is that both antagonistic states [order and chaos] can be ruled by a single law. An even bigger surprise was the discovery that there is a very well defined ‘route’, which leads from one state – order – into the other state – chaos. Furthermore, it was recognised that this route is universal and can possibly be reversed.*

*‘Route’ means that there are abrupt qualitative changes – called bifurcations – which mark the transition from order into chaos like a schedule, and ‘universal’ means that these bifurcations can be found in many natural systems both qualitatively and quantitatively.”*

Any person who finds her/himself, consciously or unconsciously, in front of a repeated sequence of bifurcations swings between two poles. Bifurcation and oscillation are dynamic experiences of everyday natural, social or psychic life.

## **2 - The triadic structure of living systems, nature and language**

The other meta-pattern was his triadic recurrent model, at the core of any theoretical proposal: economic, dynamic and topological relations – conscious, preconscious, unconscious knowledge - Ego, Id and Super-

Ego structure, - oral, anal and genital phase, etc. J. C. Rolland said the Freud's structural model is "*a psychic system as structured around the three agencies*"(30).

From Galileo's statement that Nature is like a book and the letters of its alphabet are triangles and circle, and the influence of Pascal's triangle in maths and probability theory, to fractal geometry realised by Mandelbrot, Sierpinski and von Koch with computer graphics, the shape of the triangle is the basic shape for developing, describing and analysing models and complex forms in a lot of different fields of Nature.

As the triangle, number 3, develops from the point, number 1, by a line, number 2, so in the evolution of the Indo-European languages, but also in many others, in the beginning there was only the first person, after the second person and, only later, the third. Even if the triangle or the third person are at the end of an evolution, at the same time they represent development itself: the combination of triangle generates all other planes and solid figures, while the interaction between I & You with others, person or things, is the conceptual frame for any relationships and understanding.

In living systems we also have three central premises or keys, as Miller pointed out (32). The first is that the living system contains many subsystems; the second key is the complexity while the third is the principle of fray-out, that is, as a system grows in complexity, the subsystems become more differentiated, i.e. the fractals and fractal geometry as a pattern for evolving a complex adaptive system.

We have already considered how Freud organised and rooted his theoretical configuration of psyche with the recursive use of three agencies, "*the tripartite mind*" as R. S. Wallerstein (33) calls them.

'*What are metapatterns?*' asks Tyler Volk in his book (34). They compare and generalise, they share a common shape and connect and they forge a trail in the possible space of new configurations. They help to formulate models and to understand the structure of scientific debates. They are attractors - functional universals for forms in space, processes in time and concepts in mind.

The binaries, the dynamic balance and these triadic processes, are at the core of any natural, social and psychic evolution. The laws that settle these processes are universal, as Chaos Theory pointed out. Before we go into chaos and order, let me draw a profile of Freud's shadow.

### ***Empedocles: the Freud 's shadow.***

Empedocles is quoted by Freud in 1938 saying he knew him from a long time. We know that Freud has introduced the death and life instincts and, as he mentioned, they were not well accepted by many members of the psychoanalytic field.

Following my metaphorical assumption, Empedocles' suggestions accompanied, as a smooth, tiny shadow, Freud's evolution, not in terms of an authority in the knowledge of ancient feelings, like Sophocles tragedies, but as scholar. A

couple of pages before his homage to Empedocles, he repeats one of his favourite phrases: *“Only by the concurrent or mutually opposing action of the two primal instincts we can explain the rich multiplicity of the phenomena of life”*. This concurrent and mutual opposing action sounds to me as if he had perceived the importance of interaction as it was growing in the new scientific views, but he was locked inside his mythological orbit. Empedocles’ intuitions balanced his dreams of connecting mythological and natural science.

## **E - Freud’s Psychoanalysis, Linearity and Non-linearity**

Modern non-linear dynamics is one of the most powerful theoretical frames of modern sciences. Even if H. Poincarè built up non-linearity at the beginning of our century and Freud discussed with Einstein many things, Freud never really understood or was exposed to this new scientific frame and indeed he only quoted the concepts of ‘entropy’ or ‘thermodynamics’ a few times. He was completely blocked by the scientific method, the linearity, of his teachers, even if many psychoanalytic ideas contain implicitly most of the concepts of non-linearity.

Following G. P. Williams (38), non-linearity studies how something changes over time, taking into account the whole system, an assemblage of interacting parts; this is exactly what psychoanalysis does. *It helps to explain irregular behaviour over time, ... it pays to be familiar with new directions and new interdisciplinary topics, ... it is ... the easiest way to see how something changes with time making a graph ... and ... shows complex, unsystematic motion. It ... deals with long-term evolution; finally ... complex behaviour can have simple causes.*

Non-linear means that output is not directly proportional to input, like in the example of the quadratic iteration presented above, or that change in one variable does not produce a proportional change or reaction in the related variables. As Nature does not produce processes that are linear, so even what happens in the psychic reality is non-linear. M. J. Feigenbaum suggests that a new principle of ‘economy’ immediately emerges: *“why put out Herculean efforts ... when anything else possessing the same qualitative properties will yield exactly the same predictions and results”* (39)?

In my research I would like to understand, for example, if the long term four sessions per week psychoanalytic experience could yield the same result as a brief, medium or long-term one to three sessions per week psychoanalytic psychotherapy. Only making a measuring device, a **‘grid’** that is able to record and measure these different experiences, I think could clarify which changes produce this or that experience and so make predictions, to verify premises and outcomes and to test efficacy.

The modern theory of non-linear dynamical systems seems the best suited to achieve this aim; because it is focused on the analysis of a series of observations, one can make on a system, whether simple or complex. Its techniques, e.g. phase space embedding, are universal, and

do not make reference to any specific model of the system under observation; in our case no specific model can certainly be complete. Moreover, we shall make use of the experience accumulated in the physical sciences to determine whether a “motion” regularity is increasing, whether it is heading towards a fixed cycle or a chaotic phase. Equally, this theory allows us to control and direct the effect of small external perturbations on dynamics: quite clearly, this has profound relevance to therapeutical practice.

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S. Petersburg, 20<sup>th</sup> of April 2002

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To know more about psychoanalysis and non-linearity you can read:

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*Un siècle après l’"Esquisse": nouvelles métaphores?*  
*Métaphores du nouveau.* Rev. Fran. de Psychanalyse, 6, 1990.
- 2) J. I. Sashin & J. Callahan:  
*A model of Affect Using Dynamical Systems.*  
(unfortunately I have a copy of this paper, without a reference).
- 3) J. S. Grotstein:  
*Nothingness, Meaninglessness, Chaos, and the “Black Hole”*  
I – II – III – Contemporary Psychoanalysis, 26, 1990 – 27, 1991.
- 4) M.G. Moran:  
*Chaos Theory and psychoanalysis: the fluidistic nature of the mind.* Int. Rev. of Psychoanal. 18,1991.
- 5) V. Spruiell: (\*)  
*Deterministic chaos and the sciences of complexity:*  
*psychoanalysis in the midst of a general scientific revolution.*  
JAPA,41, 1993.
- 6) R. M. Galatzer-Levy  
*Psychoanalysis and Dynamical Systems Theory:*  
*Prediction and Self-similarity.* JAPA 43,1995.
- 7) J-M. Quinodoz:  
*Transitions in psychic structures in the light of Deterministic*  
*Chaos Theory.* Int. J. Of Psychoanal. 78,1997.
- 8) L. C. Mayes :  
*The Twin Poles of Order and Chaos*  
The Psychoanalytic Studies of the Child, 56, Yale Un. Press, 2001.

(\*) During our exchange of correspondence, we agreed on the need for a measurement device in psychoanalysis. He wrote me: *“I take a cautious view concerning our ability to make use of non-linear dynamics, except metaphorically, until we become literally capable of measuring some interacting variables”*. This is exactly what I am trying to do.

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  10. Freud S. – idem – pg. 118.
  11. Maiocchi – 1995 – idem, pg. 390.
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  20. Maiocchi – 1995 – idem, pg.469.
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