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DYNAMICS OF AN ARTIST'S EMOTIONAL STATES RELATIVE TO HER OR HIS AUDIENCE AND ARTWORK. A MATHEMATICAL APPROACH (I)

BY

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Abstract. Following previous models of Strogatz, Steele and Sprott, this paper examines two models' dynamics of the emotional states involving an artist in relation with his/her audience and artwork. The parameters included in the first model are convictions or commitments and for the second model they are β, responsible for the Ego Mechanisms of Self Defense (portrayed as a parameter involving un conscious influences) and α, responsible for a set of cognitions regarding the role of artists' artwork (portrayed as a parameter involving conscious thoughts). The models show the evolution of the emotional states of an artist and qualitative maps of flow towards equilibrium are obtained for each artist. Furthermore, the model is analyzed in terms of energies, while similitudes with the partition function of an assembly of oscillators are explored.

Keywords: evolution; psychological balance; system dynamics.

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1. Introduction

The idea of building a model for phenomena explored by the social sciences field was explored by Strogatz (1988), idea in which the variables were the feelings of Romeo and Juliet toward each other and the parameters were characterizing the "romantic style" of the Romeo and Juliet. The evolution of this love/hate relationship system was analyzed using the following general system of equations:

$$\begin{cases}\dot{R} = \mathrm{a}_{11}R + \mathrm{a}_{12}J \\ \dot{J} = \mathrm{a}_{21}R + \mathrm{a}_{22}J\end{cases} \tag{1}$$

where R represents the Romeo's love for Juliette, J represents Juliette's love for Romeo, both are functions depending on time: $R = R(t), J = J(t)$; $\dot{R} = {}^{dR}/_{dt}$ and $\dot{J} = {}^{dJ}/_{dt}$ represent the variation of Romeo's and Juliette' love for his/her partner with time, respectively.

A very important issue is to define what the parameters a_{ij} represent, and if they relate somehow with concepts in psychology, otherwise this "ballet" of equations, including their solutions means nothing than pure intellectual exercise. In the Strogatz model, a_{ij} parameters represent the romantic style of each person, so: a_{i1} – the extent to which the person is encouraged by his/her own feelings and a_{i2} – the extent to which the person is encouraged by the partner's feelings for his/her.

Sprott (2004) defines individuals as "secure" when $a_{i1} < 0$ and "synergic" when $a_{i2} > 0$. To be "secure" means that the person takes cautious steps with respect to his/her own feelings, trying to secure his or her own future against possible suffering caused by a romantic relationship failure, to be "synergic" means that the person reacts the same way in accordance with the partner's feelings for him/her, anti-synergic means a person loves being hated and hates being loved by the partner. The system can exhibit sixteen possible pairings (four possibilities for each individual), each pair having its own dynamics. The dynamics of some colorful named pairings as "fire and ice" or "peas in a pod" or "Romeo the robot" are described later in the article (Sprott, 2004). Nonlinearities and chaos can easily occur while describing a love triangle (a third person will create a six differential equation system) or by introducing in the differential equations logistic function configurations as in the following system:

$$\begin{cases}\dot{R} = \mathrm{a}R + \mathrm{b}J(1 - |J|) \\ \dot{J} = \mathrm{c}R(1 - |R|) + \mathrm{d}J\end{cases} \tag{2}$$

Here "too much love" from the partner works against the love affair, suggesting that romantic attachment should be limited or, better said, carefully expressed to the partner.

The parameters a_{ij} seem to be personality traits, or patterns of behavior, cognitions and emotions that are specific to the individual. Being "secure" (as defined above) relates to holding oneself of the primary emotional impulse, prudence on developing an emotional attachment, both involving power of will, rational approach. However, the same "secure feeling" could come from fears of getting involved emotionally. Rational approach comes from one's beliefs: it is a cognitive pattern. Fear is an emotion, then it is an emotional pattern. Acting in a way or another is a behavioral pattern.

These parameters involve complex patterns, patterns given by one's nervous system's physiological response to stimuli, emotional, and cognitive repertoire.

In a later article Sprott jumps from analyzing the dynamics of romantic relationships to dynamics of happiness (Sprott, 2005). The form of the initial equation is changed, being amended with coefficients and differential variables of order 2 or even 3, each amendment being proposed to best fit the (psychological) situation. In Eq. (3) the parameter β represents the attenuation rate of happiness.

$$\ddot{R} + \beta\dot{R} + R = F(t) \tag{3}$$

where $F(t)$ is a Gaussian white noise with mean zero – function of time that signifies emotional reaction to real life events.

The attenuation rate is introduced because there is a "tendency to acclimate whatever good things life provides". After the initial emotional shock (positive or negative) that a significant event brings into one's life, the emotions tend to fall back into the ordinary state. Adapting to the one's environment is more important to being a functional being rather than experiencing eternal progressive joy. Happiness may be an ideal, a desiderate, but depending on how it is defined, it can relate to a complex set of emotions and cognitions from basic to superior: mild vegetative affects like a sense of well-being, positive emotions as joy, pleasant surprise, comfort, harmony, sense of security, euphoria, self-realization. Defining $\dot{R}$ as "happiness" can be included in a general characteristic of the human mind: a simplification in order to obtain cognitive economy.

Concepts such as "happiness", "well-being", "self-realization" are not the focus of a debate in this paper, but the intent is to underline the complexity of a concept used as a main variable in these models. Operationalizing is a must to making a viable link between these mathematical models and psychology as a science. For example the term "happiness" used in his equations resembles more the concept of "euphoria". This can be a dysfunctional issue in psychiatry relating to affective disorders as manic disorders. A progressing joy can sound desirable but it may relate to a drug addiction behavior, both to achieve "the high" and to get rid of the subsequent physiological "low".

At Sprott, the attenuation intervenes only when a shift from the initial emotional state is sensed; in the Eq. (3) it applies to $\dot{R}$.

Steele *et al.* (2014) have introduced in their romantic dyad model emotional love state ideals of woman and man: f^* and m^*. The parameters affect the difference between the ideal emotional state and the actual emotional state of the woman and man. What is important is that the authors specify that there are no two dyads alike, the phase diagram is like a topological map and changing the parameters will result in change on the topology. There is no general map that suits a sample of dyads, it is nonsense to extract means of parameters from a sample population and to present a general system as fitting the "normality" even if it is a statistically one. Each dyad has its own dynamics.

2. Theoretical Models

Model 1. Fame and Appreciation – System Dynamics Involving an Artist and Her/His Audience

For this model we consider as the system variables:

$x(t) - \text{the artist}'\text{s appreciation toward her/his audience at time } t,$

$y(t) - \text{audience appreciation towards the artist at time } t,$

The system is presented in this form:

$$\begin{cases} \dot{x} = a(x^* - x) + by(1 - \frac{y}{y_m}) \\ \dot{y} = cx\left(1 - \frac{x}{x_m}\right) + d(\mathrm{y}^* - y) \end{cases} \tag{4}$$

where: a represents an engagement parameter, it shows the level with which the artist engages or go along with her/his appreciation towards the audience, a level of confidence in her/his emotional involvement with the audience; b – the openness of the artist to her/his audience (a rate signifying the care of the artists to audience feedback); c – the trust of the audience in the artist appreciation, or the audience openness towards what the artist offers; d – the audience engagement in their own appreciation towards the artist; x^* – the ideal appreciation of the artist towards her/his audience; y^* – the ideal appreciation of the audience towards the artist; x_m – the appreciation threshold that the artist can have for the audience, in order to produce maximum $\dot{y}$; y_m – the appreciation threshold that the audience can reach for the artist in order to produce maximum $\dot{x}$.

The expressions $\left(1 - \frac{y}{y_m}\right)$ and $\left(1 - \frac{x}{x_m}\right)$ represent the logistic terms for the relations, if $x > x_m$ or $y > y_m$, the logistic terms become negative, reducing the dynamics of *x* and *y*. In other words, if the artist were involved too much in her/his appreciation towards the audience, surpassing the threshold x_m, the audience would become saturated and have an opposite reaction, with a rejection of the artist. In a similar way, if the audience appreciation were higher than the threshold y_m, the artist would feel suffocated by the audience and react with withdrawal.

The evolution of this system can be found by applying the method of Strogats (2014a; 2014b; 2014c), building the Jacobian, calculating the fixed points (x_0, y_0), the eigen values λ_i, the determinant Δ and the trace τ. These values can be computed automatically online on Wolfram alpha webpage (LLC W., 2014).

The evolution of the system can be found qualitatively by looking at the diagram in Fig. 1:

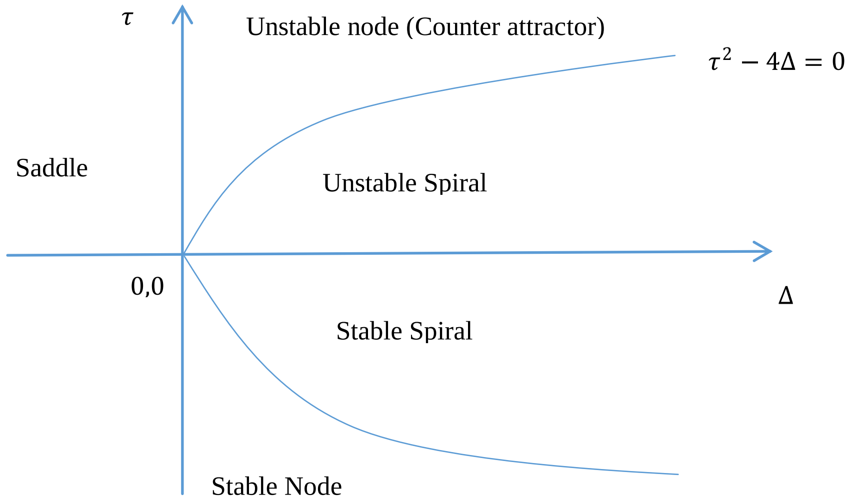

Fig. 1 – Diagram showing possible evolutions depending on the terms Δ, τ, and $\tau^2 - 4\Delta$.

If the fixed points fall on the axis or on parabola $\tau^2 - 4\Delta = 0$, then the evolution cannot be determined qualitatively. Otherwise the following evolutions can occur:

1. If $\Delta < 0$ the evolution will be a saddle,
2. If $\tau > 0$, $\Delta > 0$ şi $\tau^2 - 4\Delta > 0$ we will have a curved unstable evolution from a counter attractor,
3. If $\tau > 0$, $\Delta > 0$ şi $\tau^2 - 4\Delta < 0$ we will have a spiraled unstable evolution from a counter attractor,
4. If $\tau < 0$, $\Delta > 0$ şi $\tau^2 - 4\Delta < 0$ we will have a spiraled stable evolution toward an attractor,
5. If $\tau < 0$, $\Delta > 0$ şi $\tau^2 - 4\Delta > 0$ we will have a curved stable evolution toward an attractor.

Example 1. For a specific artist-audience relationship we give an example where: $a = b = c = d = 1$, meaning that both the artist and the audience engage positively in their appreciation and respond positively to the appreciation of the other. We set the ideals of appreciation $x^* = y^* = 8$ and the appreciation threshold $x_m = y_m = 10$.

The system becomes:

$$\begin{cases} \dot{x} = (8 - x) + y(1 - \frac{y}{10}) \\ \dot{y} = x\left(1 - \frac{x}{10}\right) + (8 - y) \end{cases} \tag{5}$$

The fixed points and their type are:

a) $x_1(-4\sqrt{5}, -4\sqrt{5})$, $\tau_1 = -2 < 0$, $\Delta_1 = 1 - \left(1 - \frac{y}{5}\right)\left(1 - \frac{x}{5}\right) = -6.77 < 0$, $\tau^2 - 4\Delta = 31.11 > 0$. That means $x_1(-4\sqrt{5}, -4\sqrt{5})$ is a saddle type node,

b) $x_2(4\sqrt{5}, 4\sqrt{5})$, $\tau_2 = -2 < 0$, $\Delta_2 = 1 - \left(1 - \frac{y}{5}\right)\left(1 - \frac{x}{5}\right) = 0.37 > 0$, $\tau^2 - 4\Delta = 2.49 > 0$, That means $x_2(4\sqrt{5}, 4\sqrt{5})$ is a stable node, attractor type, the evolution is a curve type toward it.

c) $z_1 = \left(10 - 2i\sqrt{5}, 10 + 2i\sqrt{5}\right)$ and $z_2 = (10 + 2i\sqrt{5}, 10 - 2i\sqrt{5})$. Both points are imaginary numbers, so the evolution would be a saddle type one around the real part of z_3 and z_4: (10, 10).

The evolution of this particular artist-audience system is shown on Fig. 2:

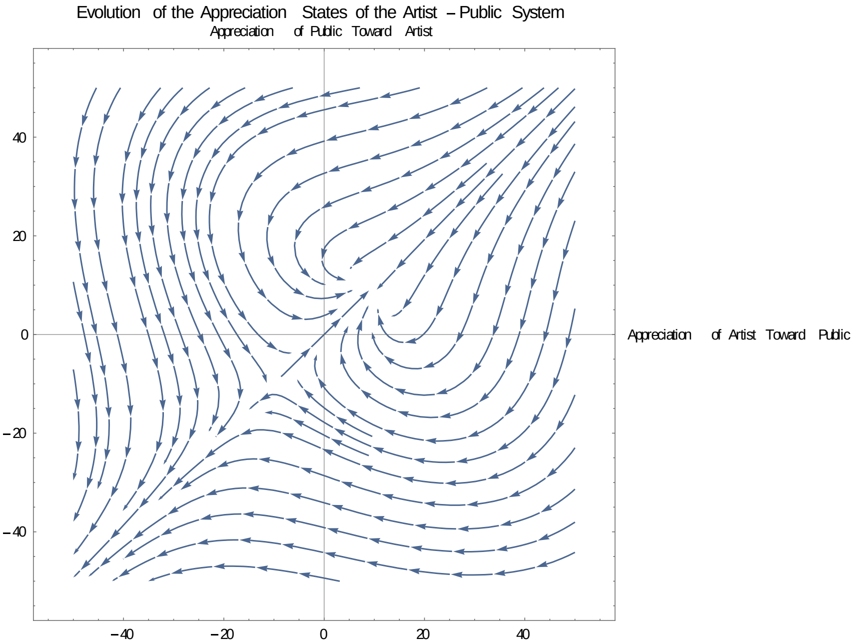

Fig. 2 – Evolutions of the appreciation states of the artist – audience system. Example 1.

We notice in the I-st quadrant a tendency of the evolution to go toward the attractor $x_2(8.94, 8.94)$ and an unstable saddle type node in the III-rd quadrant.

At low (positive) appreciations of x and y what will prevail is the tendency to obtain the ideal of appreciation, but once the values become greater, the logistic term will limit both the appreciation of artist toward audience and audience toward artist to the value of 8.94. What is interesting is that this value is a bit above the threshold value 8. At 8.94, the artist will "put a brake on" her/his appreciation but the audience appreciation will counteract well enough to go over this "brake" and will bring the system at equilibrium. With these $a, b, c, d, x^*, y^*, x_m, y_m$ parameters, it seems the equilibrium will be at a point where the artist and the audience are slightly bothered with their appreciation just a little bit above the threshold appreciation value.

Example 2. We choose $a = b = -1$, meaning that the artist rejects her/his own appreciation toward the audience and does not have trust in audience appreciation toward her/him. The audience responds "normally" so $c = d = 1$. The artist has a low threshold for the audience appreciation $x_m = 4$, $y_m = 10$ and the ideals remain at $x^* = 8$, $y^* = 8$.

The phase diagram look as in Fig. 3:

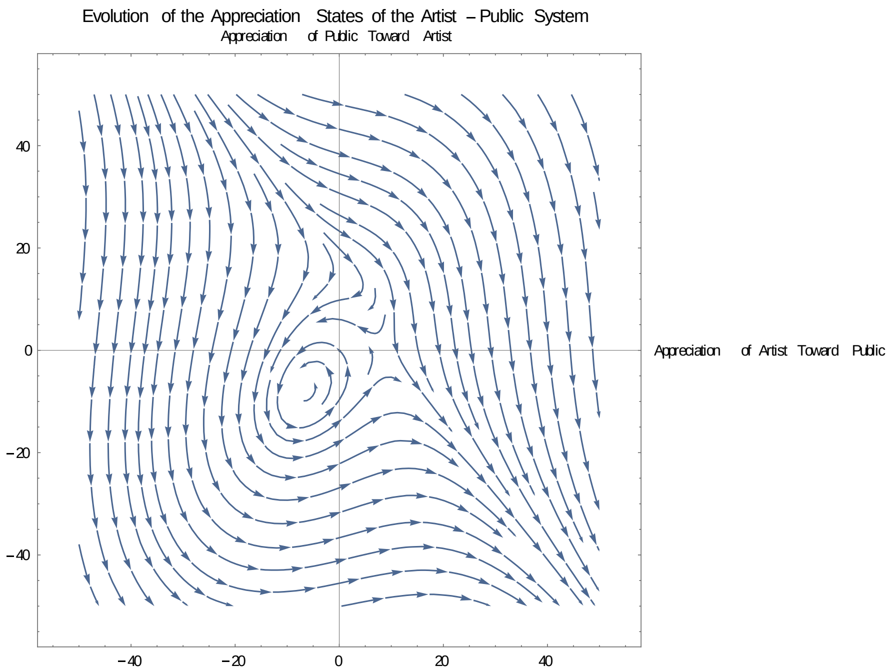

Fig. 3 – Evolutions of the appreciation states of the artist – audience system. Example 2.

The fixed point $x_1(8{,}0)$ is an unstable saddle node, $x_2(-6.23, -7.93)$ is an unstable node and the evolution will be a spiral coming from this counter attractor.

We notice that around the node x_2 where both artist's and audience appreciations are negative, oscillations will occur and the evolution will go in a place where even if the artist's appreciation will rise, the audience will respond negatively. There is an unstable node at $x_1(8{,}0)$ where the evolution can go toward the previous oscillations at node $x_1(8{,}0)$ or go directly to the same public relation disaster where the more the artist appreciates the audience the more rejection he or she will receive from the audience. Either way the "recommendation" for this artist is to try less to love or hate the audience but operate some cognitive adjustments involving parameters a (commitment to own appreciation) and b (trust in the audience appreciation).

Model 2. Dynamics of an Artist's Emotional State

A previous linear regression study analyzed the dependence of psychological equilibrium of an artist as a criteria and variables involved in the process of art creation, like mechanisms of self-defense, beliefs regarding the positive impact of one's own creation to personal life and on audience as predictors. However, the variables both dependent and independent were seen as independent with time. The evolution of a system in which the variables are time-dependent is more likely to be closer to reality, as there is a continuity between emotional present state and a subsequent one. The mathematical approach of a linear or nonlinear system seems to fit better and the diagram of phases gives the system evolution map.

The following equation is proposed:

$$\ddot{u} = -\beta\dot{u} + \alpha|u| \tag{6}$$

where $u = u(t)$ represents the psychological state of an artist which depicts the concept of the artist being in a psychological balance ("psychological balance" is a term preferred to "psychological equilibrium", the latter might interfere with the mathematical term of "equilibrium of the system"), $\dot{u} = \frac{du}{dt} = \dot{u}(t)$ represents the variation of his/her state, β is aparameter of attenuation or damping which takes into consideration the power of mechanisms of self-defense; the unconscious mechanisms of self-defense intervene only when a variation of present state is sensed, α is a parameter of conviction, the artist's established belief that his/her artwork has therapeutic effects on one's own psychological state. This parameter influences the state of the artist continuously: it is a stable belief. If the state is positive, it sustains this state; if the state is negative, it works against the state, affecting the system equilibrium according to the artist's strong belief. That is why the state u appears in the absolute value.

Introducing the substitutions $\begin{cases} x(t) = u(t) \\ y(t) = \dot{u}(t) \end{cases}$ we will obtain the system:

$$\begin{cases} \dot{x} = y \\ \dot{y} = -\beta y + \alpha|x| \end{cases}$$

The Jacobian is $\mathrm{A} = \begin{pmatrix} 0 & 1 \\ \alpha & \beta \end{pmatrix}$. The values for the system trace is $\tau = \beta$ and $\Delta = -\alpha < 0$, therefore we have a saddle type evolution. We calculate the value of $\tau^2 - 4\Delta = \beta^2 + 4\alpha$.

The general approach with all cases will not be discussed here, instead we will obtain the phase diagrams for specific cases by introducing the differential equations on the Wolfram alpha site.

Example 1. Stage Actor

The parameters were set to vary between 0 and 1, and they were obtained by a questionnaire.

After filling out the questionnaire, an artist (actor) obtained the following scores:

$\beta = 0.95$, this parameter represents that – during the process of art creation (in this case performance on the stage) – the artist used (unconscious process) catharsis and relief caused by sublimation and/or other Ego mechanisms of defense.

$\alpha = 0.55$, this parameter represents the artist's belief (conscious process) that her performance has a therapeutic effect on her and on her audience.

The system becomes:

$$\ddot{u} = -0.95\dot{u} + 0.55|u| \tag{7}$$

To solve this second order differential equation we introduce the following substitutions: $\begin{cases} x(t) = u(t) \\ y(t) = \dot{u}(t) \end{cases}$

The Eq. (7) is transformed in a system of two first order differential equations, on which we can apply the formalism as Strogatz has done on the "love affair Romeo – Juliet" dyad to obtain the evolution of this system:

$$\begin{cases} \dot{x} = y \\ \dot{y} = -0.95y + 0.55|x| \end{cases} \tag{8}$$

The Jacobian is $\mathrm{A} = \begin{pmatrix} 0 & 1 \\ 0.55 & 0.95 \end{pmatrix}$. The values for the system trace is $\tau = 0.95$ and $\Delta = -0.55 < 0$, therefore we have a saddle type evolution. We calculate the value of $\tau^2 - 4\Delta = 3.1 \neq 0$.

The phase diagram of this system can be easily obtained introducing the code “streamplot [{y, 0.55*Abs[x]-0.95*y}, {x, -1,1}, {y, -1,1}]” on the Wolfram alpha website (LLC W., 2014), (Fig. 4):

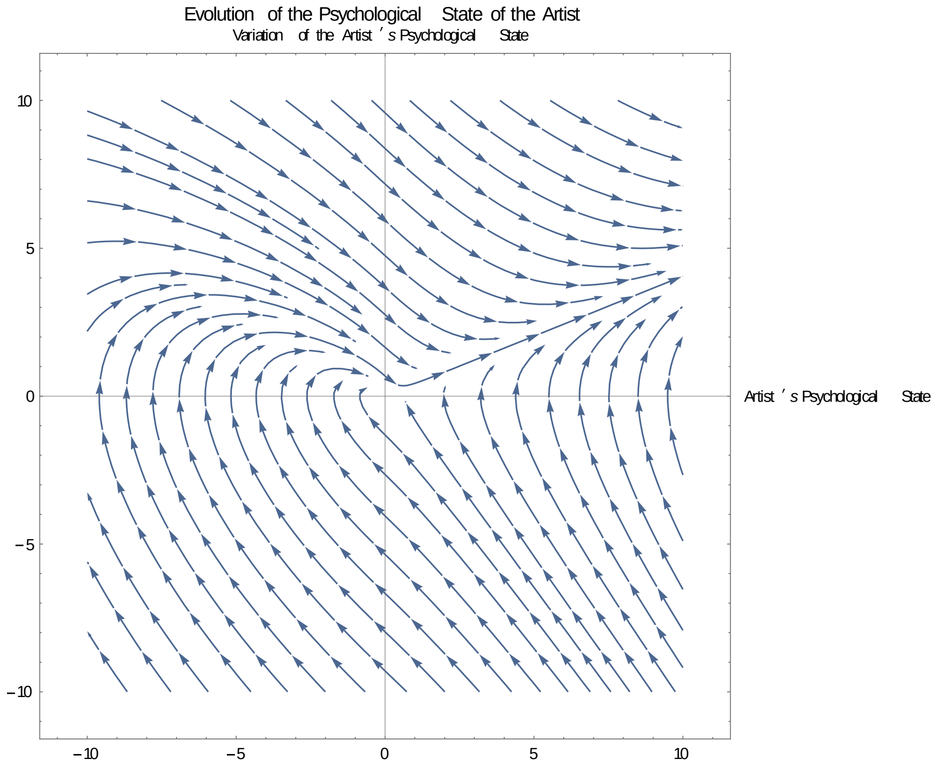

Fig. 4 – Evolution of the psychological state of an artist. Example 1.

The fixed point is (0, 0) and it is an unstable saddle type node. For both the state and the variation of state positives (I-st quadrant) we notice that, no matter of the initial position, the system will evolve asymptotically toward increasing the positive state of the artist. The variation of an artist’s state will increase or decrease toward the asymptotic value. For initial values that are in the II-nd quadrant (negative states but positive variation of states) the evolution will be toward diminishing the negative states. For the III-rd quadrant (both state and variation of state negatives) the system will evolve toward more negative states of the artist; however, once the variation becomes positive, the evolution will enter in the II-nd quadrant, which means that on the long run, the states will become positive. For the IV-th quadrant (positive state but negative variation – the state decreases in time), the evolution can go either directly toward I-st quadrant or take to the longer left path, toward quadrant III, II and I.

Example 2. Fiction Writer

Let us take the case of a writer, who scored at $\beta = 0.35$, meaning that her unconscious has a medium power of influence on the evolution of her emotional states. However, she scored high on parameter α =0.91, meaning that she is convinced that her artwork has a power to heal herself and her audience. The model is written as:

$$\ddot{u} = -0.35\dot{u} + 0.91|u| \tag{9}$$

The evolution can be found following the same method as above and the phases diagram is shown in Fig. 5.

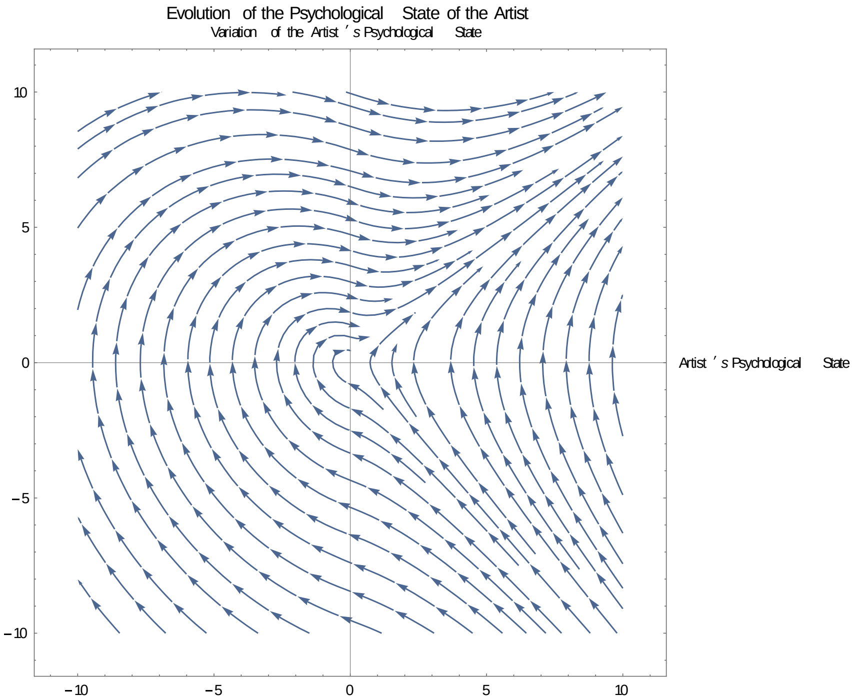

Fig. 5 – Evolution of the psychological state of an artist. Example 2.

The evolution in the I-st quadrant resembles the one in Example 1, but on the rest of the quadrants the evolution curves are much larger around the fixed point (0, 0).

Similitudes with an Assembly of Oscillators

The following differential equation describing the equilibrium of the states is considered:

$$\ddot{q} + \beta\dot{q} + \alpha q = 0 \tag{10}$$

Where q represents the psychological state, $\dot{q}$ represents the evolution velocity of the state q, $\ddot{q}$ represents the evolution acceleration of state q, β is a parameter of attenuation which takes into consideration the power of mechanisms of self-defense, α is a parameter of conviction, these parameters are the same as defined above at Eq. (6). For the sake of simplification we will use β as unconscious self-regulating and α as conscious self-regulating parameters of the artist's state.

Eq. (10) implies that there is an interaction involving unconscious and conscious mechanisms, interaction responsible for the evolution of the psychological state (of the artist in our case).

The Eq. (10) can be written in a Hamiltonian form, introducing the variable $p = \dot{q}$, a situation in which the Eq. (10) becomes:

$$\begin{cases} \dot{q} = p \\ \dot{p} = -\beta p - \alpha q \end{cases} \tag{11}$$

or in the matrix form:

$$\begin{pmatrix} \dot{p} \\ \dot{q} \end{pmatrix} = \begin{pmatrix} -\beta & -\alpha \\ 1 & 0 \end{pmatrix} \begin{pmatrix} p \\ q \end{pmatrix} \tag{12}$$

Some consequences become obvious:

a) from (11) the plane (p, q) can be constructed and it is named the plane of generalized coordinates and momentum - the phases plane, the first equation from (11) being a form of defining p;

b) the system described by Eq. (12) is not a Hamiltonian system because its associated matrix

$$\hat{M} = \begin{pmatrix} -\beta & -\alpha \\ 1 & 0 \end{pmatrix} \tag{13}$$

is not an involution (its trace is not null);

c) the variation rate of the physical action represented by the elementary area from the phases plane is the square form:

$$\frac{1}{2}(p\dot{q} - q\dot{p}) = \frac{1}{2}(p^2 + \beta pq + \alpha q^2) \equiv P(p, q, \alpha, \beta) \tag{14}$$

A generalization of Hawking's theorem deals with the fact that a measure of the information on the system is the area of the phase plane (Anderson, 1996). As a consequence, the potentiality of the system can be obtained. The information is non-manifest and contained in the system. The interaction with the environment implies the non-manifest – manifest transition of information, situation in which the system reacts.

d) For

$$v = {}^{p}/_{q} \tag{15}$$

the Eq. (5) takes the form of a Riccati type equation (Hazewinkel, 2001):

$$\dot{v} + v^2 + \beta v + \alpha = 0 \tag{16}$$

which admits the conservation law (Denman, 1968):

$$Q(p,q,\alpha,\beta) = \frac{1}{2}(p^2 + \beta pq + \alpha q^2)\exp\left\{\frac{\beta}{\sqrt{\alpha-(^{\beta}/_{2})^2}}\tan^{-1}\left[\frac{p+(^{\beta}/_{2})q}{q\sqrt{\alpha-(^{\beta}/_{2})^2}}\right]\right\} = \text{const} \tag{17}$$

From (17) it results that the relation

$$Q(p,q,\beta) = \frac{1}{2}(p^2 + \alpha q^2) = \text{const} \tag{18}$$

is a law of conservation in classical sense either if parameter β is null or if the movement in the phase plane goes is a straight line that crosses the origin, with the slope β. In such a conjecture, if we define $Q_i = {p^2}/_2$ as the unconsciously driven energy and $Q_c = \alpha\, {q^2}/_2$ as the consciously driven energy, the above equation becomes the energy conservation law:

$$Q = {Q_i}^2 + {Q_c}^2 = \frac{p^2}{2} + \alpha\frac{q^2}{2} = \text{const} \tag{19}$$

Now, if we do the substitutions

$$w^2 = \frac{p^2}{\alpha q^2}, \mathrm{r} = \frac{\beta}{2\sqrt{\alpha}} \tag{20}$$

the Eq. (18) written in the form:

$$\frac{\alpha q^2}{2} = Q(r,w) = \frac{\text{const}}{1+2\mathrm{r}w+w^2}\exp\left[\frac{2\mathrm{r}}{\sqrt{1-\mathrm{r}^2}}\tan^{-1}\frac{w\sqrt{1-\mathrm{r}^2}}{1-\mathrm{r}w}\right] \tag{21}$$

shows explicitly that the expression $Q(\mathrm{r},w)$ depends, among others, on w^2, *i.e.* it depends on the ratio between the unconsciously driven energy and the consciously driven energy.

The relation (21) written as

$$\frac{Q(\mathrm{r},w)}{\text{const}} = F\left(\mathrm{r}, w = \frac{\varepsilon_0}{u}\right) = \exp(-\frac{\varepsilon_0}{u}) = \frac{1}{1+2\mathrm{r}w+w^2}\exp\left[\frac{2r}{\sqrt{1-r^2}}tan^{-1}\frac{w\sqrt{1-r^2}}{1-rw}\right] \tag{22}$$

specifies a perfect similitude with the partition function for an assembly of oscillators of Plank type (Lavenda, 1995), r being the correlation coefficient, ε_0

being the energy of an oscillator from the assembly and u the reference energy. Within this context the consciously driven energy has a stochastical behavior, the statistical variable being determined by the ratio between the unconsciously and consciously driven energies. For energies of order $\varepsilon_0 \to u$ the partition function depends only on the correlation coefficient between the unconsciously and consciously driven energies, while for a low correlation between these two, $r \to 0$, it can be defined the information quanta:

$$\varepsilon_\nu = u\ln 2 \tag{23}$$

If $u = kT$, the above relation defines the information quanta in thermal representation:

$$\varepsilon_\nu = kT\ln 2 \tag{24}$$

while, if $u = h\nu$, the same relation (14) defines the information quanta in wave representation:

$$\varepsilon_\nu = h\nu\ln 2 \tag{25}$$

In relations (24) and (25), T is the temperature, ν is the radiation frequency, k is the Boltzmann constant, and h is the Planck constant. In such context, the fundamental elements of the multivalent logic from the information theory in the Landauer sense (1961) can be applied to our model.

3. Conclusions

Two models were discussed and both provided qualitative information regarding the evolution of a system: an emotional dyad between the artist and her/his audience for the first model and the emotional states of an artist (with her/his variation of emotional state known). This qualitative map, the phase diagram, can be used by a psychologist to assess what kind of therapy could be implemented. A successful change process means that the system evolution map is changed. In some cases, regardless of the changes induced on an emotional level, the evolution goes to the same result, so a better approach could be a cognitive therapy (changes on a, b, c, d or α, parameters). In other cases, an Ericksonian therapy (changes on parameter β – responsible for the Self-defense unconscious mechanisms) would seem to be more appropriate.

A Hamiltonian model was constructed using the nonlinear dynamic theory, as a continuation of the second model. A Riccati type equation was obtained which could provide further information on the interaction between conscious and unconscious psychological mechanisms within a human mind. Future studies are required on this model in order to assess whether similitudes between the physical behaviors of assemble of oscillators and human psychological processes would make sense.

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DINAMICA STĂRILOR EMOȚIONALE ALE UNUI ARTIST RELATIV LA AUDIENȚA SA ȘI LA CREAȚIILE SALE. O ABORDARE MATEMATICĂ (I)

(Rezumat)

Pornind de la rezultatele anterioare ale lui Strogatz, Steele și Sprott, lucrarea de față examinează dinamica a două modele care implică stările emoționale ale unui artist și ale audienței sale, respectiv ale percepției rolului terapeutic al produsului său de creație. Parametrii incluși în primul model sunt convingerile și angajamentele în aprecierile artistului și ale audienței sale iar pentru al doilea model sunt β - responsabil pentru influența mecanismelor de apărare ale Eu-lui asupra stărilor sale psihice –procese psihice inconștiente și α - responsabil pentru puterea convingerii artistului că arta sa are valență terapeutică – procese psihice conștiente. Modelele arată evoluția stărilor emoționale și diagrama evoluției de stare, aceasta fiind specifică fiecărui artist. În finalul lucrării, este construit un model în termeni de energii și au fost explorate similitudini cu funcția de partiție a unui ansamblu de oscilatori.