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Web-Based Services

Background & Methods

for

Objective Gender Variance Evaluation

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Abstract: Gender identity formation is not something simple, but very complex. Multiple causes and variables are involved, some among them are known and some are unknown. Due to that complexity, undoubtedly, even following a typical sexual and genital development, we are never sure "a priori" what will be the way gender identity will develop. Most people follow what we expect - the Male or Female way of simple dichotomy - the way of high incidence probability. But there are other possible ways for that development, low probability ways. We name these low probability states as gender variance states - *GV*, and among them we name typical states as cross-dressers (*CD's*), transgenders (*TG's*), transsexuals (*TS*), among other possible states. The simple co-existence of states with different incidence probabilities configures sufficient evidence that gender identity development is a chaotic system - with its typical signatures and lack of predictability of effects, generating a spectrum of variable probability states. In Medicine and Psychology, all state that is "far from equilibrium" - or which incidence is characterized by low probability - soon is considered - really disqualified - as an "abnormality", or as a "disorder" or as a "pathology" - even if the state threatens not life or health - but only the ideological "status quo", the dominant ideology of Gaussian values of highly probability states, being considered "normal". That ideological "status quo" is being questioned by modern science - with the development of complex system's theories, the study of the emergence of the new, the natural fractal distribution of variety and diversity, the possibility of the quantification of far from equilibrium low probability state signatures in Nature. The background of our developments to measure gender variances is not related only to the complexity of causes - we study and consider not causes - but mainly we quantify effects - the spectrum of typical dynamical effects that trigger variance and diversity among gender development possibilities. That way we could develop new INSTRUMENTS FOR QUANTIFICATION of typical signatures of gender variance developments, considering the SOC 6th defined by WPATH. These signatures may be recognized and compared, enabling the possibility of objective differentiation of dynamic states. That quantification is privileged when we use computers, and mainly when we use computers through the international web of computers. That way we have a good instrument to evaluate people through the Web, and to help local practitioners - doctors, psychologists, sexologists and gender therapists all around the world - with objective quantification of gender variances to help their decisions evaluating people.

Context

- Up until today, for medicine and psychology a "disorder" is not necessarily something "disordered".
- All that is far-from-equilibrium is labeled as a "disorder", as an "abnormality".

Far-from-equilibrium -> Unpredictability

- Nobel prized Prigogine since the 40's discovered the natural emergence of self-organized unpredictability from far-from-equilibrium when there is a necessity (a catalysis)

(Prigogine 1945; Nicolis & Prigogine, 1977; Prigogine 1980; Kondepudi & Prigogine, 1998) .

- So, far-from-equilibrium may be related to a new order that may emerge from an unpredictable phenomenon and not necessarily to a "disorder".

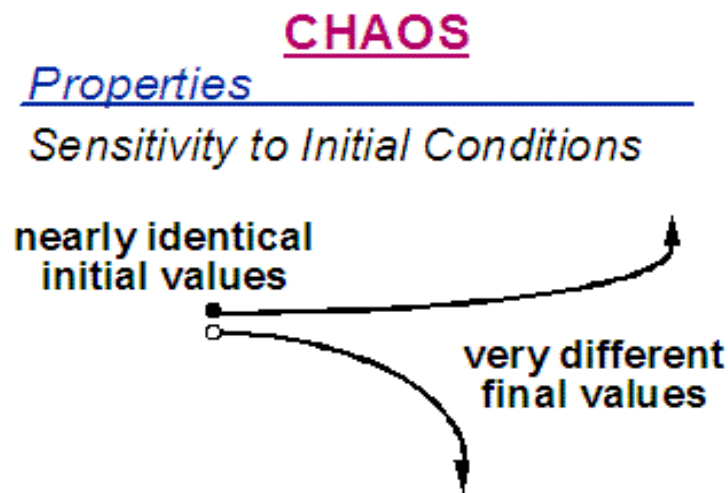
(Prigogine 1945)

GI unpredictability is a fact

- The self-perception of pertaining to one gender or the other, or to neither or both, or even in between them is defined as *GI-gender identity*.
- *GI unpredictability* (unexpected *GI* development) happens with typical or atypical (intersex) sexual development (Freitas, 1998)
- An unpredictable development means a nonlinear development - the co-existence of high and low probability states (Spratt 2003);
- *GI* development high probable states are Male/Female and low probability states we classify as *Gender Variances - GV*.

From nearly the same start ->
unpredictability =
co-existence of high probability states (M/F
dichotomy) and low probability far-from-
equilibrium states* (GV)

(Sprott 2003)



GI unpredictable development:
Dynamic Qualification

One-to-one bias

- Our old reductionist scientific point of view considers always one-to-one cause-effect linear simplistic relations; FOR EXAMPLE:
- Our law says the genitals simplistically define sex and gender;
- Some researchers consider simple chromosomes relations as one-to-one defining sex, if not also gender;
- For *GI* some defined in the near past a "sex of rearing" cause-effect one-to-one relation - with dramatic consequences for some intersex, almost all *GV* and other lives;
- More recently some consider the brain differentiation also as an one-to-one cause-effect direct relation to define *GI* formation;
- Others try to see simplistic relations between *GV* and sexual orientation - which are different and independent phenomena - among other simplistic one-to-one cause-effect "theories".
- All these one-to-one cause-effect relations are structurally biased, because *GI* formation due to its inner unpredictability IS NOT SIMPLE AND MAY NOT BE DEFINED BY ONE-TO-ONE simplistic linear relations (in macro phenomenological scale) - even when it is sure these variables may be important for its development.

Many-to-many complexity

- After Prigogine some researchers developed knowledge about complexity, self-organization and the importance of many-to-many point-of-view to study unpredictable phenomena, among them:
- Wolfram developed the Cellular Automata concept (Wolfram, 1994);
- Stuart Kauffman developed the concept of Random Boolean Networks (RBN) - from which later was developed the concept of Neural Networks (1993) ;
- Kaneko & Tsuda (1996) developed the concept of CML-coupled map lattices;
- Bak (1996) with some colleagues, developed the concept of far-from-equilibrium Self-Organized Criticality;
- Sabelli (2005) with some colleagues, defined the Bios Process to quantify far-from-equilibrium creativity and novelty.

We qualify GI formation through
Bak's self-organized criticality
(as a most probable hypothesis for the
mechanism of CAUSES)

and

we quantify the EFFECTS considering
Sabelli's Bios Process model
(quantifying signatures and novelty from
different possible STATES as EFFECTS)

Important Remark!

The quantification considering Bios Process model for the EFFECTS is independent from the qualification of the process as a self-organized criticality for the mechanism operation of CAUSES. Self-organized criticality is a good hypothesis for the way CAUSES act – but the quantification considering Bios Process equations for different typical STATES as EFFECTS is etiology-independent.

Many-to-many -> $1/f$ power distribution of events

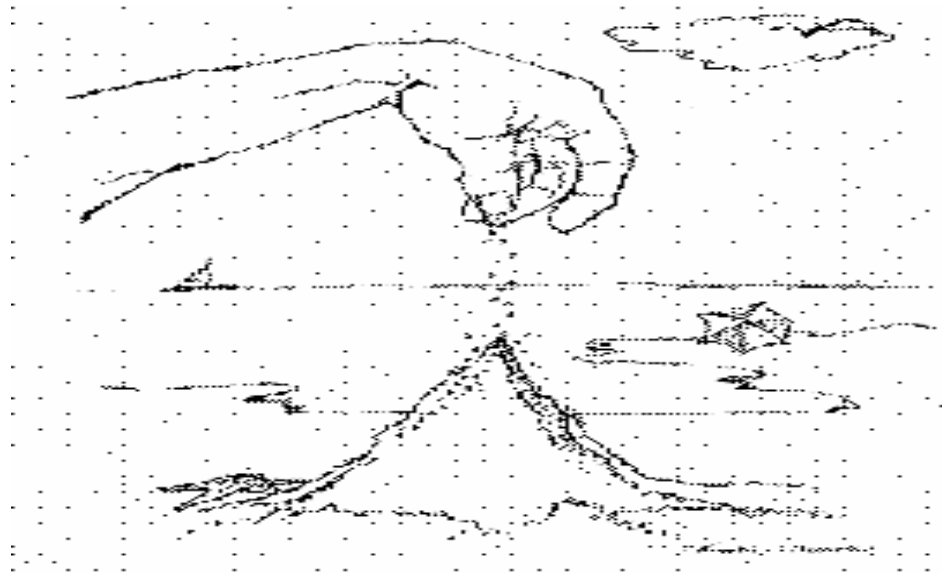
Natural unpredictable dynamic systems may show an $1/f$ power law distribution for incidence versus intensity of events (Bak, 1996).

Examples are avalanches, earthquakes, tempests, hurricanes, natural geomorphology, bridge collapses, genetic evolution of species, social movements and group violence.

GV or gender states also may follow that same pattern!

Imagine a sand pile. In the beginning the sand pile is stable at a near steady state. Than... near a critical point... something new may be triggered... the sand pile may self-move... small avalanches... a big avalanche... a new order... = self-organized criticality

(Bak 1996).



GI-> probable Self-Organized Criticality

Lets consider a possible analogy with the sand pile.

Most of the time the sand pile is in a near steady-state, as in the gender system M/F dichotomy is also stable.

But considering the inner conditions of the sand pile (NATURE), from a critical point on, any contingency (NURTURE) may trigger an avalanche.

Also for the gender system we may have "avalanches" due to inner system characteristics and to contingencies of life (NATURE & NURTURE IN CO-OPERATION).

The result of these "avalanches" we label *GV*.

During self-organized critical states, a small catastrophe (avalanche) may trigger a greater one, as a falling domino sequence.

For example genetic criticality may trigger endocrine criticality and both may trigger cerebral criticality that through life will trigger self-perception criticality which may activate more personal catastrophes. Also the emotional state of the mother during gestation may affect her immune system, that can be at a critical state and could affect the fetus endocrine system, and so one critical state may triggers other and so on. That way an unexpected *GI* may develop (intrinsic *GI* unpredictability), due to a many-to-many relation of critical situations due to known and unknown factors, since an early starting point in life.

Depending on the energy level the criticality continues or may be halted. TS are examples of overall falling domino criticality; CD's have not the same energy, and live more limited critical states.

Critical states trigger instability, generating domino's effect, defining a whole new emergent order... an $1/f$ fractal order.



Remark:

The criticality is a possibility for gender space - not a necessity.

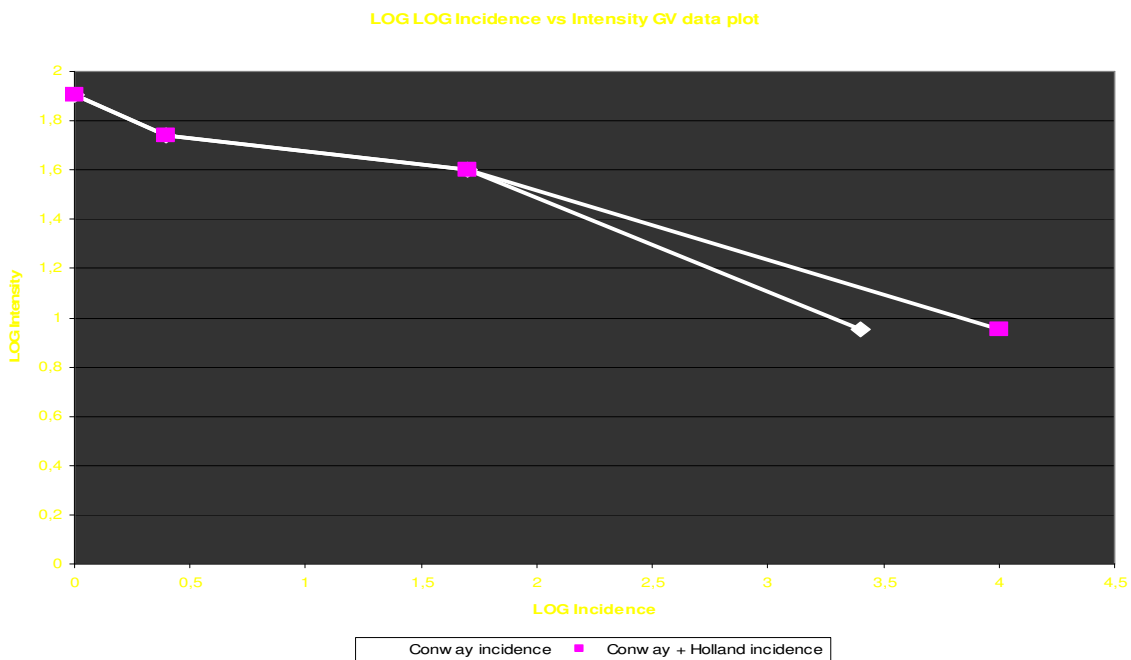
We have no absolute evidence that criticality is the best model to fit gender identity dynamic qualification - we consider it is a probable model - and a lot of more research will be necessary to be sure the model fit the reality - and that that model is the best model to fit that reality.

GV incidence vs intensity

Evidence of a 1/f fractal pattern

(Conway 2002 GV published incidence data and Gendercare unpublished free test's results intensity data)

*A self-organized critical system shows a straight line at the log-log plot as a necessary – **not sufficient** – condition (Bak 1996)



Quantifying
GI dynamic states

Nonlinear (unpredictable) system quantification analysis considering Chaos theory (Sprott 2003) and Bios Process theory (Sabelli 2005):

Deterministic means -> ORDER

Stochastic means -> DISORDER

- Deterministic developments are:
 - 1. Simple / periodic > near steady state > low energy > simple order; or
 - 2. Chaotic > far-from- equilibrium > middle energy > inner not so perceptible order; or
 - 3. Creative > far-from-equilibrium > high energy and catalysis > emergence of new order.
- Stochastic (Random) developments are:
 - 4. Stochastic > far-from-equilibrium > low, middle or higher energy > disorder.

Proposed objective criteria

for differential classification of Diversity (Order) and Disorder

- Defined dynamic signatures* = order > "diversity".
- No dynamic signature* = "disorder".

* We call dynamic signatures

- the evidence of pattern on dynamic measurements* from time-series data
(Kantz & Schreiber 2000, Sprott 2003, Sabelli 2005).
- * Main dynamic measurements are:
Phase Space Diagram;
Return Map Portrait;
Recurrence Plot (Sprott 2003, Sabelli 2005);
Isometry Diagram;
Arrangement Diagram (Sabelli 2005).

We show ample evidence of the existence of these signatures considering the families of *GV* as defined by the *SOC 6th* and the possibility of its recognition and measurement.

The research for signatures

From many-to-many -> Many-to-one:
One measurable observable

- We do not know all the variables that interfere with gender identity formation dynamics.
- In nonlinear system dynamics we may consider one measurable observable - keeping in mind the main dynamic pattern for the system will be preserved by that observable.
- That mathematical approach is possible due to the Taken's theorem - Takens (1981), Sprott(2003).
- That one observable we will define as gender identity (GI).

Simplifying variables

- We will consider gender space a discrete space (a space where we have difference equations and not differential equations).
- We need to previously eliminate genetic variables that may determine TSD-typical sexual development or ASD-atypical sexual development (intersex).
- We need to eliminate sex assignment as a variable. So we will divide gender space in two:

MtF space, for male assigned subjects.

FtM space for female assigned subjects.

Generating GI dynamic data:

Web-based Tests

MFX (for MtF's or male assigned)

FMX (for FtM's or female assigned)

- What are these tests?
- They are mainly two clusters of 100 "sexed" questions specific to different periods of a patient's life.
- Based on the patient's answers for each period of his/her life we calculate not scores (as simple psychometric tests) but time-series (as dynamic or process tests) for each scale.
- There are 4 scales:
 - Unexpected Gender scale - or the main scale - UG.
 - Typical gender variance scale-GV.
 - Sexual Orientation scale-SO.
 - Sexual Action scale-SA.

The main scale UG

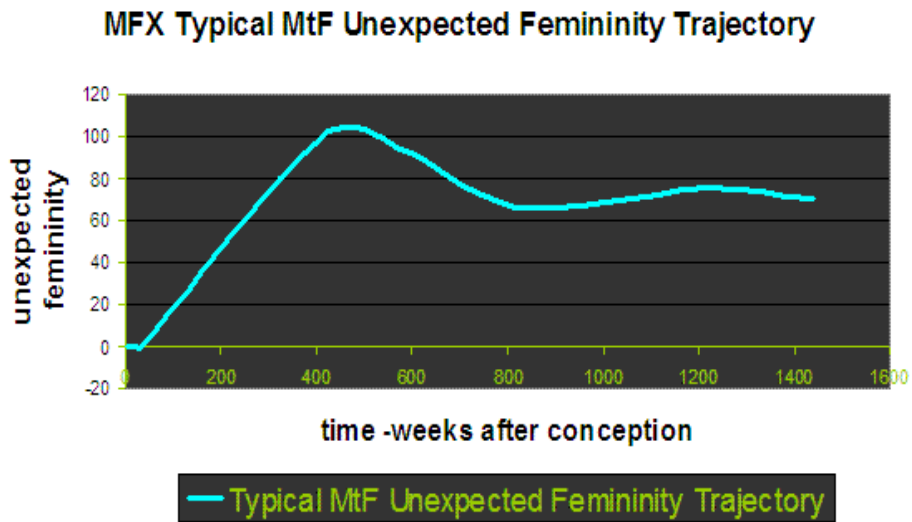
- We use that main scale for the research for signatures;

- for each patient and
- for each SOC 6th family

- For each patient we calculate a specific time-series.

- From that time-series we calculate:
 - Phase Space Diagram.
 - Return Map Portrait.

UG time-series example



First signature: phase space diagram

- Phase Space: space of positions versus gradients (velocities, momentum).
- For a dynamic system, the phase space shows the system structure as an invariant if the system is deterministic (ordered) and a scatter of points if it is stochastic (disordered).

Phase Space Variables

- We define the Y axis as unexpected GI. We label it $G(t)$, at time of life t .
- Gender Gradient = $X = \{G[t(n+1)] - G[t(n)]\} / [t(n+1) - t(n)]$

2nd Signature: Return Map Portrait

- We start from the same time-series MFX/FMX tests data.
- We map each iteration in relation to the preceding one, considering Taken's theorem to define properly the time delay embedding.

For regression analysis and curve fitting we utilize the software: * *Curve Expert 1.3* by Daniel Hyams.*

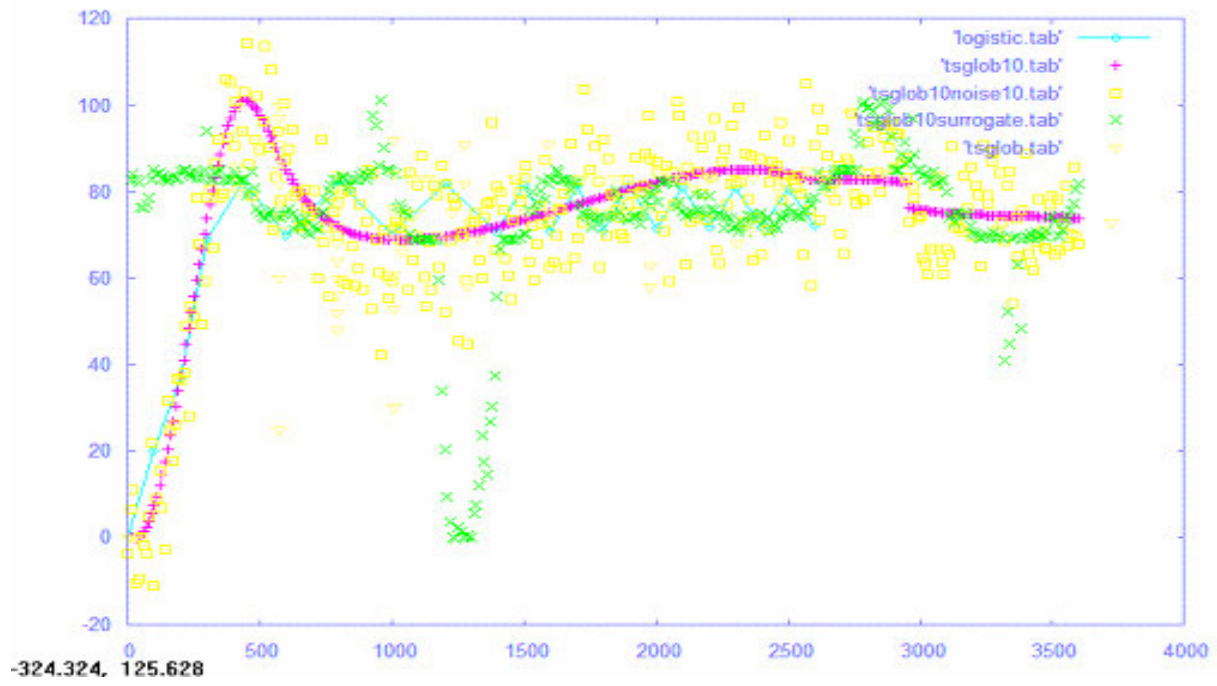
Return Map Coordinates

- $X=X(t)$
- $Y=X(t- \Delta t)$

Research for SOC 6th Families Signatures

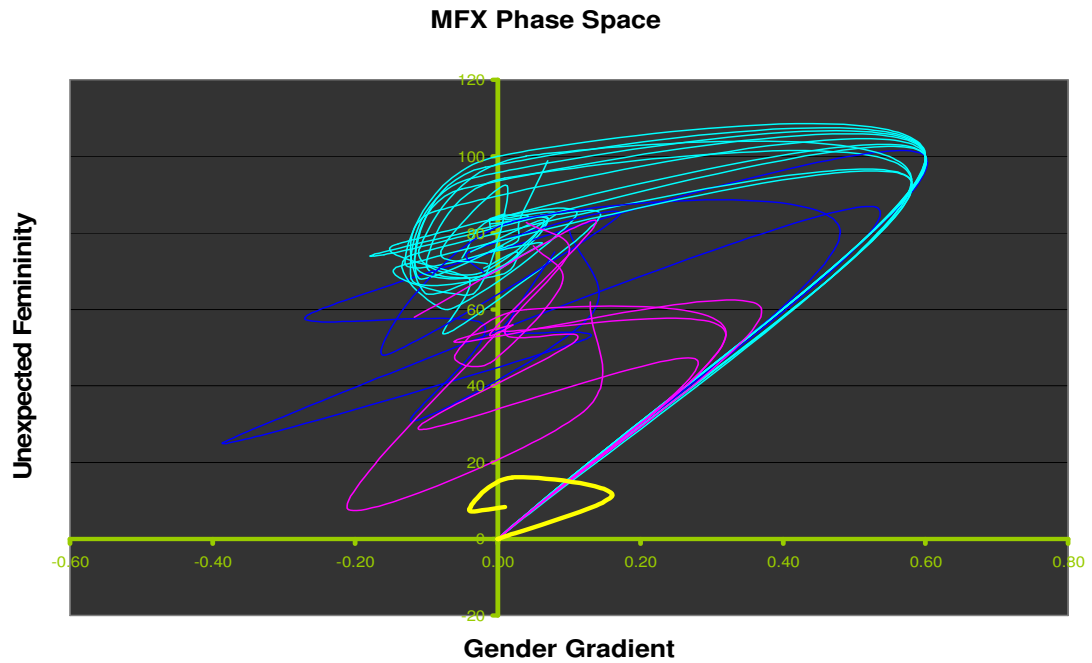
- As controls we used hundreds of results from normal people, with no gender variance, including heterosexuals & bisexuals & homosexuals and typical CD's, TS's and TG's evaluated by face-to-face conservative procedures (Brazilian patients);
- For each family we consider 3 possibilities: (1) the regression curve from experimental data; (2) added noise and (3) surrogate data* to test the significance of any possible signature.
- We label surrogate or "shuffled" data, data that have the same basic statistics as the regression curve (time-series).
- We utilize * *TISEAN 2.1 for Windows* by Rainer Hegger, Holger Kantz and Thomas Schreiber* software (with GNU plot) to perform dynamic calculations for each family analysis.

Example: TS family time-series



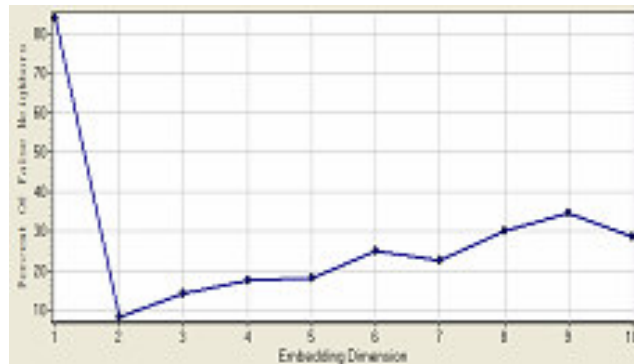
1st signature: Phase Space Diagram for Gendercare Tests

Yellow - "normals"
Light blue - "TS"
Pink - "GIDNOS"



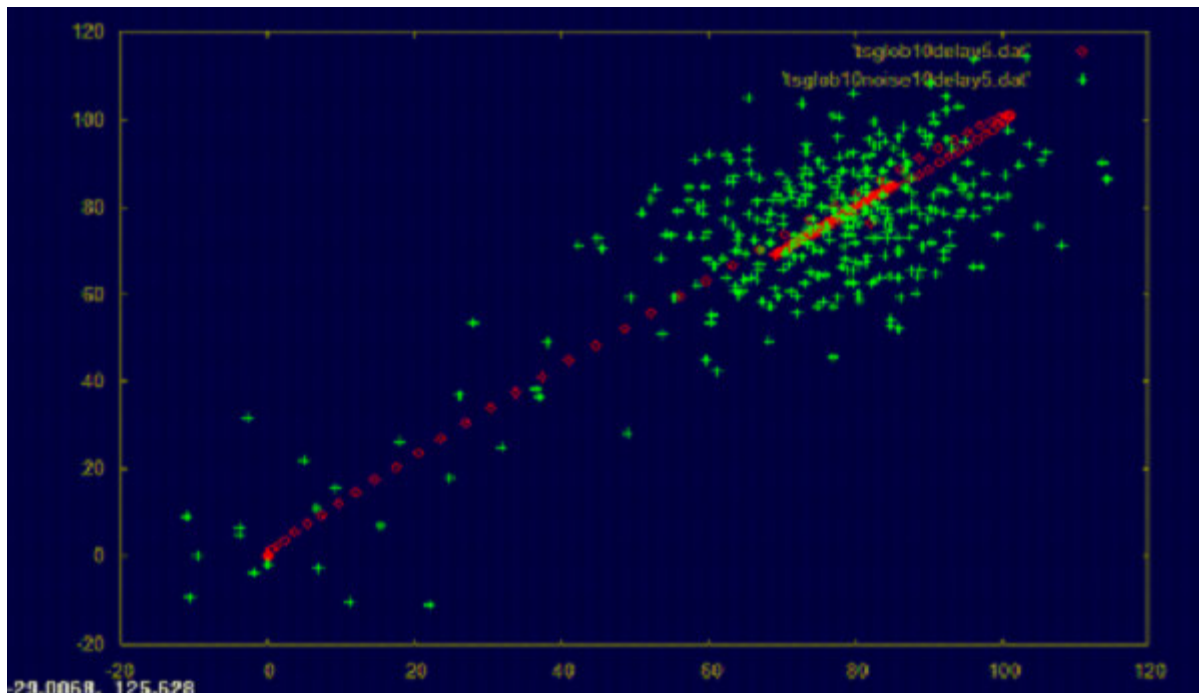
2nd. signature: Return Map for TS family Order and not disorder

Taken's theorem checking for best embedding dimension to be sure the one observable variable (GI) shows the overall system dynamics

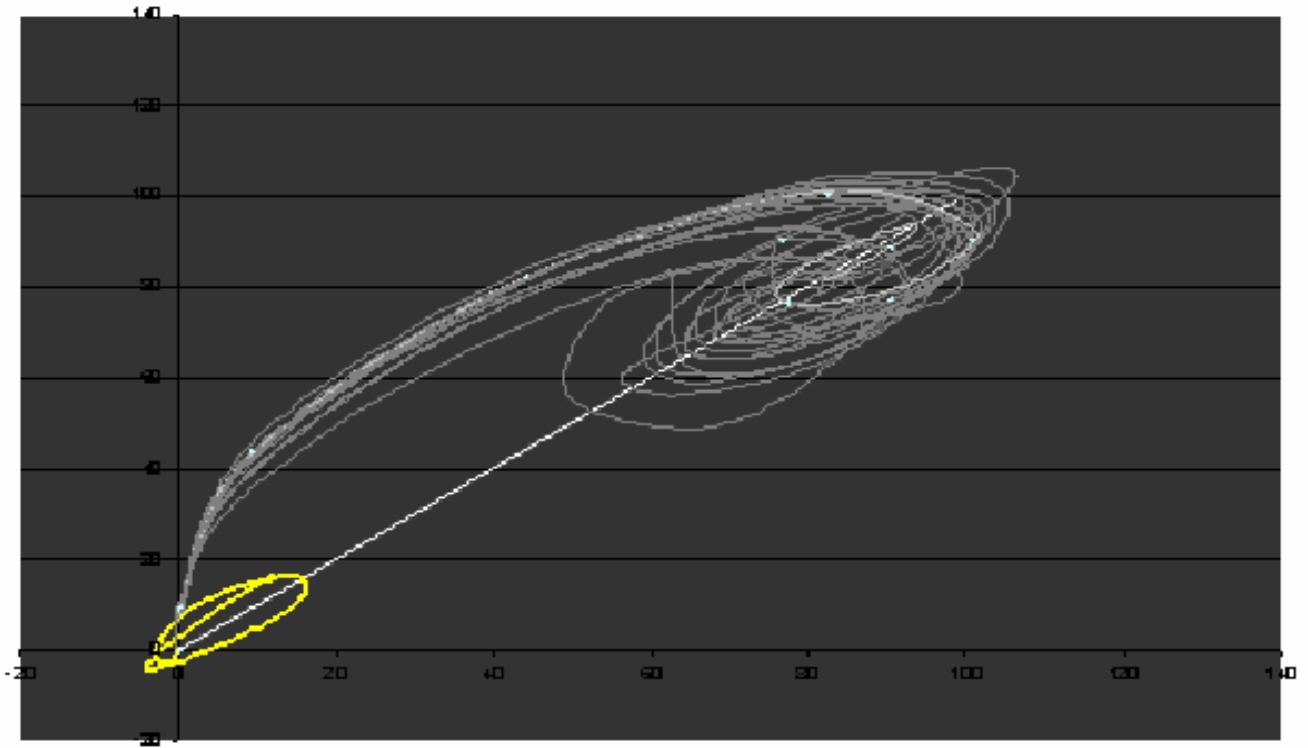


Green dots of noise meaning disorder and not order.
Compare with the red 2nd TS signature curve.

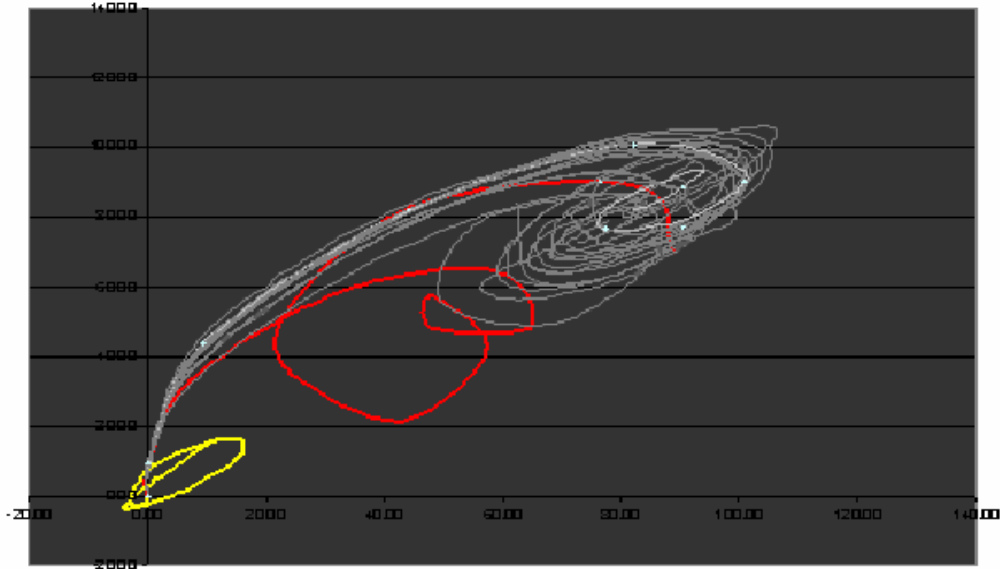
The basic statistics are the same for noise and TS data.



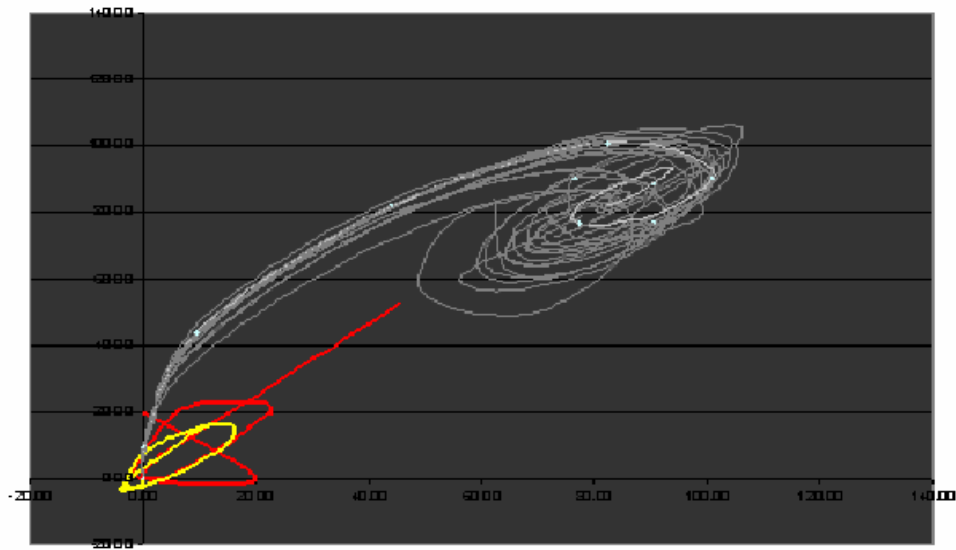
Gender identity 2nd. Signature example:
"Normal" yellow and TS gray.



Other 2nd Signatures in Gender Space

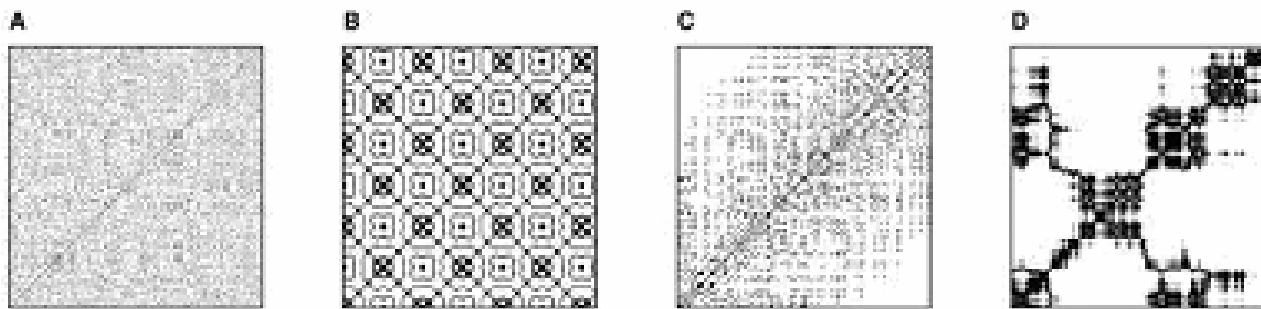


Klinefelter with IG example: ASD-atypical sex development (intersex), that feels as intergender-IG



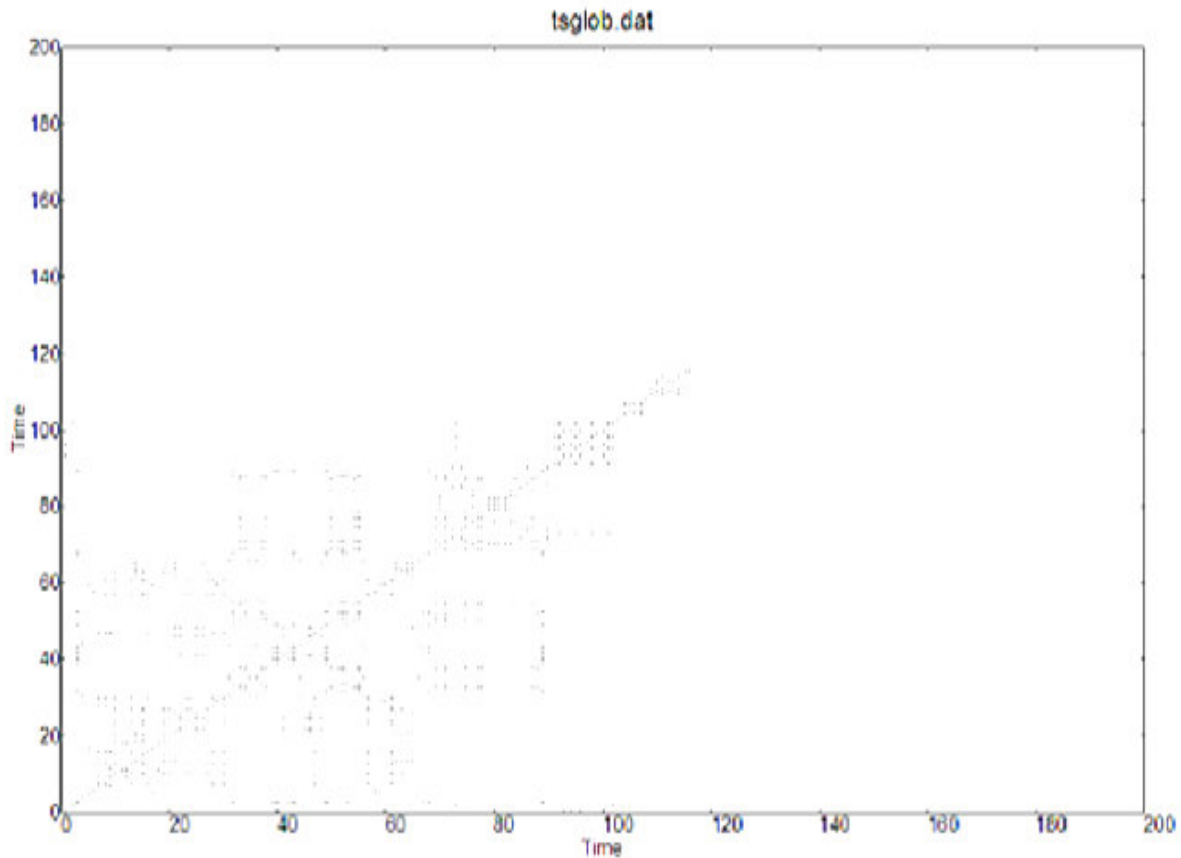
SOC 6th family testing for 3rd/4th/5th...
signatures:

Testing SOC 6th families for Recurrence Plot



- A- No 3rd signature -> Disorder/GIDNOS;
 - B- Simple 3rd signature ->-simple Order/Normal,CD;
 - C- Deterministic Chaotic 3rd signature -> transient order/TG;
 - D- Emergence of 3rd signature -> new Order/TS
- To develop the study of emergence of a new order considering the Normal, CD, TG, TS, IS, GIDNOS families we used the Bios Analyser software developed by Lazar Kovacevic, 2006
 - The next figures were developed by the Bios Analyser, taking into account typical TS family MFX and FMX data.
 - We used for RP, Bios Analyser, VRA software (Kononov 2007) as personally suggested by Kovacevic in a private communication.

The figure shows the recurrence plot for the TS family.



The plot shows inner structure and not "disorder". The structure is "biotic" (Sabelli, 2005) - the 3rd signature.

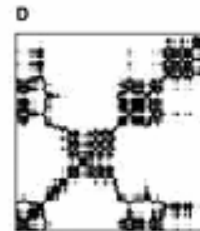
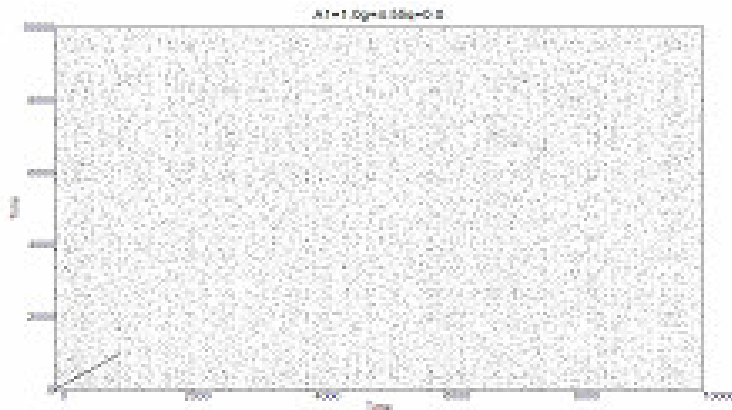
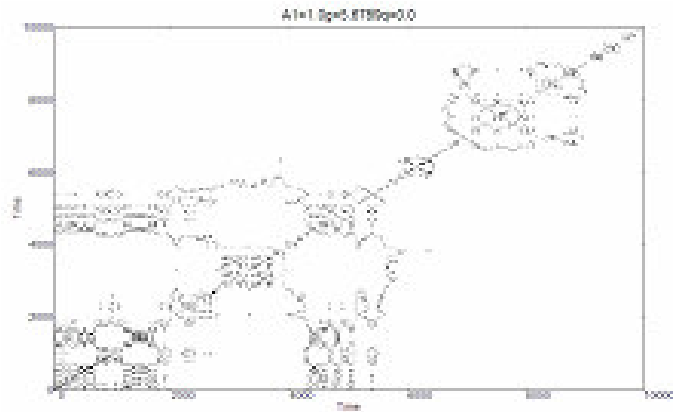
TS family recurrence plot - see the biotic pattern and order.

Upper : Bios $g=5.6789$ - also a biotic structure and order.

Lower : Bios $g=4.55$ - almost no order but disorder.

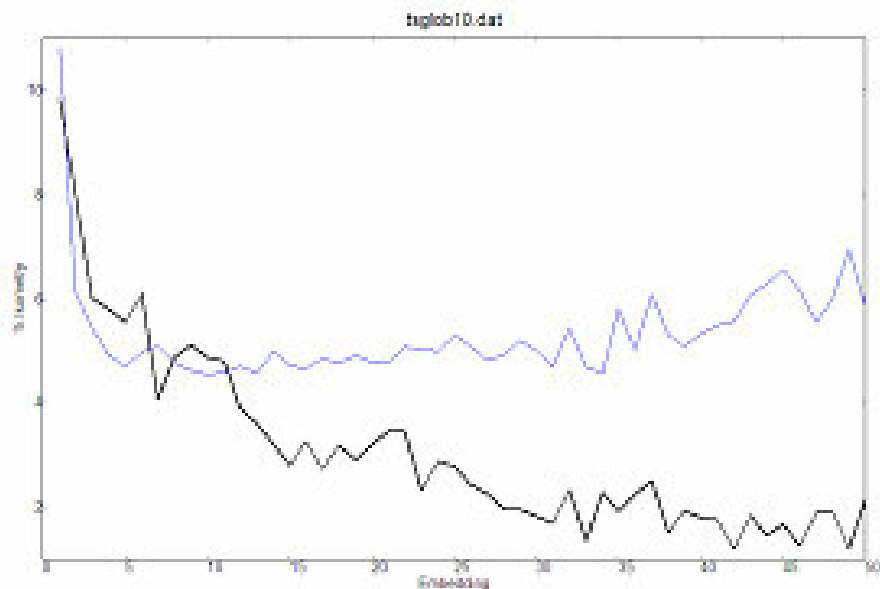
Compare with the 4 typical 3rd signatures below...

The TS family clearly shows the emergence of BIOTIC order and not disorder.

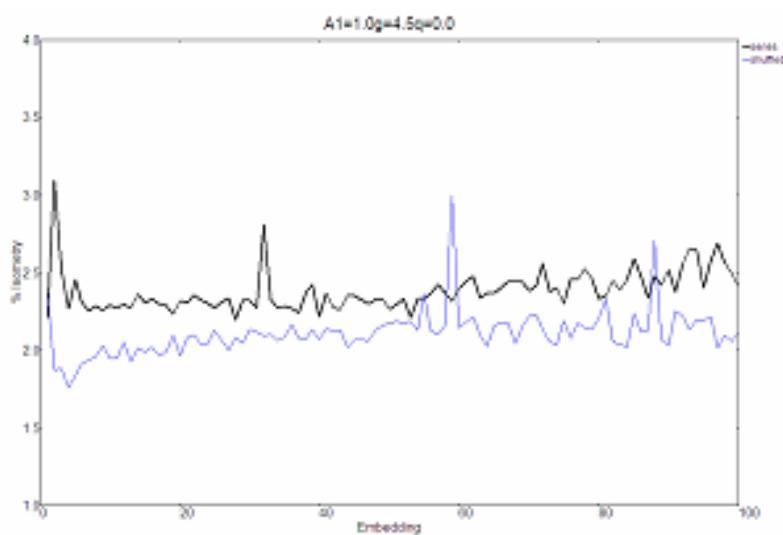


Isometry Diagram: a possible 4th signature

TS family: Blue indicates shuffled data and black the main data.

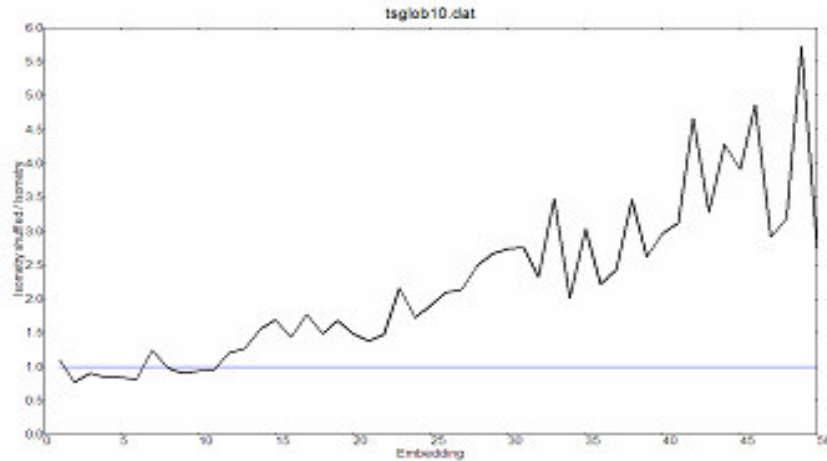


Stochastic isometry - no signature - only isometry

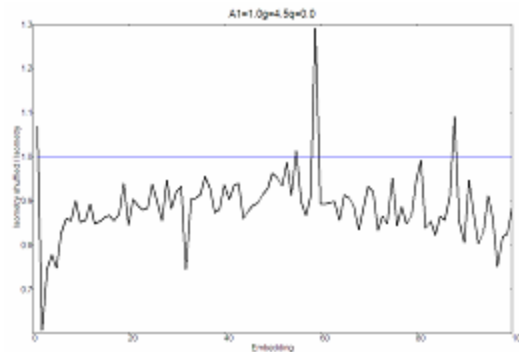


Arrangement - a possible 5th signature

TS Arrangement data (left) has a defined emergence pattern; the blue means no emergence and the black line shows the evolution of novelty .



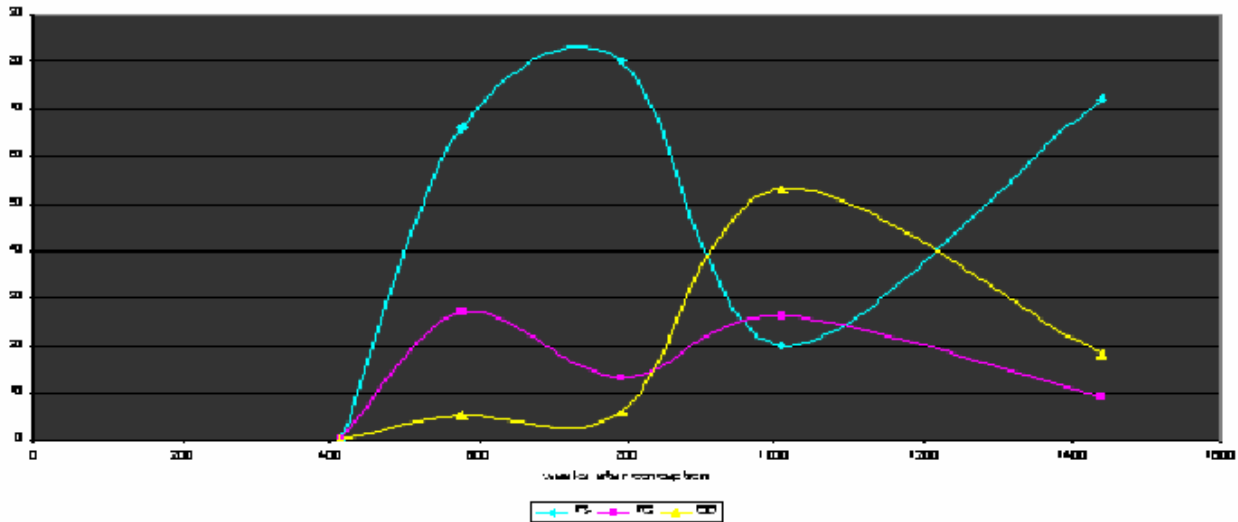
Stochastic lack of arrangement signature.(Sabelli 2005)



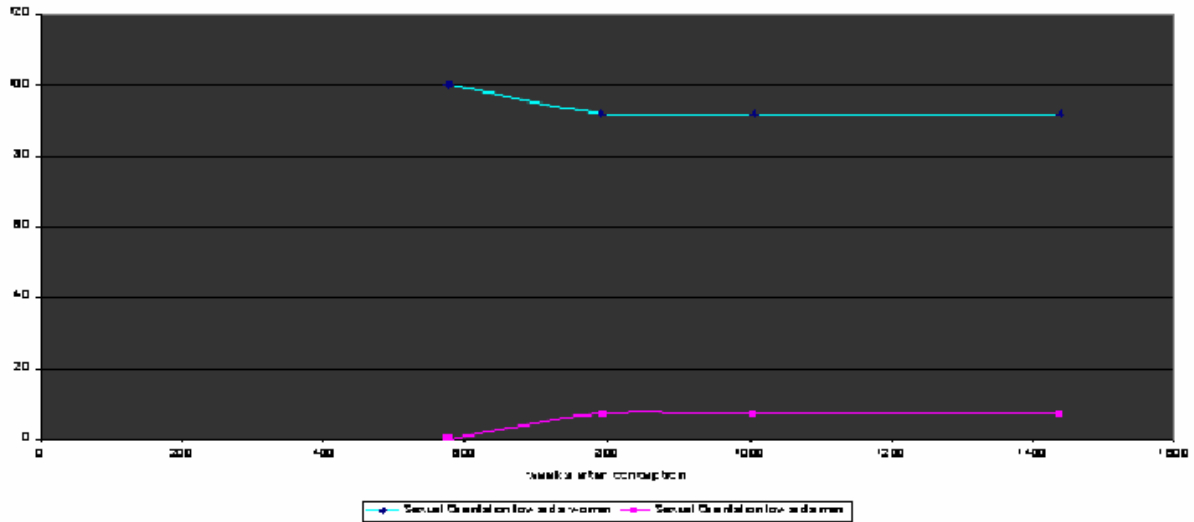
Other MFX and FMX unexpected gender test scales

GV Scale

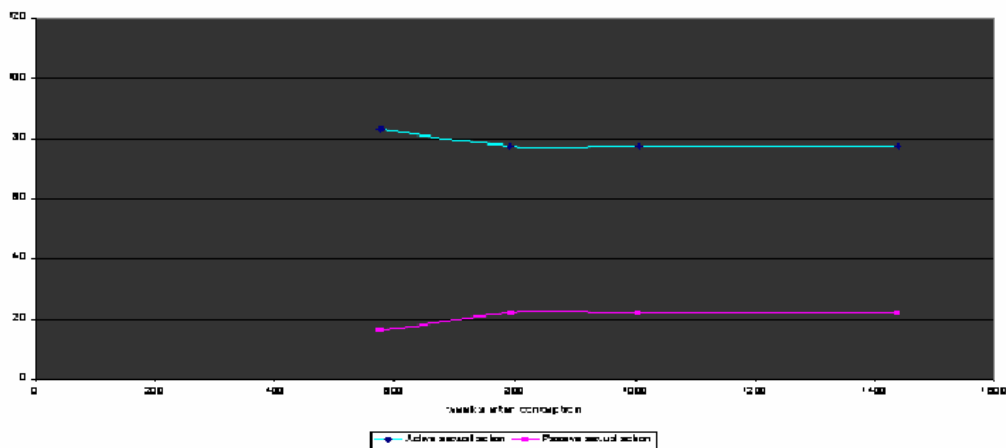
It is important to understand that this score is applied on top of the Unexpected Gender score. So if the UG score is very low, the GV score may be high but the overall score will be very low.



Sexual Orientation Scale



Sexual Action Scale



Complete Gendercare GV web-evaluation includes:

- Anamnesis*;
- MFX or FMX online tests looking for signatures.
- MMPI psychiatric screening looking for possible real mental problems.

* When we research typical or atypical sexual development (intersex) and the gender half-space MtF or FtM - and also all the patient's life through it's own words.

Conclusions

- Gender identity, with typical or atypical sexual development, is something "a priori" unpredictable (may have different probabilities for different states);
- Gender identity is the result of a complex dynamic development due to known and unknown factors; any essay to consider simple linear cause-effect relations is sterile and biased.
- GI incidence x intensity data shows a fractal $1/f$ power behavior - what is a strong evidence that GI naturally develops a diversity of possible states with fractal distribution of probabilities - showing self-similarity and complexity - that probably is derived from self-organized criticality (Bak 1996; Conway 2002).
- No GI formation etiology theory is necessary "a priori".
- We may quantify that complex system by one observable considering Taken's theorem in discrete space (many-to-one).
- We developed online tests (Gendercare MFX and FMX tests) to take experimental time-series data from each patient.
- We used these experimental data to evaluate each SOC 6th family looking for dynamic signatures.

- We discovered significant signatures and order for most SOC 6th families.
- We classify some patients as *GIDNOS*, when we could not discover order and/or when we perceive through the MMPI real signs of mental problems that could threaten health or life.

SOC 6th families

- Transsexual (F.64.0 & F.64.2 ICD-10th) family - shows a biotic pattern as defined by Sabelli (2005).
- Crossdressers-CD (F.64.1) family - shows pulsations/oscillations (simple and periodic pattern).
- "Transgenders"-TG (nowadays classified as F.64.8) family - shows a chaotic and deterministic pattern.
- Intergender-IG (F.64.8) families are complex and associated to intersex; may show a chaotic pattern.
- GIDNOS (F.64.8) families are stochastic, very disturbed by noise and may be considered a "disorder" that may need face-to-face psychotherapy, mainly when life or mental health may be threatened.
- "Normals" are simple.

Objective Instruments for GV Measurement

WEB-based: The best option

- Computers and the web are the best medium to develop and use dynamic methods (Wolfram 2002).
- Web-based services to objectively evaluate signatures are the most appropriate and fast, easy, cheap and ethical solution, and must be considered as a good - if not the best method.
- We hope it will be properly considered in SOC 7th.
- Through the web we may reach almost all countries, cultures and world regions with objective instruments for GV measurement.
- Surely our tests are a good way to assist face-to-face local practitioners, giving them an objective criteria for making a decision about each patient.

We believe we have shown you enough evidence of the scientific and mathematical background of our ideas and methods, after 6 years and near half a thousand evaluated patients.

We never tried any "fake and not ethical psychiatry through the web" as some mistakenly thought.

What we developed - and is absolutely new - was the knowledge about GI which dynamic signatures and diversity or disorder we may recognize and objectively measure through the Web.

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-
- . **All figures from Tisean & GNU plot, Bios Analyzer software and VRA software, CRP software; also from Gendercare reports; from Gendercare web-pages; from Sabelli et al papers, from Sprott papers and from Per Bak papers.**

- . I would like to thank all Gendercare clients;
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- . OII board members;
- . Also Sonia John and Milla Hurn for their help with the English edition;* all English mistakes are mine - not theirs!!!
- . We have a lot of work to do to continue developing objective methods to help GV people - adults, children and youths*.
- . **All sponsorship/partnership is VERY WELCOME.**
- . **Gendercare.com**
- . Be in touch through our contact page please!
- . * We have a special GAME-TEST project for children and youths, based on private choices to EARLY RESEARCH their GI formation dynamics! Your help to develop it is also welcome!

Thank You