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GUTS IN THE EDGE OF WEALTH

An inquiry to human creativeness

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ABSTRACT

Creativeness has been a hot topic of human intelligence system underlying innovations, discoveries, and many novelties brought to the enrichment of human civilization. Unfortunately, present cognitive theories relatively separated from speculative philosophical debates only to show the very slowly development, to give a picture about how creativeness works. Here we present some synthesis between neurological reentrance system, infant evolutionary psychology, and modified socio-psychological theories to construct a new view of creativeness apart from main discussion on cognitive science that so far is still much centered on the problem of consciousness. We present a random graphical model to construct what we call 'space of creativeness' as a bridge between micro and macro-view of human cognitive system. Furthermore, as a part of our main concern, our space of creativeness will be useful to explore the nature of the interconnectedness between human creativeness and her economic potentiality, along with its phase transitions throughout population.

Keywords: creativeness, wealth, random graph, self-discrepancy theory, evolutionary psychology, reentrant neurology

Always allow ourselves and our colleagues to be crazy enough!
The World will tell us if we are right or wrong.
Stuart Kauffman, *At home in the universe*.

1. INTRODUCTION

Cognitive science has been far away focusing on the structure and emergence of consciousness down from neuronal stance, or constructing higher level of descriptions based on linguistics that makes the meaning possible of to emerge. On the other hand, the

explanatory power of cognitive theories concerning the form of interrelationship between individuals or generally, each of their sorts of conscious interaction with environment consists of socially or naturally structured field is at least very inadequate. General outlook examining the interaction of individuals with the environment has for a long time been taken over by higher level of description of human dynamics along with an explicit notion of limitation, primarily because of the all-too-simplistic generalization of human unique properties.

On the other hand, a bridge between individual and social level of human dynamics must come to an urge whenever the specific properties of mere individual or social dynamics do not represent certain conditions in which the role of perceptive and adaptive action directly manifests[1]. Such manifestation gains its stance as a conscious individual embodied within particular robust structure of creativeness. Such creativeness as a dynamic building of human consciousness is essential for human to interact with social construction or simply to solve adaptive problems.

Ironically, the earlier theories of such bridge represent an explicit avoidance of too straightforward reduction; therefore it gains no explanatory power of the dynamics. The rest lies on the enigmatic imaginary field of personality and falls down into mere speculations.

What we are about to construct deals much with the dynamics of human creativeness closely related to specific social structures. The specificity declares a notion of the impossibility to completely map or formalize every single mode of interaction between individual and its environment, social or natural. The dynamics reckons much the development of personality as an adaptive system. In sum, the dynamics mentioned here is constructed based on the relationship between individual's social, or more specifically, economic circumstances, therefore, the problematic bridge between such micro and macrostructure is resolved up to certain limits, to the problem of creativeness.

2. EVOLUTIONARY BIOLOGICAL AND NEUROLOGICAL PERSPECTIVE

Archaeological evidence shows that human as a perpetually-evolving species started to enjoy a 'creative explosion' only 40.000 years ago, very much late than its first appearance in South Africa some 60.000 years earlier (Stringer *et. al*, 1993).

Many scenarios has been put forward to explain such explosion that permanently enhanced the evolutionary performance of the human and human mind, namely the idea of mental-model (Harris, 2000) or the emergence of creativity through sexual selection (Miller, 2000). It is counterfactual to note that in many ways, we still behave like chimps or any other primates that share common ancestors with us, or on the contrary, that chimps can do physics or drive cars or other non-adaptive actions. Human discovered language and finally, abstract thinking, giving a notion that the idea that human cultural achievements are just the by-products of evolutionary processes.

But as Carruthers argues, comparative biology still shows a cognitive mechanism generally found in all young mammalian species: *pretend play* (Carruthers, 2002). In human species, this mechanism starts from the age of eighteen months of all normal babies in the world. They pretend to be engaging in a wide variety of adult or fictional activities.

Carruthers later argues that its function is to practice for the sorts of imaginative thinking which will later manifest themselves in the creative activities of adults. This seems to be closely related to creativeness as both involve imagination. This straightforward relation gains two primary objection.

First, pretending can take human out of the real world and make human falls down to fantasy, and Carruthers answers with an example saying that even a primitive prehistorical hunter would still need speculative hypotheses to find the right way to track his wounded animal,

[1] On the macro-micro linkage look Coleman (1990).

indicating that such creative 'fantasies' are valuable to reveal the unseen causes of events. *Second*, why is playing (involving overt movements) directly associated with imagining? Carruthers argues that this play activity would almost certainly have existed in evolutionary repertoire of human infants and all other babies of mammals, and moreover, the combination of play and pretence will give the infants a significant development to their various sorts of physical skills, such as building alliances and sharpening social skills generally.

Carruthers arguments can lead to many psychological and philosophical objections, but evolutionary biological and neurological perspective will give accordance through different level of descriptions.

Biologically, human is still entrapped in the same cranium containing the same circuitry our hunter-gatherer ancestors ever used, later giving a notion that our ability to solve more complicated problems like learning math, writing songs and skateboarding are only by-products or side-effects of neural activities to solve adaptive problems (Cosmides *et. al.*, 1997). In other words, babies of all mammals really have the same activities of play and pretence, therefore this evolutionary approach gains its comparative evidence to other species, and creativeness is inherently embodied in evolutionary processes of mammals. Discovery of language gave human a creative departure from its 'normal' evolutionary path as compared to any other primates.

Neurologically, the play and pretence of eighteen-month-old babies will start a series of automatic performance. Using EEG test, Edelman and Tononi shows that activity of specific cortical regions is closely tied to specific 'aspects' of consciousness (Edelman *et. al.*, 2000). When we first learn a new skill such as Carruthers' sorts of physical skills, we need consciously to control everything we do. But after some time our performance becomes automatic and soon fade from consciousness, just like when we do not have to think once we master the way to play piano or to ride a bike. Later we suggest the act of playing and pretending is the sort of learning new things itself that enhancing the function of specific cortical regions associated to certain aspects of consciousness. It will go on throughout human lifetime.

Generally speaking, as Carruthers argues, childhood pretend play and adult creative thinking and problem-solving share the same cognitive basis, that is generating initial supposition and thinking or reasoning within its scope. And since it shares the same basis, the pretence play is best seen as practice for adult creative thinking. Therefore, a theoretical basis of creativeness is constructed without explicitly elaborating its coherence with the entire concepts of consciousness and thinking.

3. SELF-IDENTITY AND SELF-DISCREPANCY

After describing cognitive theoretical building blocks of creativeness commonly regarded as an integrated part of personality (Dimitrov, 2003), then we turn to the next elaboration reckoning its interdependence with environment. Here we only attempt to relate Carruthers' concept of creativeness to economic structure in social system. Unlike any agent-based approach, our theoretical standpoint will not move to the dynamics of population. Rather, we try to build a bridge between the rise and fall of the growth of individual creativeness interdependently embedded in economic circumstances of a person.

Earlier socio-psychological theories of development of creativeness gives a lot of emphasis on the selfness as an adaptive system along with the feedback loop between the self and the other, the 'I' and the 'me' following the tradition of symbolic interactionism, or the private and the social of Higgins' self-discrepancy theory that we will explain and modify later; and in consequence, the feedback allows the creativeness to manifest. On the contrary, the basic assumptions were left in messiness and boundlessness, therefore a formal description is hardly possible.

The moderate standpoint concerning such complexity and such messiness lies on the specific approach to particular aspect of human creativeness as we will describe in our model.

This standpoint will not bring a complete picture of human creativeness as usually found in intelligent-measure, psychodynamic, or behavioral approach. Rather, it will lead to certain aspect of human properties: guts, or as we define courage to stand against the persistent modern division of labor. The Durkheimian point of view here refers to the external social structure, the other side of human adaptive system on which our bridge between cognitive processes and economic structure is about to build.

It is intuitively sound to view the modern division of labor in society as the prominent structure in determining human modern life-style. This division of labor as officially institutionalized in modern economic organization will in turn give the shape of human creativeness as economic potentiality. *No one will be able to speak of achievement out of economic accounts that are explicitly codified in the terms prosperity, wealth, or simply money*. Who you are is highly related to what economic status you are tied into.

The question thus comes to the mode of perception and mental action taken by individuals. Here we refer to Higgins' self-discrepancy theory (Higgins, 1985). The theory, as commonly found in most of socio-psychological elaborations, tend to dive into *deep* structure of human emotions or motivations, but in a great lack of *narrow* structure that gives much consideration on social properties. Higgins' self-discrepancy only gives a flash on human emotions whenever inappropriate social circumstances suppress. A multi-faceted self prevails. Later Higgins indicates a great resonance between his theory and corresponding theories of neuroscience, cybernetics and Gestalt psychology.

Table 1

The Self-Discrepancy Theory: The compartmentalization of self in six self-states

		Standpoints on the self	
		Private	**Social**
Domains of the self	**Actual**	Actual/Own	Actual/Other
	Ideal	Ideal/Own	Ideal/Other
	Ought	Ought/Own	Ought/Other

Table 1 shows the compartmentalization of the self into six states. The actual is an actual situation a person must deal with and change if possible and necessary. The change is directed toward the ideal, but there is *the ought indicating the existence of obligations to accomplish rather than keep pursuing the ideal*.

Higgins proposes that a discomfort will appear anytime an inconsistency occurs among the states, e.g.: ought/own vs actual/own that further will lead to particular kind of emotional discomfort, such as readiness for self-punishments concerning motivational significance, and guilt, self-contempt, or uneasiness concerning the emotional state. The intensity of the discomfort was expected to increase with the magnitude of the inconsistency.

On the contrary, what was drawn by Higgins as discomfort or an indication of the degree of discrepancy of the self to support a self-identity with each its own motivational implications is what we define as guts. In turn, we will build a model exploring the interrelations between guts and wealth, guts and creativeness, and wealth and creativeness. We find a proper modification of Higgins' compartmentalization as a candidate of appropriate bridge: it seeks the deep structure while keeping the relationship with motivational significance that is highly related to professional choices or the modern division of labor itself.

3. GUTS AND WEALTH

Here we strictly define *guts as the courage to take a stand against the normal pathways previously determined by wealth, while wealth represents the economic potentiality as determined by the logic of the modern division of labor*. Such economic potentiality grasps any initial potentiality possessed by the individual such as skill-enhancement of many kinds of expertise including foreign language, artistic-aesthetic skills, accommodation of creative hobbies like writing or acting skills; earlier access to the internet and any other sources of

knowledge that seems to be significant problem and many parts of the world; and most of all, the shape of education system and educational cost that is oftenly regarded as the preparation for every student to enter the professional life. If we put it all together, then Carruthers' initial supposition is able to gain wider domain.

Up to this point, we assume a specific interdependence between economic potentiality and the potential creativeness of each individual. Economic potentiality or simply we call *wealth in our context for brevity, gives the width or abundance of a space we call the space of creativeness.* The wealthier a person since the earlier part of his life – quite possibly even since the first eighteen months of a person's life, the more able the person to enhance its field of creativeness. But certainly not on the contrary, the poorer a person does not mean the less able the person to be creative.

To avoid the idea of the space of creativeness to fall down into deeper structure such as intelligence or cultural intrusion instead of simply Carruthers' evolutionary play and pretence creativeness, we will limit the model up to the probability of the prevalence of maximum creativeness as a function of wealth.

Rather than constructing a creative dynamics of human of all ages, we specifically limit the class of ages from babies to pre-professional ages. Wider class of ages will certainly be out of our interest here since the model is designed to depict the emergent structure of professional choices that are more difficult for professionals or people with established occupations to readjust or convert.

On the other hand, our model will completely cut off the social part of Higgins' compartmentalization because we will only deal with individual perception of its environment that gives a ground to grow creativeness. The only parts remain are ideal, ought and actual which we will treat using random graph as follows:

- *actual*, the present economic potentiality governing the construction of ideal space of creativeness and its ought space to be fulfilled. This state consists of economic potential set $w \in W$ = (0,1), $w \rightarrow 0$ represents totally poor and $w \rightarrow 1$ represents totally wealthy. As we will show later in the graph of space of creativeness, the value of *e* determines the probability of a vertex *p* to appear. The nodes represents all kinds of creativeness possible, while the vertex represents the association between nodes or kinds of creativeness that must be put together to gain cortical system.
- *ideal*, the maximum degree of creativeness one can possibly reach and enhance, determined by her economic potentiality, e.g.: being a successful actress for a rich girl or being a successful secretary for a poor girl; this belongs to maximum creativeness set $A = \{a_1, a_2, ..., a_m\}$, represents graph's average path-length *L*.
- *ought*, the permitted degree of creativeness that reflects the chosen pathway of economic fulfillment despite her maximum creativeness, e.g.: being a successful directress for a rich girl or being a successful housewife for a poor girl; this set belongs to permitted creativeness set $B = \{a_1, a_2, \ldots, a_n\}$. This can be generated by randomly removing nodes or vertices using certain probability *q* or removing them with certain choosing procedure.
- *creativeness*, given *A* and *B*, defined as $d = m - n$, where $m = n$ since $B \subseteq A$, indicating that maximum creativeness is always exceeding permitted creativeness because of a simple logic: a person can be something if she already knows what the thing really is.

We will construct this space of creativeness model using random graph as a preliminary approach although evolutionary graph such as networks with preferential attachment or decaying networks seem to be more appropriate candidates for our model. This model will much consider the vertex to appear between two or more nodes and represent the path-length of guts (rich girl: a directress – a journalist – a singer – a model – an actress; poor girl: a secretary – a housewife).

According to Edelman's neurological description, we propose that the more possible two links connected than to any other nodes, the more possible these two nodes being represented in the same region of cortical systems or the more closely-related these nodes as automatic performances (singing and modeling rather than directing company and acting). According to

Carruthers' evolutionary description, the longer the path-length of one's creativeness, the more creative or fast-learning she is because of her ability to incorporate many subjects of creativeness at the same time, involving both play (overt movement) and pretence (fantasizing).

Up to this point we are not yet attempting to construct a classifying system to find the general rule to judge which node is more probable to be connected to one node after the other, regardless the fact that Carruthers has given us the main principle to build such system. We leave this classifying problem as a further works. We also have not reached the maximum value of *m* that is certainly must be limited for the reason that our brains can be the jacks-of-all-trades but masters of none.

Before we simulate the model, notice that this space of creativeness model is built upon a limited social environment, the economic potentiality. Despite its limitedness, this model can be a gateway to comprehend more relevant and widely-related creativeness problems, such as the design of educational system or labor force of a population.

5. THE CREATIVITY AS A RELATIONAL GRAPH

As described above, we can see the difficulties on seeing the creativity as connected to economic system perceived, and how someone choose not to follow the standard social system as the impact of the modern division of labor among the society. In order to overcome the difficulties, we can consider the creativity to be representable as a relational graph[2]. Thus, there is a set of creativity actions $(d \in \Delta)$ which are scaled based upon the characters of the impact of the actions regarding the economic system surrounding individual. Every $d_i \in \Delta$ is compared to each other on the distance of the pre-described scale. Therefore, we will have the web of creativity (d) consists of *k* creativity items constituting the nodes in a two dimensional plane while the distance is measured solely in terms of connections or links between the nodes (Figure 1).

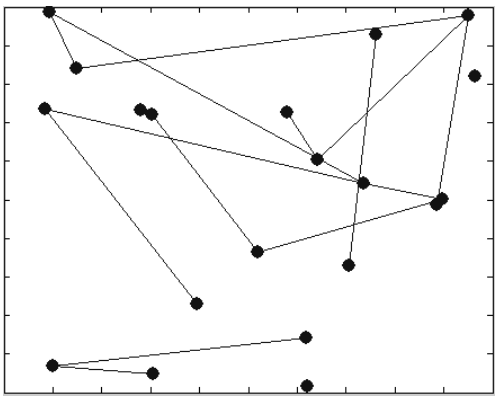

Figure 1

The web of creativity: every node is representing given creative actions placed in the 2-D plane based on the distance with each of other node. The connection represents the taken actions depends upon the external system of the individual.

The web of creativity is assumed to have many nodes with sparse connections, but not so sparse that the graph reflects bad web of creativity of becoming disconnected. As we know the graph is connected if there is a path joining every pair of distinct nodes in the graph.

[2] We can say that relational graphs have defining property that the rules governing their construction do not depend upon any external metric of distance between vertices since the vertices of relational graphs are labeled and ordered according to some kind of geometry (e.g. ring). It is important to note that the distance between the vertices is measured solely in terms of the graph itself, and not in terms of any externally defined space.

Consider any sequence $x_1,\ldots,x_{n+1}$ of vertices. A path G is the sequence of edges $e_1,\ldots,e_n$ such that the endpoints of edge e_i are x_i and x_{i+1} for $i=1,2,3,\ldots n$.

We will see only one that will be of our particular interest, i.e.: the characteristic path length $L(n,k)$, representing how the creativity and the active property (wealth) of someone shaping her gut on standing before the standard and normal way of living pre-described by the perceiving modern socio-economic living.
Technically, we can say that L is defined as the shortest path $d(i,j)$ between two nodes, averaged over all $\binom{n}{2}$ pair of vertices and is best computed numerically for a known graph.

In the standard model of graph theory modeling social network (Watts, 2003, Kleinberg, 1999), the neighborhood is often representing the clustering coefficient $C(n,k)$. This coefficient somehow characterizes the extent to which vertices adjacent to any other vertex are adjacent to one another. For example, a vertex a has k neighbors (in this case the pre-scaled creativity item adjacent with); then at most $\frac{k(k-1)}{2}$ edges can exist between them (if all neighbors of a is connected to a).

While L is the average of the path length connecting two creativity items, C measures the throng of the scaled creativity items. Henceforth, we can say that L is the global property of our graph and C is the local property pre-described in our web of creativity: C becomes one important aspect of someone's utility function on taking an action while L representing her guts on taking an actions amongst her web of creativity. In other words, we will use the parameter L as the parameter of someone's guts. High value of C indicates highest potentiality to be creative for a single person because of her capacities to incorporate many different field of creativeness at the same time, without our intention to refer directly to human cortical system. On the other hand, L much indirectly represents space of creativeness as a result of adaptive behavior to social environment.

6. BEYOND CREATIVE: FROM POOR TO WEALTHY

We will examine two extreme situations on seeing someone's guts beyond her conditions of perceiving the economic system around her. A situation of extremely poor will impact on the low probability $(p \approx 0)$ of connecting any creative ideas in someone's mind. While she can get the ability on mapping any creative ideas to face the world, she is unable to find herself inter-connecting the ideas. In the other hand, the wealthy will find facilities and abundant possibilities $(p \approx 1)$ on interconnecting any ideas and it will remain his ability (intelligently) to manage the creativity.

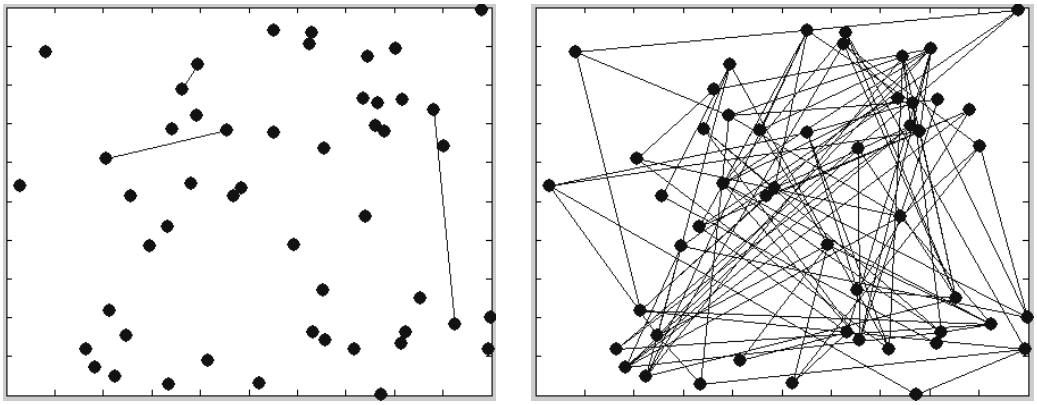

Figure 2
Example of our random network model on the web of creativity. The left shows the first extreme conditions on there are almost no connectivity on each node. The right shows the topology after the updating of the plane as the other extreme conditions..

We use the random network model to analyze the web of creativity. By the two extreme conditions above, it is obvious that the low probability of the connecting nodes is externally driven by the economic system, forcing individual generally not to improve her creativity but to follow the "straight" road to the predictable idealization of living. This is contrast to the connected nodes of creativity showing how the individuals have more than enough facilities (and wealth) for incorporating her mindful and highest idealizations. An example of our experiment result is described in figure 2.

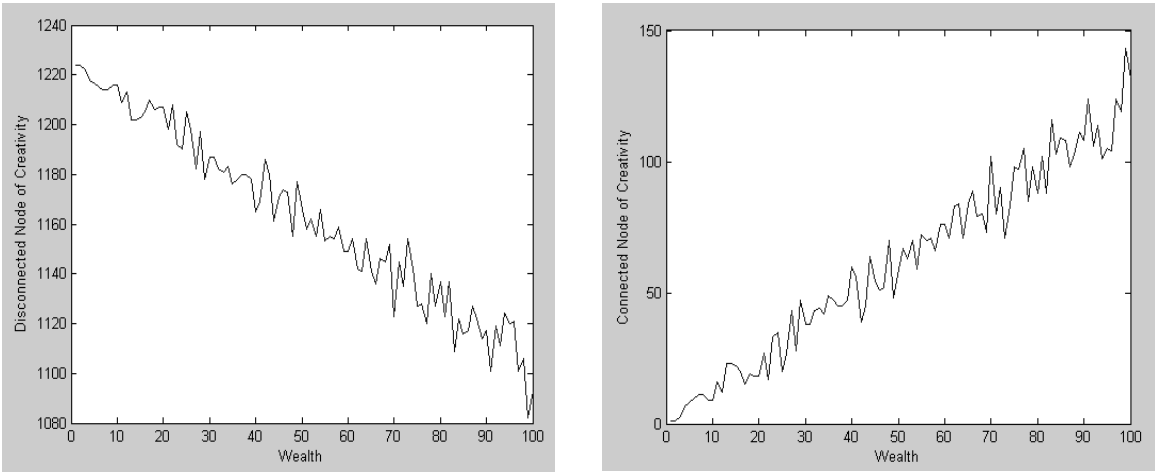

Figure 3
The decrease of the disconnecting nodes and the hike of connecting ones as a function of wealth described as the wider facilities on connecting every node of creativity.

From the computational experiments, we can see that there has been a kind of transition from the poorly-connected web of creativity to the fully-connected one. As the probability of the incoming new graph rises among the nodes, the disconnected nodes decrease drastically contrast with the hiking of the connected creativity. As described before, the connecting nodes reflect the bigger possibility of implementing the creativity concerning the good facilities of the individuals.

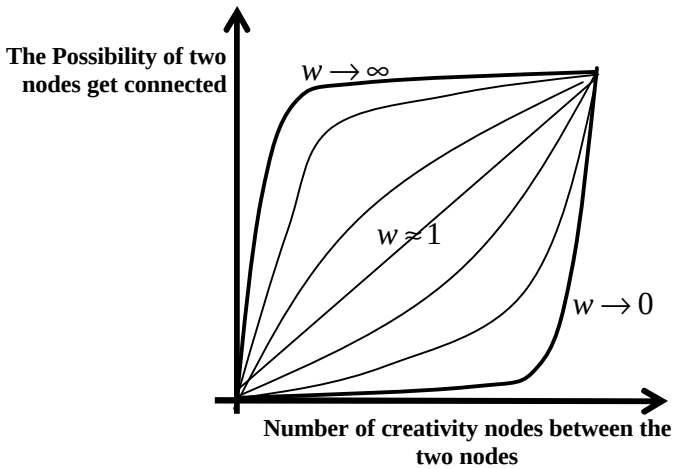

Figure 4
The two extreme conditions of the poor and the rich concerning the creative self-improvisation and the utilization of the structural cognition. The first extreme condition reflects the highest possibility of the utilization and the other reflects the abundance of the possible nodes but not to be implemented of the pressure of the socio-economical conditions.

Hence, there is a transition between the poor and the rich. But where is the guts laid maximally?

The phase transition however occurs on the evolutionary hike of the wealth as the significant externalities on self-improving creativity. Figure 4 shows the easier look on the transitions. When the guts are represented on the way in figure 4, then we can give our analysis on our search of one's guts as the main drive behind the change of her economic environment through the idealization based on what she perceives and reflects within the space of creativeness.

7. GUTS IN THE EDGE OF CHAOS: BETWEEN POOR AND WEALTHY

In our model, gut is defined as the average path length *L* interconnecting the node of creativity. The important question for our model is how someone's gut is correlating the wealth she possessed. Is the wealthiest will have the biggest gut and the poor gets the smallest? Interestingly, in our computer experiments we found that guts maximizing somewhere between the biggest wealth possession and the smallest. We can see this in figure 5.

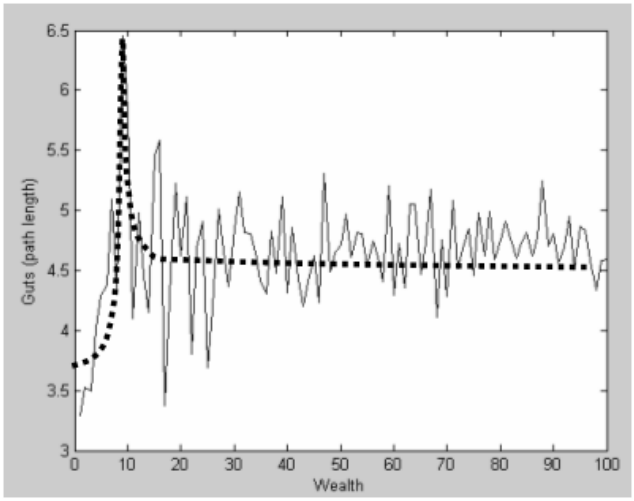

Figure 5
The repeatedly simulations show the pattern of the maximization of the Guts (path length) somewhere between the $w \to 0$ and $w \to \infty$.

Certainly, this fact reminds us to the very well-known plots of the phase transition stimulated as important background of the complexity studies. This kind of phase transition has been studied very carefully in many phenomena, i.e.: the cellular automata (Mitchell, et.al., 1993, Li, et.al., 1990), the social network in searching a scientific explanation on small world phenomena (Watts, 2003:79), The phase transition is a unique discourse in physics and there have been a lot of theoretical works built upon this cases, e.g.: Kadanoff (1971). In physics, the discourse is well-known as the critical behavior of a system in which the properties of the universality and the scaling problem (Situngkir, 2003a).

But certainly, this is not the place to visit the physical phase transition since the aim of our main project is to capture the other place where phase transition belongs: the guts of someone and the transition of her possession as the basic classifier if she is poor or wealthy. However, this fact can be interpreted as the impact of the critical condition where the highest guts can be observed.

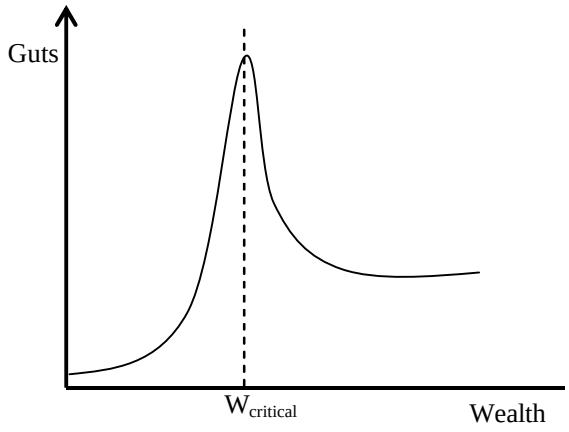

Figure 6
Guts as function of wealth (W): at the critical W value, many creativity node connecting the entire web of creativity and reflected the maximum gut someone ever have while this gut shrink rapidly as the more of possession or facilities (wealth).

Parwani (1999) explained how such critical situation in which the $W_{critical}$ yielding the highest guts in someone cognitive system (micro-states) is something that can be turned out as the self-organized system in the macro-states. The situation of the $W_{critical}$ just like the cellular automata, small-world effect, the uncomputability of computer programs, the physical phase transition, and so on (Situngkir, 2003a), is the symptoms of the complex adaptive system – a system in which very critical to become disorder from the order conditions henceforth often called the edge of chaos - whose one important parameters inherently is the self-organized criticality. The sudden emerging highest gut is able to be seen as the emergent phenomena that seen as the statistical macro-states. There have been many works to show many complex systems in nature display regularities in a statistical description of their observable macro-states. In this case we will see the macro-properties of this phenomenon as the corollary of the self-organized criticality obvious in it.

8. A HYPOTHESIS: POWER-LAW DISTRIBUTION OF THE MAN WITH GUTS

The interesting challenge of the research on the cognitive condition of one's highest guts on doing something out of normality beside the standard modern economic surroundings regarding her economical status is to answer the question: how often we can find someone in the conditions having critical value of $W_{critical}$ and gain the highest guts. To answer the question, we are back to the approach to the critical condition and start to use the cognitive system of the highest guts as micro-properties to be aggregated in the population with various values of W concerning the values of the gut they get.

In the edge of chaos of the phase-transition between order and disorder, particularly in the self-organized criticality point, the distribution of the population will follow the power-law distribution. This is contrasted to the stable system which follow the Poison's Distribution. Poison Distribution simply can be written as $n(s) \sim \left(\frac{e^{-m} m^{s}}{s!} \right)$. This is contrast with the power law distribution $n(s) \sim s^{-x}$. In Barabasi, et.al. (2002) the innovation of network theory approaching the scale-free network has shown the probability a randomly selected node has exactly k links decays as a power law, following $P(k) \sim k^{-g}$ where g is the degree exponent. This is happen in many of documented scale-free network, i.e.: the world wide web, the internet, the cell, the web of human sexual contacts, the language, or even the web of actors in Hollywood, most of which appear to have degree exponents between two and three.

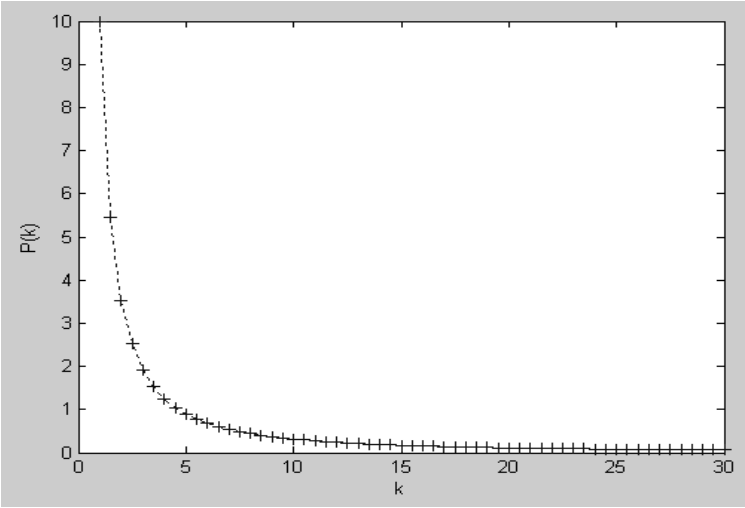

Figure7

The power-law distribution of *P(k)* when $g \sim 1.5$ with a normalization constant 5.

Power-law distribution[3] is the distribution of statistical properties in the critical self-organized system – a kind of universality coming from the scaling and phase transition discourses. Inspired by the works of Barabasi et.al. (2002) we can say that the distribution of the most connected networks *P(k)* indicating the highest path-length (or guts in our model above) to the lowest connected networks will follow the power-law distribution with *k* close to the unity. Henceforth, the probability to find people with the biggest guts will be very small on a population.

Although it is obvious that we should check carefully to the statistical data concerning this to exacerbate this proposition, we can still use our sense on our history to realize that only small people have initially guts on facing the economic system successfully and consistently on the way in the names of the famous leaders, scientists, etc. that is not supposed to gain any achievement of life to be such important places in the heart of the history. Therefore we can say that only few numbers of people consistently standing on social-economically standard way of living and have the opportunity changing the history of time.

However, this assumption came from the conviction that only the small numbers of people dare to stand to challenge the standard socio-economical living can be successfully and have guts to do it. And without lowering our standard to the democratization we must say that they are the best one to lead the society.

9. CONCLUDING REMARKS & FURTHER WORKS

At first glance, it sounds naïve to construct an imaginary landscape to describe arbitrary space depicting the state of creativeness of human being. At least, we can take this paper as a preliminary standpoint to step into more elaborated space of creativeness.

We believe that other reports gathered from the field of evolutionary psychology and neurology is in accordance with the entire building of our model, giving us a sufficient standpoint to build a bridge between macro-view and the micro-view, deep and narrow structure, a new kind of level of description along with its inherent limitation as we previously noted that, the model is merely build upon the ground of economic structure.

Finally, we also believe that this preliminary works can resolve the lag between classical psychology and cognitive science in determining and exploring the complex nature of human creativeness, at least to certain limits.

[3] A nice introduction to the power-law distribution can be read at Adamic (2003).

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