PANSYSTEMS METHODOLOGY AND ITS APPLICATIONS: CYBERNETICS, EPISTEMOLOGY, SHENGKEOLOGY AND SOCIOLOGY $\left(\text{II} \right)$

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Abstract: New Formulation of PM, PM Logic, Observo-control Relativity, Panweight Fuzziness, Generalized Composition, Modelling, Decisions, Games, Social Shengke.

6. PM Shengke and Observocontrol Logic

The PM extraction is of methodological concepts for decisions and games. The typical cases include such as R_i (i = 1,2,5,6,8,12) and pansymmetry extractions. A new generalization of cybernetical method is the so-called the 5-combined extraction consisting of R_i (i = 3,5,6,9,10). The so-called games extraction consists of certain combination of R_i (i = 2,6,7,11),etc. sometimes including certain political principle, psychological states, qualities of players or menpower, legal system, methods, policy, stratagem, tactics. The games extraction presented in fact is of the common principles of various warfares and can be considered as a sort of complement, extension or generalization of certain concepts in the famous Chinese ancient military book Sunzi Strategy (770-221 B.C.). Sunzi said: "know yourself and know the enemy, you can fight a hundred battles without the denger of defeat." Substantially speaking, the Sunzi law is concerned with a sort of R_6-games extraction. An important difference of warfares of various historical periods may be embodied as the difference of the power or force of corresponding games extraction.

Strengthening PM Extension-Variation Extraction (SEVE Principle). The extension with the aid of PM relations and its combination with relevent variation in

the extended systems, this complicately formed concept is called PM extension-variation (EV). And the SEVE principle means the PM EV-extraction with the aid of certain socializational powers, modern science and technology, initiative modelling, artificial acceleration and strengthening. The SEVE principle is an important methodological concept in the analysis, treatment and operations to social and ecological LSSDS, and in various modern work or exploitation we naturally ask ourselves to turn our face to modernization, world and the future. The principle presented here is useful for management, social shengke, education, theorems-extending, theory-developing, creation, systems engineering and related disciplines. There are many methods, policies, priciples, concepts connected closely with this principle, for example: reform of entprise from pure product pattern to that of economy-management-administration and variant structure, value engineering, correct policy of opening to public and crosswise connection , reorganization according to the policy of good cycle, discussion and collective research,public relations, scholar of opening to public, etc. In a certain sense, the very marvellous and mysterious Qigong (a system of deep breathing excercises) and related psychic functions are usually according to a certain SEVE principle to practise some stylized body-idea movements, the initiative goal of PM extraction is the good cycle of relaxation-calm-equilibrium of body-mind, is to enter a state of half-waking and half-sleeping and to improve the existence power. The further goal is to control certain autonomous systems or nerves and to yield so far as certain psychic functions.

Shengke Relativity. This is the concept the shengke (synergy and conflict, pros and cons, advantages and disadvantages, gains and losses, superiority and inferiority , etc.) is generally dependent on subjects, objects, goal indexes,environment, scope, conditions, criterions, PM relations, parameters,etc. Generally speaking, the opening, closedness, reform, conservation, stability, chan-

geability, order and disorder (in synergetics), dissipati-
ve structure, self-organization, tolerance-reducing, equi-
valence-reducing, formulism, stylization, normalization,
systematization, clustering, discoupling, simplification,
epitome analysis, certain PM relations, pansymmetry, ins-
tability, autonomy and nonautonomy, harmony and anharmony,
reversibility and irreversibility, equilibrium and nonequi-
librium, chaos, catastrophe, bifurcation, disclosedness,
concentration and decentration, organization and disorga-
nization, etc. all have certain shengke relativity.

Epitome Shengke. This is the concept of a special PM
extraction that in shengke relations or in MDG one should
be good to organize certain global optimality, feasibility
, satisfaction, easiness, convenience and simplicity or to
realize certain active shengke with the aid of epitome (
local, temporary, partial, index-scope-object-resours-par-
tial) cooperation, synergy, shengke and compromise.

Panenvironment and PM Observocontrol Law. The extend-
ed system formed by the aid of PM relations is called pan-
environment of the prototype system. The panenvironment
which is relatively small in scope in a certain sense is
called small one. In MDG or in operations the concept of
PM extraction of small panenvironment, epitome, PM models
or panproduct is called PM observocontrol law.

PM Observocontrol Relativity. The concepts of obser-
vation and control in PM are extended and generalized to
certain generalized systems. The former is mainly concer-
ned with obtaining information, news, knowledge from ob-
ject-systems, specially about their properties, structures
,states and softwares, and the latter with the reform,
transformation, reorganization of them. The structure, pa-
ttern, mode, PM model, ways and means of a certain given
object U is simply called mode of U and denoted by $M(U)$.
For example the related multi-I/O automata-PFN is usually
used as certain mode of observocontrollability or others.
We define the so-called observocontrol (OC) pansystems as
$H :: = H_1 | H_2 | H_3 | H_4 | H_5 | H_6 | H_7 | M(H)$. Where H_1: OC objects; H_2:

OC subjects; H_3:observation; H_4: control; H_5: OC mutual ac-
tion; H_6: panenvironment; H_7: mutual action between H_6 and
H. The PMOC relativity is embodied as certain generalized
systems of H which describe some conditional generalized
causality relations, network relations or PM relations, etc.
including H-PFN and its transformation, or automata with H
as its interior state-space. The PMOC relativity is close-
ly connected with following concrete principles and con-
cepts: (1) PM observocontrollability (PMOCY, see below) .
(2) The control model and observation model all can be de-
scribed in the forms of PN which can be also simplified to
certain PF, the forms of field and network can be mutually
transformed from each other. (3) The PF or PN all can be
used as certain operators to reform control model and ob-
servation model, including certain repeated self-reform of
OC-models. (4) With repeated aid of control model one can
strengthen the observability. Any given control model is
based latently on certain difference-seeking of interior
states, for example, expressed as $\overline{I(C)}$. Any control is ba-
sed on certain necessary observability and the observation
model can strengthen controllability. (5) OC problems us-
ually can be simplified to the forms of PM simulations, and
related conservation, strengthening, weakening and dismissal
of properties, relations, predicates, structures and soft-
wares are generally conditional. (6) The shengke composi-
tion of OC and changeable panenvironment has influence on
OCY, OC models, object, subjects. (7) Sunzi law. (8) The
conditional network-relationship among cognition, practice,
perceptual knowledge, rational knowledge, logical thinking,
thinking in images, sense perceptions, etc. (9) Try-mista-
kes theory of learning (Thordike). (10) Weber-Fechner law
(in psychological physics). (11) Tendency misconception (
in psychology). (12) Mutual action theory of subject-obje-
ct of cognition (Piaget). (13) Relativity of referencial
systems or observation-subjects in mechanics and in the
theory of relativity. (14) Complementary principle of Bohr
in theoretical physics. (15) Concepts and theorems of ob-

servability and controllability in Kalman's theory. (16)
In recognitions and operations the combination of control
and various observations:filtering, smoothing, predication
, identification, modelling, communication, display, trans-
lation, decoding, detection, location, disclosing, etc. (
OC combination technique). (17) Tree-search principle. A
sort of successive confinement mode of tree-type. A typi-
cal mode is the search of (g, D, a)-type: $g(n)$: $A(n)^2 \longrightarrow$
$W(n)$, $D(n) \subset W(n)$, $a(n)$: $P(A(n)^2) \longrightarrow E_s[A(n)]$, $A(n+1) \subset$
$A(n)$, $A(n+1)^2 \subset g(n) \circ D(n) \circ a(n)$. (18) Damaged information
principle. The damage of information of prototype makes
the primitive model reduced to an epitome. (19) Theo-
ries, tools, science, technology,the true, the good, the
beautiful, social standards (norms, codes, laws, criteri-
ons),all are generally certain objectization of some
socializational OC forces formed in certain PMOCY combi-
nation. (20) Practice is some respects with emphasis on
control in certain PMOCY-dynamical combination. (21) Co-
gnition is some respects with emphasis on observation in
certain PMOCY-dynamical combination. (22) The mutual re-
peated feedback R_5-R_6 relations between perceptual know-
ledge (thinking in terms of images) and rational knowled-
ge (logical thinking). (23) Wuxing Shengke in Chinese
traditional culture. It refers to the relationship group
of shengke (synergy, conflict, interdependence, interen-
hance, interpromotion, intergeneration, interinhibition,
interinvasion, interinsult and interrestraints, etc.) of
the so-called five elements (pronoun: metal, wood, water,
fire, earth). (24) Bianzheng Lunzhi in Chinese tradition-
al medicine (CTM). It refers to a dynamical diagnosis-the-
rapeutic program according to interior-exterior panenvir-
onment (PM has already presented three mathematical models
). (25) PM-holographic-recapitulation (PMHR principle).
It refers to certain conditional (explicit or implicit)
similarities, tollerance, modelling, pansymmetries, holo-
graphic-like properties and recapitulation of various epi-
tomes of a given generalized system. The bioholographic

law, Haeckel recapitulation law, cognition recapitulation law, historical uniform law of Lyell (from present to know the past), certain similarities between the vertical sequential structure and the horizontal simultaneous structure pedigree-tree of evolution, pedigree-antitree of degeneration, etc. all these concepts or principles are closely connected with the PMHR principle, sometimes they can be considered as certain concrete varieties of the principle. (26) Codiagnosis principle. It refers to the strengthening of certain OCY, R_{12}, location, orientation, direction-fixing ,quantization, information-obtaining by the cooperation, synergy, coordination, conjunction or disjunction of many models, epitomes, quotient systems, classifications, tolerances, equivalences, projections, etc. (27) PM interpretation principle (see below). (28) FDF principle. It refers to the so-called " fast bird's-eye view, deep microscopy, frequent asking many questions " which is presented as methodological policy of learning, intelligence exploitation in order to be good at dealing with the complicated situation of modern knowledge explosion. PM has already developed many concrete concepts, principles and methods for FDF. (29) Biexplosion shengke principle. It refers to the concept that by using the combination explosion of gene-like hardwares, softwares, systems, elementary knowledge-skill-technique blocks to follow, drive, interpromote or keep pace with the situation of knowledge explosion. Naturally, the selection here of gene-systems is very crucial. (30) Konfucius law of learning: "gain new insights through restudying old material." " learning without thinking leads one to be deceived, and thinking without learning makes in a great danger." (31) Qigong, biofeedback therapy, Freud therapy . (32) Vision phenomenon of Purkyně. etc.

PM Automata and Wuxing Shengke Automata. The concept of former refers to the multifactor-multi-I/O automata-PFN in which the panweights are used to describe certain PM relations and parameters. In particular, if automata are connected with each other according to the combination (output, input) X (Sheng: intergeneration...,

Ke: interinhibition...), then every automaton here is just connected with four others. One plus four are just corresponding to the five elements of Wuxing. The multi-I/O wuxing shengke automata is called games automata or games multi-I/O automata which model a sort of typical dynamical games, a model more universal than traditional differential games.

PMOCY and PM Interpretation Principle. In the sequel, we shall use (C) to denote the class of operations and transformations generated from compositions, epitomes, quotient epitomes, set operations, panproducts, product-order transformations and the transformations induced in PM correspondence principle. Let U, V be two given classes of generalized systems which are reformed by certain class (J) of operations or transformations to the so-called OC models M: $f_i \subset Q_i \times A_i \times W_i$, $g_j \subset Q_j \times A_j \times W_j$, where Q_i (A_i, W_i) and Q_j (A_j, W_j) are perhaps the same or are different from each other . If M are reformed by (C) to $E_l \cdot p_l \cdot D_l \supset C_l$, where $E_l \subset Q_l^*$, $D_l \subset W_l^*$, $C_l \subset A_l^*$, then we say that U is controllable with respect to panenvironment V, transformations (J), OC models M, input (subject) domains E_l, panweight level D_l, controllable blocks (object domains) C_l. Sometimes we say also that U is PM controllable. In particular, $E_l = Q_l^n$, $Q_l^{[n]}$ ($=$ $\bigcup \{ Q_l^k \mid k = 0, 1, \ldots, n \}$), Q_l^*, are corresponding to the cases of n-step, internal n-step and general controllabilities respectively. The united cooperative controllable block is $\max \{ A \mid A^2 \subset \bigcup E_l \cdot p_l \cdot D_l \}$ which corresponds to the control of codiagnosis principle. If M are reformed by (C) with $\{ D_m \}$ to $q_m: E_m \longrightarrow C_m/a_m$, $a_m \in E_s[C)$, $C_m \subset A_m^*$, $D_m \subset W_m^*$, then we say that U is observable with respect to V,J,M,E_m, D_m, C_m, a_m. The united cooperative observabilities are expressed as certain epitomes $q_{(1)}: \bigcup E_m \longrightarrow \bigcup (C_m/a_m)$, $q_{(2)}: \cap E_m \longrightarrow \cap (C_m/a_m)$, $q_{(3)}: \cap E_m \longrightarrow (\cap C_m)/\cap a_m$ which are induced from M and $\{ D_m \}$ and correspond to the codiagnosis principle. If M is reformed to $r_n \subset E_n \times C_n \times D_n$, $E_n \subset Q_n^*$, $C_n \subset A_n^*$, $D_n \subset W_n^*$, where C_n are explained as some object-world, and Q_n are certain OC pansystems, $r = (r_p \cdot D_p$

$) \circ (r_q \circ D_q)^{-1} \subset E_p \times E_q$, then the interpretability from E_q to E_p is expressed as $r \circ f_a : E_p \circ r \longrightarrow E_q/a$, $a = (r \circ r^{-1})^t$. If $(r \circ f_a (E_p \circ r))^1 \subset a$, then the interpretation of E_p from E_q is of black box or is impossible. Generally speaking, from the OC world Q_q one can only interprete or explain certain epitomes or quotient epitomes of C_q and Q_p, and the different interpretation systems are generally in some synergy simulation relations. The mutual interpretation is conditional. The failure of mutual interpretability can not be usually explained as another new OC interpretation fallacious. According to the codiagnosis principle the cooperation, coexistence, union and intercomplement of various OC interpretation systems presents a more complete cognition to the object-world. The PM interpretation principle presented can be considered as a PM model of the famous Bohr's complementary principle in theoretical physics and its speculative generalization. The uninterpretability of certain psi from the viewpoint of traditional natural science does not be a serious reason to consider any psi or researching psi fallacy. Naturally, this is not a proof for any concrete psi.

7. PM Causality Logic

In PM the meaning of causality is extended or generalized. Sometimes certain conditions, constraints, pan-environments, means, measures, tools, methods, ways, etc. all can be considered as some generalized causes. In practical cases we usually us PFN to model various causalities.

Causality Relativity. This concept refers to that there exist certain mutual relative independence or sheng-ke relativity of advantages and disadvantages of causes and effects, means and goals, methods and treated objects.

Or-And Extraction. This is a special concept of PM extraction in causality analysis which includes several subconcepts: the PM extraction of or-and relation, utilization of large scale conjunctive (disjunctive) systems, and exposition-selection of multi-or O/I systems.

High-Efficient Condition. Another name is high-effi-
cient-or or high-efficient disjunction. This is a princi-
ple refering to organization, exposition, selection of
high-efficient or low-price conditions, means, inputs,
outputs, disjunctive factors in the operations research
of causality network or muli-or O/I systems. This is a
generalization of the principle in value-engineering.

High-Price Conjunction. It refers to the principle
of considering high-price conjunctive conditions or ne-
cessary conditions to be ones of crucial importance. It
can be considered as a basic concept in PERT, CPM, GERT.

Dynamic Key-Order. It refers to the concept that in
the analysis and operation of large scale conjunctive
causality PFN one should consider the case that the key
ranking is dynamic according to certain parameters.

Small Causality Panenvironment. It refers to the
special case of application of PMOC law to the small cau-
sality, including reverse search from goal, eagerness for
quick success and instant benefit within certain macro-
control, optimal strengthening of purposefulness and di-
rectionalness, etc. as certain methodological policies.

Causality Shengke. It refers to the shengke analysis
of causality PFN, including certain PM extraction, exten-
sion and exposition of low-price causes, restriction of
hidden competitive goals, development of methods, ways ,
tools, conditions and panenvironment. The concept presen-
ted is also a methodological principle to exploit intel-
ligence, resource, facilities, theories and technique.
It is a fundamental concept for diagnosis and detection.

Necessity Method. This is the concept of utilization
of certain necessities to confine the scope of search, to
extend related conditions and concepts of theorems and
to help problem-solving.

PM Network-Connection. This is a method of problem-
solving by using successive network-organizing, network-
extending and network-connecting according to some PM
relations.

Implicit PM Theorems. It means a class of theorems of reducing to projections, explicit simulations, hard simulations, single value correspondence and 1-1 mapping by using confinement, necessity, epitome, quotient operations, etc. Generally speaking, the induced simulations of the transitive closure of the compositions of binary relations (implicit simulations or synergy simulations) and their corresponding inversions are of projections or epitomes. The conposition of the transitive closure of induced tolerance of given binary relation (implicit simulation) and the relation itself is of a hard or explicit simulation. In implicit model the induced confinement according to the tolerance of complement of induced tolerance of the simulation makes the relation projection. Certain theorems about OCY also can be considered as some special implicit PM theorems. The traditional implicit function theorems in analysis mathematics and differential topology are of special microtypes of the subject presented here.

Self-Excited Multiloop System. This is the concept refering to the multiloop shengke system of causality PFN , including PM extraction of positive or negative feedback of causality and confinement and stage-reducing of goals.

Synthetic Near-Optimality. Generally speaking, multi-index of goal can be reduced to the case of lower dimension according to PMOC law. Another method of forming synthetic index is as follows: set up certain virtual synthetic optimal point by using that of single indexes and then realize synthetic evaluation and review by PM clustering according to certain generalized distance.

Neighbourliness Principle. Neighbourliness, relevancy, approximation and similarity can be modelled by R_3, R_{11}, R_{12}, generalized distance, equivalence and tolerance. We can use these concepts to research the relevancy, independence and the relationship between the principal and the subordinate of causality.

8. More on Some Problems in Social Systems

Society is in substance a sort of supercomplex and supercomplicated systems. In analysis, treatment and operation of social systems people require and create various simplified methods, means, patterns, models and styles, including various epitome methods, clustering operations and quotient systems analyses. Naturally about them there are differences of importance, priority, relativity, shengke panweight which are according to different viewpoint, requirement and utility of social systems. Generally speaking , the production, distribution, exchange and the control right over them are the fundamental items of society, so the epitome (clustering, quotient) analysis -operation based on them is of fundamental importance. The partition of class is substantially a clustering reduced from the controllable right. Consequently, class analysis, and economical equivalence analysis and the analysis of control-distribution right for rare resource and rare chance are of fundamental methods to understand society. Naturally, if some people disobey the original scientific criterion and CW-IVCC principles, and wilfully broaden their scope and make farfetched generalization, it would lead to misfortune or ruinous events.

Two important concepts of PM to analyze problems of society are R_3-shengke and PM extraction of pansymmetry (EP). A society which has no sufficient socializational power and operations to macro-EP is of weak systems. Every social system and subsystem have their own index system of utility, value and operations, among them there exist various R_3-shengke relations. The social noms, morality, rules, criterions, policies, education, custom, socialization, public opinions, mass media, etc. all these are usually used to guarantee or to support certain global functions or pansymmetries (some R between freedom and constraints) of certain social system or subsystem. Tolerant EP between large scale system and subsystems will strengthen rationality, and excessive constraints may make society to deviate from

optimal shengke of rational structure, and conversely, ex-
cessive freedom for some subsystems usually destroy the glo-
bal freedom of large scale social system. If there exist to-
lerant transformations of pansymmetries of subsystems whi-
ch destroy the global EP utility, then it means there are
certain conflicts, or gaps and omissions of society. Some-
times partial EP is in contradiction to the whole. In the
case the rules-system is incomplete, certain subsystems
usually eager for exploiting various tolerant transforma-
tions of pansymmetries in order to gain some opportunities
of preferential competition and become the winner in distri-
bution of rare resources-opportunities. Even for the same
social system there are also shengke relations between the
whole and the partial indexes or between the long-term and
the short-term indexes. The so-called virtue in substance
is an outcome or reflection of utility of certain social
systems or subsystems, it possesses certain historical na-
ture. There is no such thing as eternal morality transcen-
ding utility of any subsystem of society. In the simplified
treatment and operations of large scale dynamical supercom-
plicated social systems, the class, political parties, mo-
ney and associations even religions all have their own
correspoding relative actions. Their criterions induce cor-
responding equivalence-tolerance partitions and epitome ana-
lysis, including corresponding various outlooks of life,
philosophy, facilities and even world. The social being and
social panenvironment have the OCY to social thinking, con-
sciousness and even subconsciousness. The legal systems u-
sually possess certain powerful nature which are used to
safeguard or defend the interests of ruling classes or lea-
ding strata and meanwhile to strengthen certain global fair
EP and constrain certain partial excessive preferential EP.
It is a sort of compulsary means used to coordinate certain
important relations among various subsystems. The demands
of society and its subsystems or individuals are always de-
veloping. The excessively rigorous conflicts between de-
mands and panenvironment conditions, the losing effective-

ness of certain necessary inside/outside OCY, etc. all the-
se are of causes of abnormal states of society, subsystems
and individuals, and so the PM extraction of causality and
subcausality (latent causality), and with the aid of SEVE
principle, it may be a feasible method to treat problems of
society. Naturally, for the complicated problems it is ne-
cessary to consider the codiagnosis principle, united OC
and comprehensive administration. The shengke of resources
and chances (in particular, the rare resouces and chances)
is of the key problems. The solution or settlement of con-
flicts among large scale systems sometimes strengthens the
competition of another sort of resources and chances inside
certain subsystems. Perhaps some competitions of subsystems
are more rigorous even than that of large scale systems.
There are many examples in history that the excessively ri-
gorous competition inside subsystem leads to failure of com-
petition inside large scale system.

In research-operations of large scale systems the PM ex-
traction of panorder (ER_8) is a very important concept. The-
re are various R_8: causality R_8, R_1 or R_9-panorder, poset R_8,
structure R_8, relational contrast R_8, systematizational or
coupling R_8 (SR_8), etc. The famous Hall's principle in systems
engineering contains a main core which can be considered as
a special concrete ER_8. And PERT, GERT, CPM mainly are of
PM extraction of R_1, R_9 and OR-AND plus high-price conjunc-
tion. The SR_8 is just a generalization of concepts such as
order, anti-entropy in synergetics and so can be considered
as an extension of the concept of information. This sort of
generalization is considerablely suited to research on so-
cial systems. Some people simply and speculatively trans-
lated many concepts such as closedness, entropy, order and
orderization, etc. of thermodynamics or physical science
into the case of social systems, it would be of forced ana-
logy, farfetched comparision or strained interpretation,
including specially the case to disobey some principles of
shengke relativity. Certain macroscopic PM extraction of
SR_8 ($MESR_8$) are very important, specially in order to guar-
antee sufficient necessary diversity, developing demands

and creation, we need to protect and develop certain gene-like and seed-like subsystems, substructures for large scale systems, including social systems, ecosystems, literature-art systems and culture systems. To parallel with the conservative laws of energy and matter in equilibrium of generalized ecosystems, the principle due to $MESR_8$ can be called conservation principle of structure or information.

For the exploitation of intelligence, talents, education, the concept of ER_8 is also of strategy. About them there is a typical key-ER_8 : (1) social and natural pan-environment, and active PM extraction of shengke of men with this panenvironment; (2) PM extraction of psychology training; (3) sufficient health; (4) direction, way, method , mode, strategy, tactics; (5) ability, talent, insight; (6) learning, knowledge, information; (7) diligence, operations research of time and other resource. And for (5) and (6) one should grasp certain gene-like or seed-like elementary subsystems, substructures or building blocks in order to form combination explosion in coordination with the high-speed development of modern science and technology (biexplosion shengke principle).

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