An Exploratory(& Experimental Economics) Proposal for a newer Integrated Model Theory of Economy and Society, Encompassing Steady-state Economy and Growth Anticipative Behavioral Economics (indifferent to its actors and systems granularity*1)

(*1. Human and/or non-human life and/or non-life, natural & physical environments and elements, Artificial-life/complex automata, artificial and/or computational intelligence and various scopes of interactions etc.)

Takeshi Fujiwara*2

(*2. DAYPLA Corporation, Tokyo Japan. This essay is a submission to my own Call For Papers for posters theme @ Web Interaction and Intelligence (ARG SIG-WI2) Study Group on April, 2019 https://www.sigwi2.org/14th-p2-3description , a granted benefit for the company's silver sponsorship in support of the SIG-WI2 group and events. Poster session scheduled on 28-29 June, 2019, at Kobe Campus for Commerce, University of Hyogo, Gakuennishi-machi, Nishi-ku, Kobe, Hyogo, Japan.)

Abstract

Modern administrations and disciplines address issues of sizable and collective "mass economics", with affinity to mass production and visible volume of consumption of commonly communicated "value". However, humanity has reached a point where a) sustainable development & decrease or evade disordered waste from habitable vicinity, b) societal rights interest in diversity of personal values & individual selective behavior, (a, b)are issues critical to survival of humanity and its environmental surroundings. **O**n this essay, I propose an explorative study for an integrated model theory of economy and society, encompassing steady-state economy & growth anticipative behavioral economics, with the following aspects: 1. **R**edefining elements and functions of economics to fit diverse value-objectives of modern humanity, or any system of self-cognition, self-organization in general. 2. **A**pplying general systems theory to economics, 3. **t**hus redefining scope of economics to any natural phenomenon as system/automata, where integration/interaction with groups of various societal/behavioral actors for value-objectives are consequentially natural in systems of economies. 4. **I**nclusion of diverging simulations of automata, and simulations themselves as automata, in the model / environment. 5. **C**ross-over solutions of local-universe and multiverse dimensions to fit diverse objectives of the homeostasis /self-generative function (even chaos is a system for models/cognitions which prefer it, whether art or science: serendipity of selection of value-models by any agent(s) of any granularity). Notion of n-manifold and phenomena of singularities to explore explanations of interacting entanglements in the model(s) of different autonomies/systems of economies in various granularities. 6. **O**n the more practical engineering side of the derived objective-explicit economics, allocation(trade-off)/optimization problem becomes a ramification problem of relation among swarm/group of automata.

Probing Aspects of Model and Constitutes
(somewhat before the economics)

1. Redefining/unfixing elements and functions to accommodate diverse value-objectives of modern humanity, or any self-cognition system.
What is/are desirable disciplinary system(s) of "Economics" to an entity(institution or personal) to start with? Is/are such comprehensively universal in applying to any reality? ***Aren't elements and functions*** of "production", "distribution", and "consumption" of "goods" and "services" ***diverse rather than universal*** to diverse entities of cognitions with different value-objectives? Description and analysis could totally differ between disciplines of Economics(as applied sciences), so I propose an unfixing of institution-specific or belief-specific terminologies and context. Also, provide more flexibility to approach diverse granularities of systems/environment.

2. Applying general systems theory / systems science Applying systems notion as adhesive to synthesize different systems/local-universes of economies(where an element e.g. "goods" may have similar traits, but differ in value, role, or qualities in different universes of economies).
"Waste-A" in Economy-A, could be considered valuable "goods" in Economy-B where a typical consumer or a life-form of some kind may have different value-objectives, or even different time-frames for their value-cycle(s).

*"**Systems science** is an interdisciplinary field that studies the nature of systems—from simple to complex—in nature, society, cognition, engineering, technology and science itself. To systems scientists, the **world can be understood as a system of systems.**"*
https://en.wikipedia.org/wiki/Systems_science Wikipedia(retrieved:2019.06)

3. fit diverse value-objectives indifferent to/ or in conflict or compromise with diverse actors and systems granularity thus redefining scope of economics to any natural phenomenon as system/automata, where integration/interaction with groups of various societal/behavioral actors for value-objectives are consequentially natural in systems of economies.
By this, I also mean relations/interactions of systems could be in peaceful coordination or in a battle for survival or somewhere in between or in no coherent relation whatsoever due to difference in cognitive or tangible frame, etc. Such adapted relations/interactions as meta-systems could be short or long-lived, where collisions, compromise, nil relations of value-objectives between different worlds are in fact everyday phenomena in the real world full of complexities, crises, where such relations are also a source of emergence and changes of value-objectives in a local-world or more.

4. Inclusion of diverging simulations of automata, and simulations themselves(as recursive functions with aims of probing scenarios and outcomes) as packeted/capsulated automata, or in other options, as bisimilation of states, **in the model / and environment simulations**. A finitely feasible computable situation(in context with model and theory of computation, computability and complexities, automata with some essential notions related to formal language, etc.) may often be described as Finite State Machine(FSM) or, observing the same situation, as a *finite* Labelled Transition System(LTS), depending where to focus the scope of behavior. Probabilistic Automata(PA), generalization of nondeterministic finite automaton may be projected here, though scheme in its quantum analog, quantum finite automata(QFA) would require different prerequisites. Regarding simulations, my notions are about simulating real-world phenomena(here, in terms of economic cognitions and solutions) of systems to approximated resolutions of computable constructs of states(as image dots are to a TV screen; finite-state automata being the equivalent of the dots here, however an automaton may be replaced by a different automaton in a worldly course of matters or happenings, as the world-as-environment is not necessarily computable a priori, though selected instances may be.) by branch-offs of simulation scenarios. Occurrences of branch-offs in world-as-environment(s) are observably stochastic in nature, and automata as actors would be efficient and robust in behavior if designed rather simple(but not versatile in its own as ASM), but also allowing non-finitely possible variations and occurrences of combinations that are open(not closed) to unknown possibilities, as is the real-world. As a result, simulations are of systems model(including but not limited to constructs of finite transitions), as well as its environment. The aspect of simulations of automata and environment is that of computation. **Such model / environment with computable qualities(containing modularly/locally finite elements) is necessary in order to study behaviors of varying economies with diverse value-objective that could be computed as dynamic models.**

5. Cross-system "solutions" to fit diverse objectives of the homeostasis /self-generative function of where systems overlap and relate to each other may be sought for. For example, a specific economic system(out of many) and a societal system(out of many) may overlap in a certain composition of state transitions, representing a same real-world phenomenon in different perspective angles(or different sub-worlds with their scope of dimensions). For solutions regarding valued-resources, a systemic cross-over solution maybe that of non-static allocations or resources.
This is where, on the more practical engineering side of the objective-explicit economics — **6. Allocation / optimization problem becomes ramification problem of relation among swarm/group of automata—**, where resource allocations are observed as dynamisms between systems of diverse value-objectives.

Pre-Design Plan Subjects for Economies and Solutions(or Game) Simulator System / Experiment Environment as Inductive Theory Forming Apparatus ; (Framing of Economies and Crises with Focused Objective-Model Automata : n-manifolds and singularities)

Simulation Research 1: Plastic waste crisis and diverging behavioral prospects. How diverse value-objective automata collide and react for formation of common accord/rules: "economic expectations for waste-free vicinities(optimistic or not)" vs "anticipative growth".
PROBE QUERY: In exploring/shaping the integrated model theory as logic for systems dynamism, the simulator system as experiments environment is core to this scheme. Real-world crises and solutions probing are viable frames to test situations and test sets, as well as being the target of applying the derived/induced/hypothesized logic. An example, a probe to redesign and shed new light to production/industry consumption/society cycle of plastics is a viable real-world theme. A probing query could be something like: "In order to suite both steady-state/saturation and growth anticipative behaviors at some level of some condition of accord between the diverse value-objectives, what are the viable range of states of actors to come in a state of accord in the simulation ranges of transitions?"
-> EXAMPLE METHOD(S): Use similarly structured automata model(s) for behavioral core systems indifferent to value-objective content(e.g. colliding value-objective scopes of plastic produce/sales/consume/recover cycle of boundaries such as [a: accumulative business/consumption continuities], [b: projected homeostasis of diverse terrestrial habitability], [c: personal purchase/consumption /threshold of control/disposal of products]), where state transitions with goals are similar in path design, however the objective(content) may differ. Implement automata of communicative bisimulations in-between the opposing(with defined observed behavior range) but similar automata, and observe if permeation of perceptions to encapsulate differences of value-objectives has co-occurrence and spontaneous mutations as emergence to a systems logic. Another method may be to use different automata models reacting to each other to begin with, where commonness emerge and form.

Simulation Research 2: Crises of international trade and global competition/Geopolitical and "GAFA"s at global resource saturation. How growth/competition prospects and tax systems (tariff wars, corporate tax havens, etc.) work, break and remap unions and partnerships between growth anticipation and steady-state of economies.
PROBE QUERY: We could simulate and probe possibilities with varying scopes of solutions by unfixing systems functions and elements such as [institution life-cycles, emergence, compulsory and/or voluntary affiliation duties/relations of constituents(typically people) to institutions/sovereignties/traditions/customs, etc.] . By doing so, we could simulate diversions of worlds(that may have been or could be generated) with institutions having different weights of influence to its members. A group of workers(or any other resource contributors)may be more obliged to pay taxes for company or companies he is a member of than to one or more of the governments of sovereignty(local or not) that the individual may be a constituent of. A probe query could attempt to undermine correlation of power of compulsory influence with organizational or pan-economic size, if some nomad-like individuals or groups prefer a more compact level of self-sustainability in terms of compulsory consumption or production. By unbundling fixed exclusive-relations between possible organized benefits and its derived sources, we could simulate and postulate on relationship models such as [transitions of: power and collaborative behaviors and selective/strategic/tactical actions among effective control of behaviors and value-properties], [transitions of: functions], in regard to the types of organizations(such as corporations, nations, nomadic tribes, families, interest groups, telecommunications-oriented groups like SNS, P2P networks, etc.) we know today or in history and their term of existence, holds effective control as media of influence, collective or not, to the autonomous unit of individual self-cognition(of any granularity). People freely joining some combined selection of sovereign corporations, nations of preference possibly with no geographical presence could be examined as ways to spend time-value etc..
-> EXAMPLE METHOD(S): Use Mechanism design theory to simulate environment to probe the unknown mechanisms/incentives among prospect of collaborating systems, of selected games of allocation preferences(for each local unit of self-cognition). In the simulation, there are swarms/groups of prospective relations of automata(thought with various life-spans, viable to its or other's goal or not), where optimization of relations depends upon mutual accord, or pseudo-accord in value-objectives.

Simulation Research 3: Pension/social security reform, financial resources and deficits. How societal systems and economies meet; with potential transitions of player roles & playgrounds. PROBE QUERY: E.g., something like "What if pension/social security scheme includes the beneficiary as a prosumer-unit, where the individual would be benefited with consumption-of-works instances as value-mediating-currency" -> EXAMPLE METHOD(S): Use competing automata for allocation of value-prospects by-passing currency reserves.

Simulation Research 4: Crises of political communications and/or military confrontations, in various domains and granularities. How AI policy debate machines could encapsulate emotional heat-ups/tactical situations into games of Gedanken experiment & enhance public cosmopolitan awareness/learning. PROBE QUERY: .This also probes behaviors/qualities of both the following: [boundary limits of definition of the explored logic], and [representativeness of data] . -> EXAMPLE METHOD(S):Layered stochastic notion-action-plains of pseudo natural language with genetic algorithms