

OECD-NAEC Conference on Integrative Economics:

Integrative or Disintegrative Economics *Searching for New Economic Paradigm(s)*

Andrew Sheng

**George Town Institute of Open and Advanced Studies
29 February 2020**

**The views expressed are entirely those of the author and not associated
with CGET or any other institution**

Key points

- Economics has followed scientific revolution along reductionist, timeless, universal principles/models that aim for “Theory of Everything”. In practice, economics discipline increasingly fragments into “disintegrative” specialist fields, becoming more complex and diverse.
- Reductionist scientific thinking breaks down complex problems into component parts – studying deeper and deeper but often forgets to put these divergent parts back to see whether the systemic whole fits.
- Mainstream economics remain linear, mechanistic in thinking, whereas natural science and other social sciences have shifted into relativity/quantum thinking of probabilistic/evolving complexity
- Neo-classical general equilibrium thinking is a subsystem trying to explain an Open Giant Complex Universe that may be impossible to compute (Polanyi/Environmental critique of Market thinking)
- We are back to Narrative (qualitative) explanations with quantitative tools. Complexity economics will get more complex, but integrative themes exist in exploration in energy, information, knowledge and AI concepts, tools and computing power.

Section 1

Changing Paradigms

From Classical Cartesian Modernity, Current Neo-Liberalism to Post-Modern Paradigm?

Committee on Global Economic Transformation (CGET) Mandate:

“As political distrust and xenophobia are rising in the developed world in response to an economic system that serves only a very few wealthy people, developing countries continue to search for paths to prosperity, and people everywhere in the world are struggling with the challenges posed by widening inequality, technological disruption, and climate change. These problems are compounded by the ineffectiveness of current policy tools in many contexts, raising questions about the role of the state, of civil society, and of individuals along with national and international governance frameworks.CGET website

CGET Study Coverage

- **Slow and stagnant growth** in advanced countries;
- Continuing **inadequacies with international financial system**;
- **Disruptions to work**, especially from new technology;
- **Widening income and wealth inequality** from globalization, financialisation and tech disruption
- **Political and social polarization** – failure to deliver inclusive prosperity
- **Trade and ineffectiveness of traditional development strategies for EMEs**, given changes in technology and global supply chains;
- **Climate change**
- **Increased migration**, caused by failed governance, slow growth and climate change

“The global financial system remains fragile.

The world economy struggles to recover.

Climate change accelerates.

Digitization and globalization depress wages. Income equality is on the rise.

Geopolitical turbulences are spreading.

*Lies are presented as truths.
Truth remains unspoken.*

And people are angry.”

Hannoun and Dittus, “Revolution Required: The Ticking Time Bombs of the G7 Model, 2017

Neo-classical Paradigm and Neo-liberal Order disrupted by 6G Mega-trends

Geopolitical Shift

Unipolar to multipolar world:
Other nations catching up with US

Geographical Shift

West to East

Gender Shift

Women get richer and earn more

Generational Shift

Rich grow older

Young facing jobless future

Geo-climate Shift

Water, food, and energy stress

G5 Tech Shift

Disruptive technology:
Jobs and creative disruption

A single factor is complex enough, but all are interacting in combination to produce very complex outcomes and Black Swans

*Huge challenges to policy and business models, as Protectionist trends means no more level playing field.
Everyone for themselves.*

The Map is Not the Territory!

Albert Koryzbski (1879-1950)



Navigation

- To See the Context of Our Time and What Must Be Transformed
- To Decide What You Want to Be in the Context of that Challenge

**What is the Right Direction
and Paradigm?**

What Economics Gets Wrong

- The Future is NOT Known- Ambiguity/ Radical Uncertainty Prevail
- The Individual Does Not Live Life with Icy Preferences On a White Board of No Context- We are Social Creatures and both influence and are influenced.
- Economics Is Inseparable from Politics

Symptoms of Corrupted Economics

- Sins of Commission - Marketing Not Analysis(Incentives Trump Integrity)
- Sins of Omission - Cowardice-Hiding from Important Issues- Silences Reveal the Contours of Power
- Fiddling in the Monastery While Rome Burns- Puzzles Not Problems and Rituals of Technique Substitute for Embracing Real Challenges
- False Certainty (Demagoguery to Reassure You That Experts Know- Until They Don't) Pretending to Know

From Classical roots to Scientific Revolution

Germano Maifred (2012), From Oikonomia to Political Economy:
Constructing Economic Knowledge from the Renaissance to the Scientific
Revolution

- “oikonomia” came from Greek meaning “household management”.
- Economics as a social science evolved with concepts, tools, processes and intellectual structure/paradigms or schools of thought. But cultural factors always considered residue.
- Classical thinking mixed nature and human behavior, but trade and science narrowed economic thinking towards exchange and market – reductionist and specialist thinking that today, does not add up.
- Economics cannot be silo, independent of politics, climate change, technology, social injustice, Anthropocene [Human impact on Nature] interactivity

Stephen Toulmin: Cartesian Modernity -1650-2007, with break in 1907-25, *Cosmopolis 1990*

- Beginning with Descartes, “theory-centered” style of philosophy (i.e. one that poses problems, and seeks solutions in timeless, universal terms) is (in a word) *modern* philosophy, while conversely “modern” philosophy is more or less entirely *theory-centered* philosophy. p.11
- After 1630, philosophers ignored the concrete, timely, particular issues of practical philosophy and pursued abstract, timeless, and universal (i.e. theoretical) issues (p.186)
- So read, the move from 16th century humanism to 17th century exact science was a swing from the practical, Aristotelian agenda, to a Platonist agenda, aimed at theoretical answers.
- Post 1907 Einstein Relativity and Bohr Quantum Mechanics, natural science moved towards Quantum/Complexity thinking, whereas Mainstream Economics remained largely in Cartesian/Newtonian classical science/maths

Mechanistic Complexity Economics: A Methodological Framework for Economic Science

Matthew Tuxford PhD thesis (2019)

- Economic Science requires a methodological reorientation in order to re-align with contemporary philosophy of science. ...It is also argued that the heterodox school of economic thought known as Complexity Economics offers a valid basis for achieving such a reorientation.
- Primary goals of scientific enterprise are explanation, prediction and control of the phenomena we encounter in the world.
- Complexity economics shares many of the philosophical commitments of the mechanistic model: that non-formal explanation forms the basis of scientific theorising, that theoretical development and testing require sustained, rigorous, empirical investigation, and that there is a methodological model appropriate to all scientific disciplines (p.267)

Neoclassical versus Complexity Economics

Neoclassical economics defined as:

“an analysis that focuses on the optimizing behaviour of fully rational and well-informed individuals in a static context and the equilibria that result from that optimization...When a dynamic context is assumed, individuals understand the probability distributions of possible outcomes over infinite time horizons at the moment of decision...Perhaps the most important characteristic of the neoclassical orthodoxy is that axiomatic deduction is the preferred methodological approach.”

(Colander, Holt & Rosser, 2004, p.490).

Complexity Economics distinguished by

- Far from equilibrium dynamics, nonlinear, and incorporate and dynamic interactive relationships between model variables;
- Agents are heterogeneous, making decisions based on rule-of-thumb heuristics, with incomplete information, with biases and capable of learning and adapting
- game-theoretic, inter-connected network structure of interactions that dynamically change over time;
- macro-level patterns emerge from micro-level behaviours and interactions; and
- Evolution - evolutionary processes of differentiation, selection and amplification that explain novelty and growth
- Beinhocker, 2007, p.96

What is Complexity Science and Complexity Economics? Kurt Richardson & Paul Cilliers 2001

- Complex system: “a system that is comprised of a large number of entities that display a high level of nonlinear interactivity” (where change emerges). p.8
- “Complex science is inductive, integrative, engaged, and different” (Byrne), with “contextually grounded tapestry of systemic dynamism, **paradigm diversity, theoretical eclecticism**, and organizational learning” Cooksey, p.16
- “Complexity economics is ”a theoretical picture of the economy in formation and in non-equilibrium”. WB Arthur (Complexity and the Economy 2015)

From Classical to Quantum Worldview (Wendt, 2006) -

Classical worldview:

1. **Materialism** – elementary units of reality are physical
2. **Reductionism** – complexity can be reduced to simplicity
3. **Determinism** – objects behave according to laws
4. **Mechanism** – causation is mechanical and local
5. **Objectivism** – objects exist independent of observers or instruments of measurement

Intuitively attractive but ignores interconnectivity and interactivity

Quantum view challenges all five:

- **Duality** – Simultaneously Particle/Wave: Virtual, dark world exists
- **Complexity grows** (Big Bang)
- **Probabilistic**
- **Non-local entanglement and relational**
- **Heisenberg Uncertainty** – objects not independent of observers/instruments

Weird but works in practice

Section 2

Integrative Economics:

Moving to Meta-level in Economic thinking

Hayek (1899-1992): Pretence of Knowledge and Predictive Patterns in complex phenomena

- The recognition of the **insuperable limits to his knowledge** ought indeed to teach the student of society a lesson of humility which should guard him against becoming an accomplice in men's fatal striving to **control society**.
- A **theory of essentially complex phenomena** must refer to a large number of particular facts; and to derive a prediction from it, or to test it, we have to ascertain all these particular facts.The real difficulty, to the solution of which science has little to contribute, and which is sometimes indeed insoluble, consists in the ascertainment of the particular facts. Pretence of Knowledge (1974)
- “Pattern Prediction: It's the whole question of the theory of how far we can explain complex phenomena where we do not really know have the power of precise prediction. **We don't know of any laws, but our whole knowledge is the knowledge of a pattern, essentially.**” Hayek on Hayek, p.122-123.

Reflexive nature of knowledge – knowing yourself, others, market, and vice versa....

Philip Mirowski, 2017

THE KNOWLEDGE WE HAVE LOST IN INFORMATION



Investors base their decisions on expectations about future economic policy.



Central banks set the interest rate based on expectations about private sector developments.

Figure 8.2. The Harsanyi Setup.

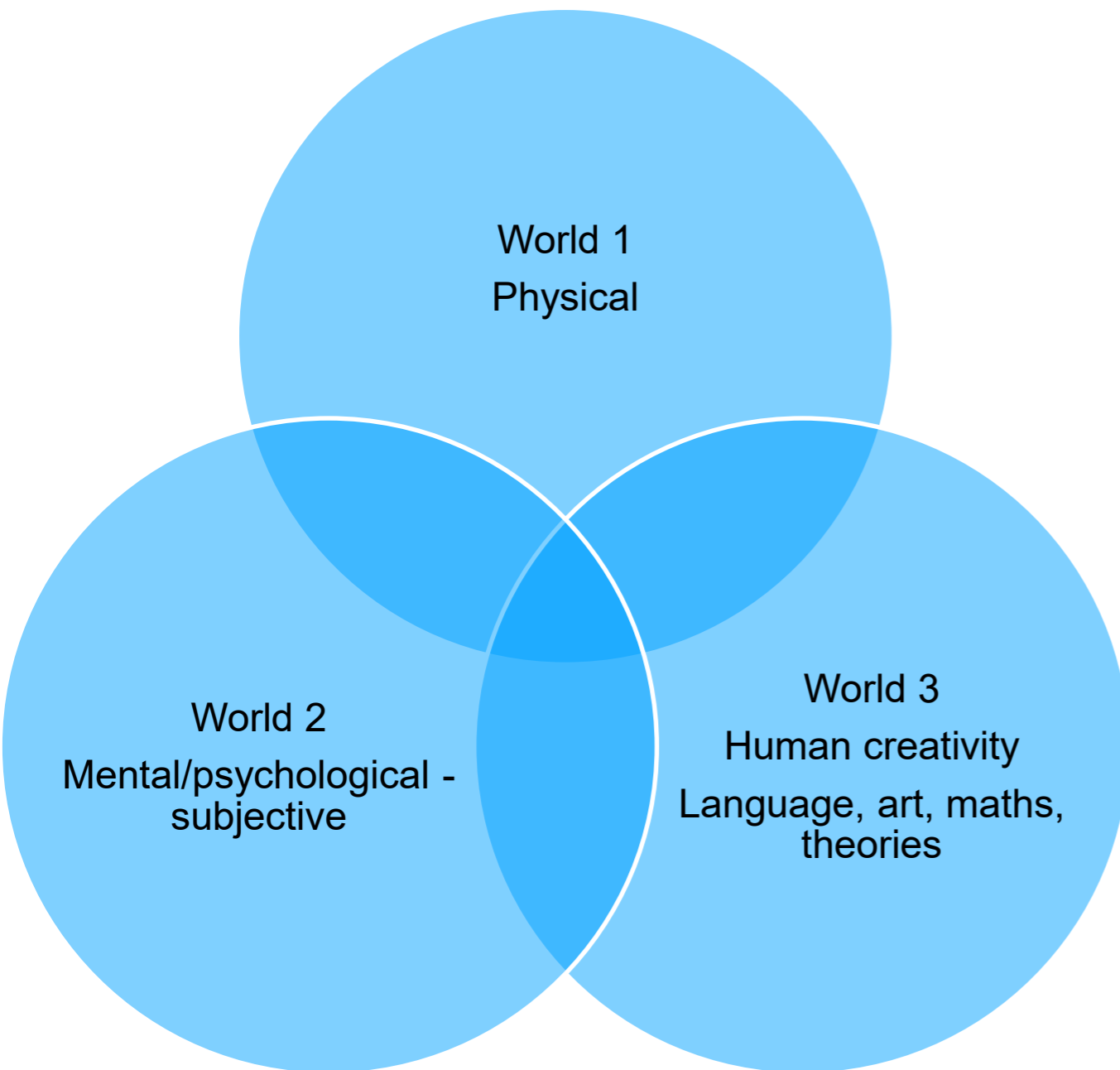
“What is Truth” in Economics

- Frank Knight, 1940, JPE

- Economics and other social sciences deal with knowledge and truth of a different category from that of the natural sciences, truth which is related to sense observation - and ultimately even to logic – in a very difference way from that arrived at by the methodology of natural science
- 3 types of knowledge – knowledge of ‘external world’; truth of logic and mathematics; knowledge of human conduct (the concern of economics being one fraction)
- All knowledge of the world of sense observation....is inseparable from (a) self-knowledge of the knower, and (b) knowledge of other knowers and of their knowledge, or of their “minds”.

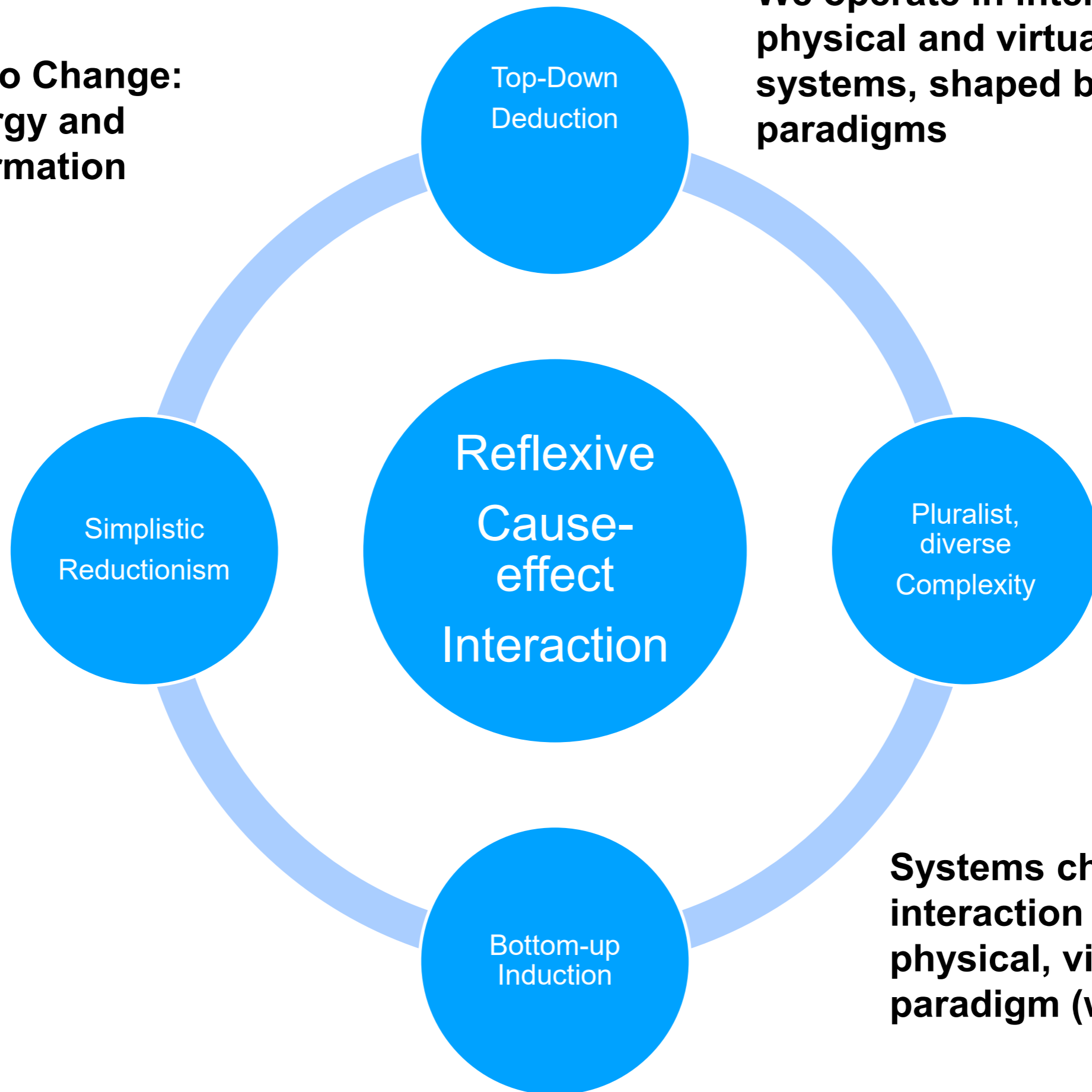
Karl Popper's Three Worlds

Tanner Lecture, University Michigan, 1978



- Monist world accepts material and physical as only One world
- Dualist world considers Mind Matter separation and/or some interaction
- World 3 accepts that abstract reality is “real” – “what is real or what exists is whatever may, directly or indirectly, have a *causal effect* upon physical things”
- Change comes from interaction between 3 worlds - Link is Energy, Information and Knowledge that humans use to change nature and human behavior – reflexive dialectics

**Inputs to Change:
Energy and
Information**



**We operate in interacting
physical and virtual
systems, shaped by diverse
paradigms**

**Systems change through
interaction between
physical, virtual and
paradigm (world 3)**

Physical, Virtual and Interactive Change

- **Physical** world obey Law of Thermodynamics, in which matter can be transformed into or by energy. Fossil fuel usage has negative by-products such as pollution and carbon that hits up world and changes context.
- **Virtual** (mental or psychological) world constructs a derivative world based on physical, framed around opposite (light/dark, positive/negative, male/female).
- **Interactive** world, in which money or human constructs become abstract reality that affects physical and virtual. This depends on information and knowledge, which also needs energy or matter (food, fuel, water) to transform. Replication of financial products (cyber-money) costs little in knowledge, but costs huge energy usage, scams and fraud.

Finance: from Physical Wealth to Interactive Value

Gold to cyber-currency

- Beinhocker's Origin of Wealth (2007) – Physical Technology (PT) + Social Technology (ST) + Business Model (BM) = knowledge matters
- Drivers of change: SMS - Sex (reproduction/survival); Money (access to wealth) and Status (Power hierarchy).
- Darwinian evolution – Genealogy + Context/Environment and adaptation to change. Fittest survive by having access to most energy, knowledge, matter and human beings [Power = Energy]
- Money is derivative, but he who controls money influences human world and climate change outcome [back to politics]

Global Warming is System Change, driven by Energy and Human activity

- Earth is heated by solar energy and moved by gravitational force
- Plant life converts sunlight into matter through photosynthesis and animal life uses energy from food to survive or dominate other species, but there were natural checks and balances
- Humans caused Anthropocene climate warming by using fossil fuels, but ignoring carbon emission, pollution, destroying irreplaceable natural biodiversity.
- Technology may bring technical solutions or options, but complex politics prevent any cooperative action.

Climate Change is the Existential Challenge, but solutions stalled by Politics

In nature nothing exists alone.

Nature has introduced great variety into the landscape, but *man has displayed a passion for simplifying it*. Thus he undoes the built-in checks and balances by which Nature holds the species within bounds.

Knowing what I do, there would be no future peace for me if I kept silent.

Rachel Carson, Silent Spring 1962

Knowledge and Action are One, both fueled by Energy

- Soros Reflexive action between Cognitive Function (to know) and Manipulative Function (to Act) causes system to change.
- Every action has costs and benefits in terms of energy, knowledge and power transformation.
- But action is framed by Knowledge/Information/Technology and therefore whoever has the superior paradigm to control the most resources (power, energy, people etc) wins.
- Explains geo-politics of climate change, fossil fuels, trade, technology, 5G rivalry etc.

Open Giant Complex Systems

Qian Xuesen, 1993

- Systems exist everywhere in nature and in human society, e.g. solar system, human body, family, manufacturing enterprise etc. classified as natural or man-made, open or closed, dynamic or time—invariant, living or inanimate
- Example: human brain has 10^{12} neurotic cells, *interaction* between human beings involve data and complexity that is beyond existing computers to calculate with precision, even with AI.
- Reductionism underlying the exact science is not suitable to open complex giant system, and the only feasible alternative is the meta-synthetic engineering from the qualitative to the quantitative.
- One-track mind and piecemeal reform just does not work. Reform needs overall analysis, overall design, overall coordination and overall plan.

Section 3

Economics of Information

Moving to Post-Modern Paradigms?

Revolution of information economics: past and future

Joseph E. Stiglitz, NBER 2017

- Economics of information constituted revolution in economics, providing explanations of previously unexplained phenomena and upsetting longstanding presumptions, including that of market efficiency, with profound implications for economic policy. Information failures are associated with numerous other market failures, including incomplete risk markets, imperfect capital markets, and imperfections in competition, enhancing opportunities for rent seeking and exploitation.
- New paradigm explores implications of imperfect information for financial market regulation, macro-stability, inequality, and public and corporate governance; and recognizes endogeneity of information imperfections. Opens up consequences of recent advances in technology and policy challenges and opportunities presented for competition policy + privacy and transparency policy.

We live in Global Networked Knowledge Economy, with winner take all power laws

“The value of a network goes up as the square of the number of users”

(Metcalfe’s Law)



Quantum nature of Information Economy:

Knowledge can be replicated or corrupted at little marginal cost

David Orrell Quantum Economics (2018)

- Digitization of knowledge means information can be copied and replicated **at almost zero marginal cost. Innovation and change is continuous**
- Knowledge benefits from agglomeration - clusters and tight networks increase know-how faster than silos and islands.
- Classical science is physical-based, ignores relational virtual (negative) side – for every matter, there is anti-matter; for every asset, there is liability.
- **Key difference: Classical – EITHER/OR, Quantum – Bohr – Opposites are Complementary (Man and Nature are One; Yin and Yang are One).**
- We cannot ignore the Dark side of any policy: e.g. shadow price of National Security is rising exponentially.

Claude Shannon (1906-2001): Information Theory evolving into Knowledge, Know-how and Creativity/Imagination

- Shannon's "*A Mathematical Theory of Communication*" (1948) was foundational to information theory for rapid advanced in computing and telecommunications, but he excluded **meaning** from definition of information, very much like Cartesian theory excluded humanity to quantify natural laws.
- He saw information as "negative entropy", "information can be considered as order wrenched from disorder."
- Ilya Prigogine hypothesized that "out of equilibrium systems self-organize into steady states in which order emerges spontaneously, minimizing destruction of information.
- Cesar Hildago sees information as physical order, in which humans embody knowledge and know-how to create order out of disorder.

Quantum Economics: New Science of Money,

David Orrell, 2018

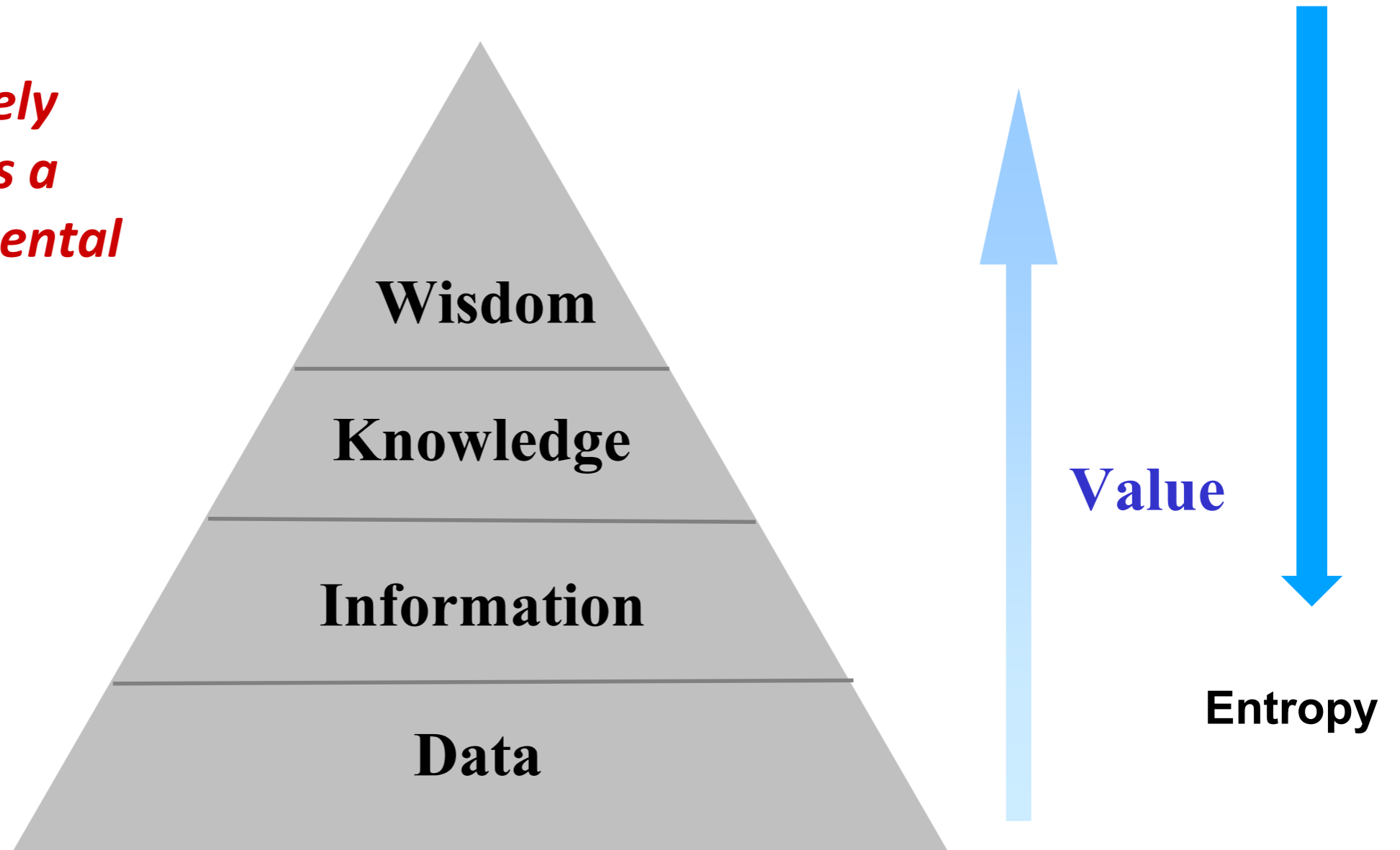
- Quantum social science suggests that decision-making process is analogous to wave function collapse of a quantum system, where system encompasses decision-maker's mind and their environment.
- Economy is non-linear, entangled, fundamentally indeterminate...prices do not reflect 'intrinsic value' and are context-dependent
- **Quantum ideas are perfectly suited to things like creation of money, entanglement through loans and other contracts, and credit default** – all of which at the heart of 2007/8 crisis, but nowhere in macroeconomic models

Quantum Accounting, Finance and Information

- Real economy and finance is described in inter-locking flow-stock (double-entry) accounting ledgers of information, in which all relationships are contractual, relational and entangled.
- Double-entry accounting implies that every asset (physical) has a liability (virtual or negative/anti-asset). E.g. intangible asset = non-measured asset; contingent liability = negative externality
- Financial derivative created from an underlying asset, and derivative can be supercharged (CDO to CDO2) at zero marginal cost!
- **Assets and derivatives are entangled** because unknown to holder of derivative, if asset impaired, derivative also impaired, in non-linear terms.
- Financial markets are dualistically entangled with often indeterminate, reflexive ways between entities.
- QE is manipulation of (central bank) Liability to affect Real Activities— huge externalities on distribution and politics (non-measured effects)

Information is property right with value:
no information, no market

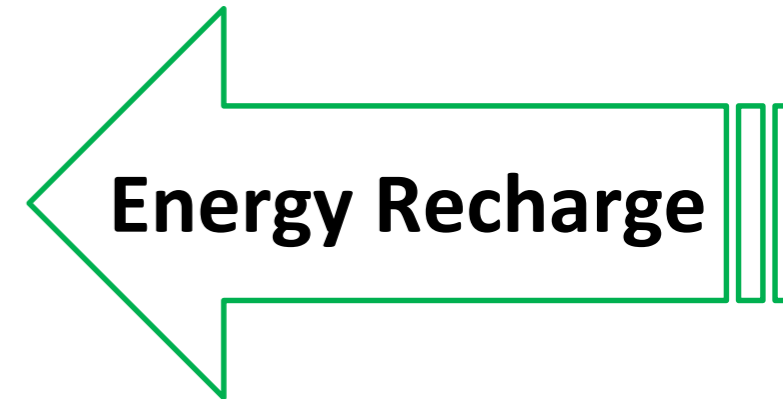
*Reliable, Timely
Information is a
Market Fundamental*



But Negative Information (Mis and Disinformation) also plays role in strategic decisions

Information is Physical – *Finance is information stored in ledgers (hierarchical or distributed) of networks*

Battery Leakage

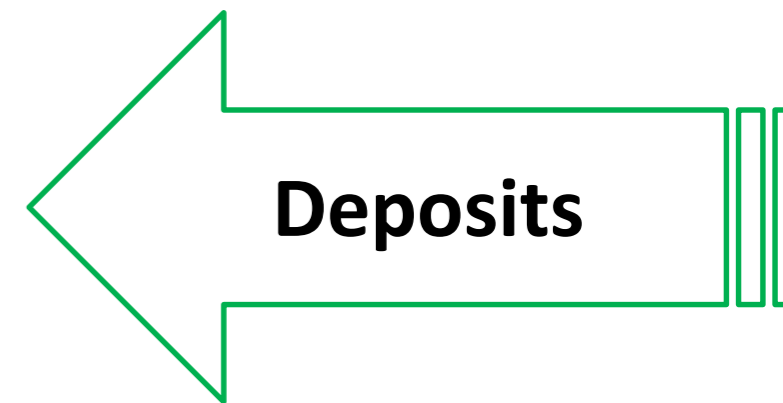


Value Destroyed

Value Stored

Value Creation

**Bank Leakage:
- NPLs, Shadow
Banks, etc.**



CGET view on Technology

Technological Disruption in Global Economy, INET, 2019

- Focus on GDP failed to represent tech progress
- Data is an asset and matters who controls it
- Tech transformation changes political economy through jobs. Traditional economic tools insufficient to deal with scale, monopolies on data and anti-competitive behavior
- Faultline of globalization shifting to tech sphere, where no clear boundary between commercial and national security concerns.

Trajectory of Economics of Information:

Mirowski (2019): economists moving into engineering of markets (experimentalist school) and Agent-based modeling (AI Big-Data)

THE HISTORY OF MARKETS AND THEORY OF MARKET DESIGN

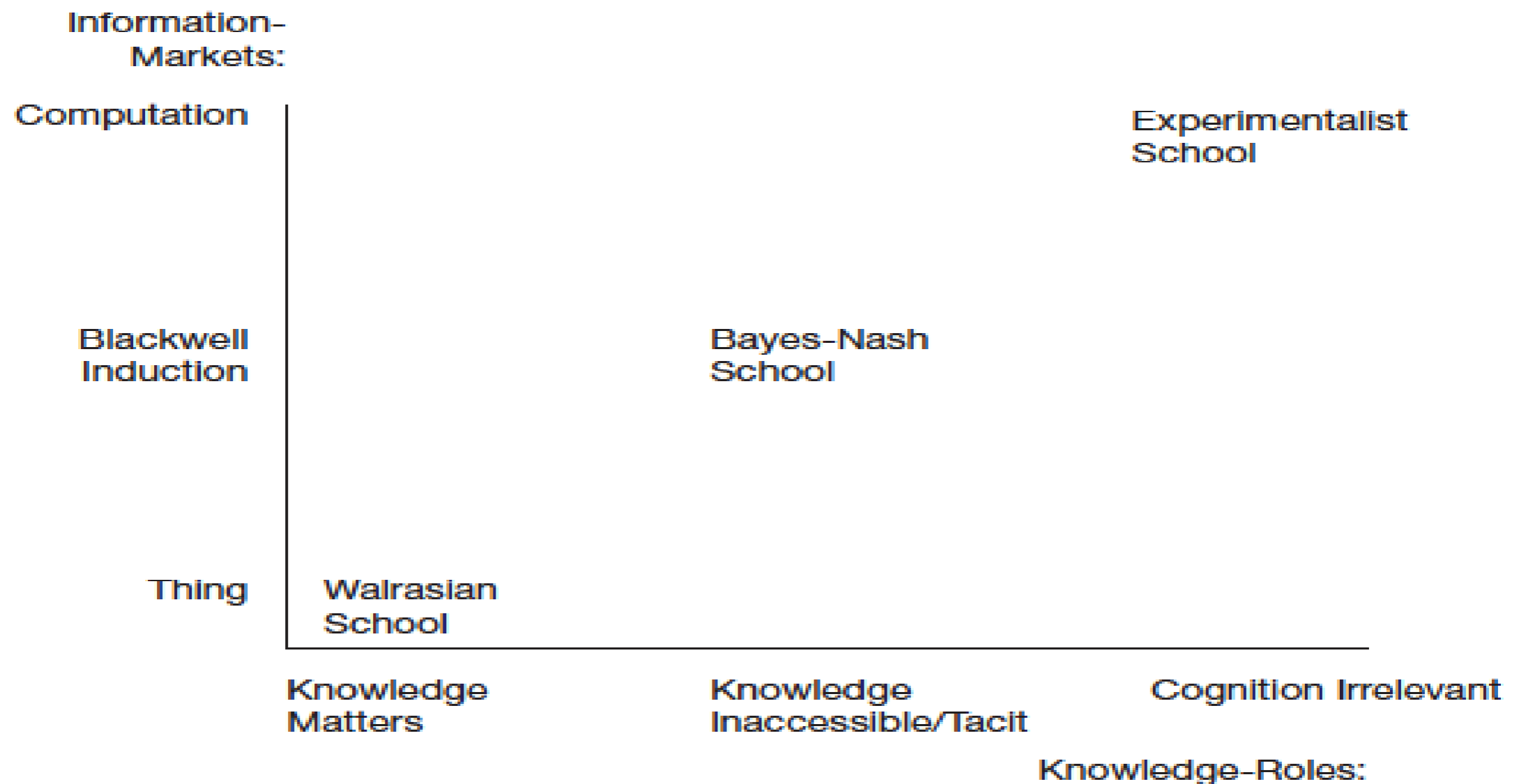


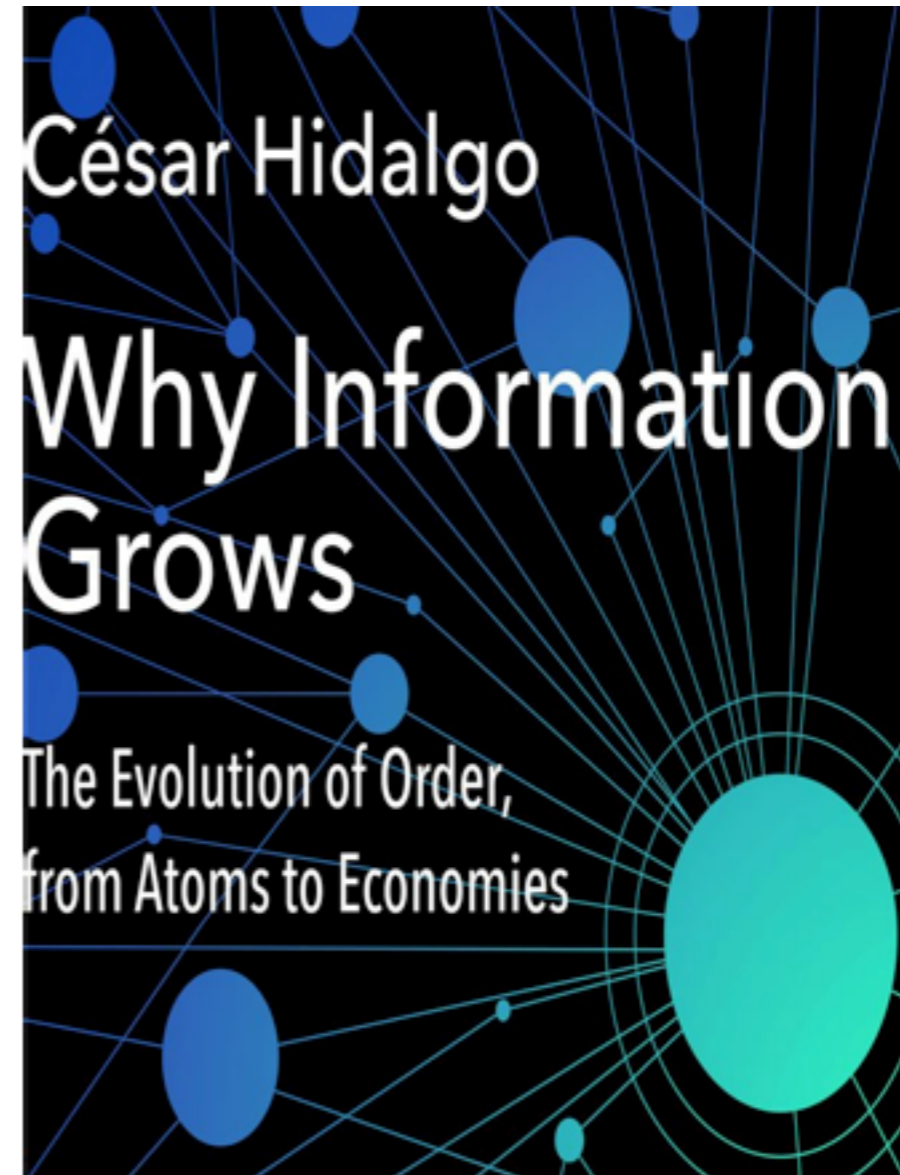
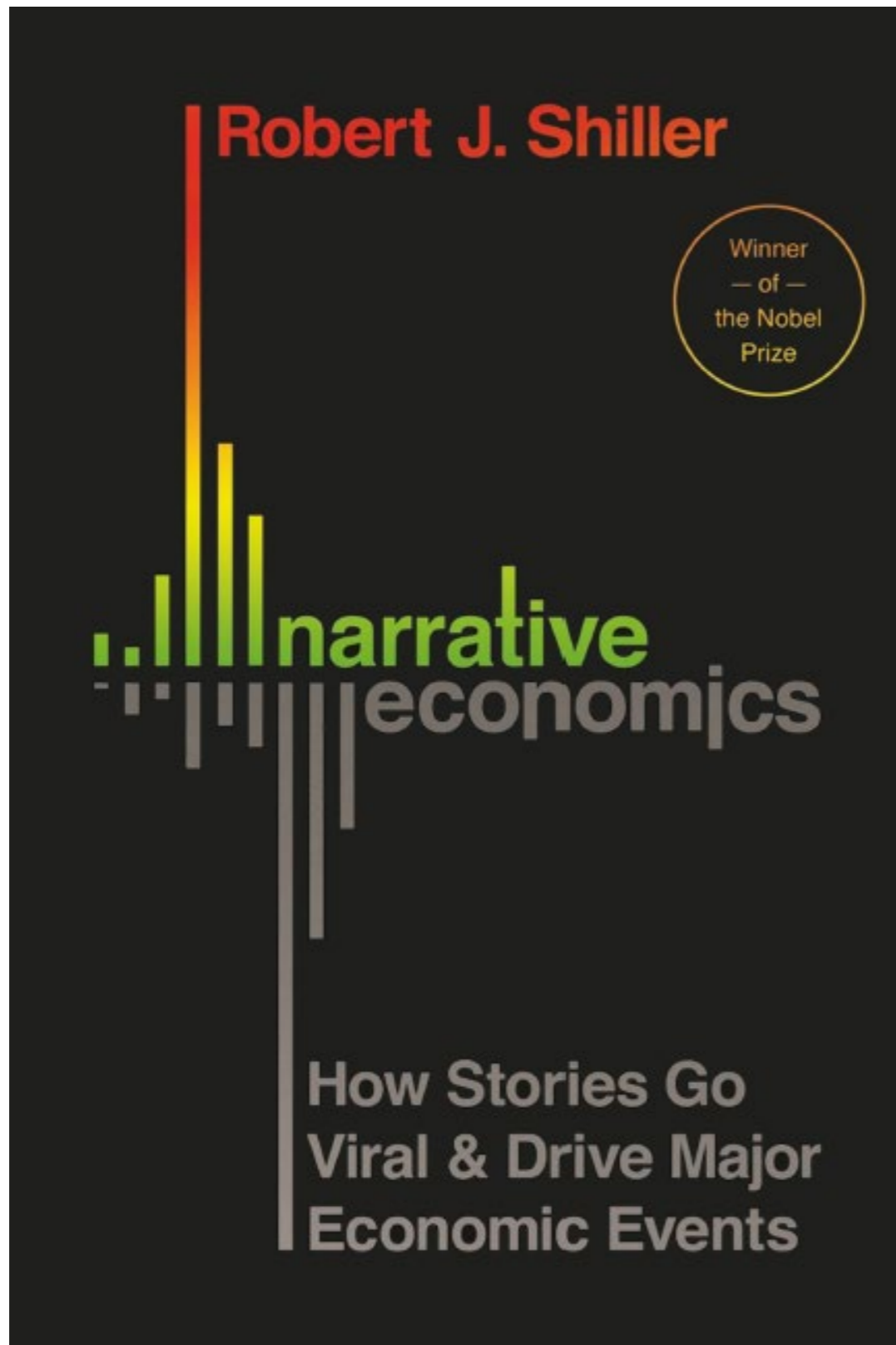
Figure 10.2. Orthodox Trajectory Through Information Space, II.

Different paths of economic thought

Alessandro Roncaglia: *Wealth of Ideas*, 2017

- The idea of representing all aspects of economic reality with a single, general model is considered excessively far-fetched
- In tackling specific aspects of reality, economists will thus find themselves working in different ‘analytic areas’, producing theories in general not reducible to one general ‘super-model’, but with common features deriving from common reference to the real world societies in which we live and the basic representation of them characterising the chosen research approach.
- Concepts, tools, processes, structures will compete and evolve over time.

Some alternative approaches



Life is a consequence of the ability of matter to compute (information)....Hildago

Tentative observations

- Business as usual (BAU) – no longer viable.
- Easy to criticize Old Paradigm, but not easy to construct practical, achievable New Paradigm (still in formation through diverse approaches)
- Unlikely one-size-fits-all solution, but most studies envisage several possible alternatives:
 - Global Leviathan (central or consensus compact to address global issues, e.g Climate Change, global taxation to fund global public goods)
 - Purposeful change – getting corporate and civil society to do more
 - Evolution through competition from diverse national models, such as Neoliberal, Scandinavian, Chinese, Thai Sufficiency Model etc
- **Is an integrated view possible? Let a thousand flowers bloom!**