

THE UNPRESTATABLE CONTEXTUAL EVOLUTION OF ECONOMIC WEBS

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- “If I knew what it was, I’d damn well already have invented it!”
John Maynard Smith.
- Theme: The evolution of the economic web is substantially unprestatable, is “context dependent”, and creates its own growing “context” that comprises its “Adjacent Possible”. This evolution is “sucked into” the opportunities it itself creates.
- 1) Evolution of a single “technology” versus evolution of the economic web linking all technologies. I want to explore the evolution of the economic web.

- 2) What is the “Economic Web”?
- 3) Economic Complements and Substitutes: Screw and screw driver are complements. Screw and nail are substitutes.
- 4) Two senses of “need”. I. The screw **NEEDS** a screw driver, its complement, to be of use. II. “Use” of screw and screw driver is for a purpose. We humans need to fasten things together. Ultimately, “demand” for a good or service depends upon our purposes and needs.

- 5) Economic opportunities are for unmet needs, in senses I and II above. Sense I is that a given technology “NEEDS” its complement to be of use. So new technologies will drive economic growth by “needing” new complements. That “need” is an economic opportunity. Sense II, we humans NEED word processing for its convenience in preparation of documents. Thus word processing emerges in the economic opportunity to fulfill that need hence demand.

- 6) The global economic web: The linked complements and substitutes including production functions of entire global economy
- 7) The global economic web has exploded from about 10,000 goods 50,000 years ago to 10 to the 8th or more now!
- 8) Why and how has this web exploded?

- 9) Above, each is complement of the next. These complements are the Contexts of one another and the contexts in which each successive innovation emerges. Word processing emerges in the economic opportunity given by the context of mainframe and personal computers, file sharing emerges in the opportunity given by the context of word processing and the invention of modems. The “opportunity” to share files “invites” the development of modems.
- 10) Personal computer does not cause but **ENABLES** the advent of its complement, word processing. Personal computer affords an opportunity to invent word processing. Beyond Cause to Enablement! Enablement is not in physics.

- 11) The Adjacent Possible of the Economic Web: Given the main frame and personal computer, word processing is an opportunity in the “Adjacent Possible” of the economic web. The Actual and the Adjacent Possible. What comes next in the Adjacent Possible emerges out of what is here now, ie, the Actual.
- 12) Algorithmic Adjacent Possible: Lego World, vast number of Lego blocks. Concentric rings with the vast number of Lego blocks in central circle. Ring one, all Adjacent Possible Lego structures one Lego attachment rule/move away. Same for circle two, out to infinity. The Lego block structures that exist NOW unleashes the Adjacent Possible of the Lego structures that can next be constructed by legal Lego moves.

- 13) New goods, services and production functions as new combinations: Parachute on Cessna rear is an air brake. Wright brother airplane is a new combination of propeller, wings, light gas engine and bike wheels. Brian Arthur makes same point in “The Nature of Technology: technologies are combinations of technologies.
- 14) New technologies grow out of what technologies now exist.
- 15) Thus the economic WEB grows by creating its own “opportunities” to grow into its Adjacent Possible.

- 16) THIS GROWTH IS OFTEN NOT PRESTATBLE AND NOT ALGORITHMIC.
- 17) THE NUMBER OF USES OF A SCREW DRIVER IN VIENNA TODAY IS INDEFINITE AND THOSE USES ARE UNORDERABLE. EG SCREW IN A SCREW, OR WEDGE A DOOR OPEN, OR TIE TO STICK AND SPEAR A FISH, OR...THUS NO ALGORITHM CAN COMPUTE ALL THE USES OF A SCREW DRIVER OR COMPUTE THE NEXT NEW USE OF A SCREW DRIVER.
- 18) BUT WE FIND NEW USES OF SCREW DRIVERS ALL THE TIME. EG JAMES BOND IN A CRISIS USES A SCREW DRIVER TO DO.... WHAT? OUT OF HOW MANY USES?

- 19) These NEW USES are typically UNPRESTATBLE!
- 20) These new uses are the heart of INNOVATION.
- 21) CrowdSourcing: Hey everyone, what is my new gadget useful for??
- 22) Then the innovative new uses of things is how the economic web expands unprestatble into its adjacent possible.

- 23) Japanese man in Tokyo, iPhone, crowded apartments, too many books; he uses the new iPhones of others to photograph THEIR books, sells their books and takes 5% as his profit!
Opportunity: crowded apartments, iPhone, market for books.
New business was his innovation.
- 24) The growth of the economic web is “sucked into” the Adjacent Possible it itself creates.

- 25) The number of uses of a screw driver depend upon the DIVERSITY OF THE CONTEXT. A screw driver cannot be used to do much by itself in empty space. But it can be used to do many things alone or with other things, (its context!) in Seattle 2017.
- 26) As new goods, services, production functions come into existence, they provide the growing CONTEXTS in which yet new goods, services and production functions can come into existence as their complements or substitutes!

- 27) The growing economic web thus explodes in diversity of complements and substitutes from 10,000 50,000 years ago to billions now.
- 28) The same is true for the evolving biosphere! The Surprising True Story of Patrick, Rupert, Sly and Gus Protocells

- 29) Models of the Adjacent Possible: Strogatz and Loreto, fits known data:
- 30) Polya Urn Model
- 31) Strogatz and Loreto augmented Urn Model of Adjacent Possible - Dynamics on expanding spaces: modeling the emergence of novelties

- 32) Extending Strogatz and Loreto for innovations in a single “lineage” without complements and substitutes to the stochastic generation of interwoven webs of complements and substitutes into their adjacent possible? It may be possible to do this in the near future.
- 33) No entailing laws for evolution of economic web, but hope for statistical laws