Rethinking the theoretical foundations of economics

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Abstract

This article offers a critique of orthodox (neoclassical and behavioral) economics and presents the outlines of a multilevel paradigm as alternative. Part 1 outlines prominent characteristics of the orthodox paradigm: individualism, socially disengaged behavior, ignorance as risk, utility-based wellbeing, and progress as economic growth. These characteristics are to be understood in terms of the conventional definition and purpose of economics as "the science that studies human behavior as a relationship between ends and scarce means which have alternative uses" (Robbins, 1932, p.15). Part 2 presents the multilevel paradigm, with its own definition and purpose of economics, as the discipline that explores how resources, goods and services can be mobilized in the pursuit of wellbeing in thriving societies, now and in the future. We describe the prominent characteristics of the multilevel paradigm: flexible, multiple levels of functional organization; the primacy of social relations, ignorance as uncertainty; multi-faceted, context-dependent wellbeing; and multilevel evolution as progress. In Part III, we show how the multilevel paradigm can be put to work in economic policy and practice at many levels.

Keywords: Economic paradigm, multilevel selection, methodological individualism, wellbeing, uncertainty

Introduction

Economics is a diverse field of inquiry with many schools of thought dating back to the 18th century. For the last 70 years, however, it has been dominated by a theoretical edifice that originated in 19th century efforts to create a "physics of social behavior" (Beinhocker, 2006; Hodgson, 2010). This involved a significant narrowing of the scope of economics, from Alfred Marshall's conception of economics as "a study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the use of material requisites of well-being" (Marshall, 1890, Book 1, Ch.1)[1] to a discipline concerned with the allocation and distribution of resources, focused on how scarce means are used to achieve predetermined ends.

This theoretical edifice came to rest on five basic assumptions: (i) individualism (i.e., individuals as the basic units of decision making), (ii) socially disengaged behavior (i.e., behavior generated by the pursuit of individual objectives subject to constraints, rather than by social interactions), (iii) ignorance as risk (i.e., as lack of information about realized values of variables with well-defined probability distributions), (iv) wellbeing understood in terms of utility (i.e., a single metric of wellbeing, based on consumption preferences, which can be revealed through economic decisions) and (v) progress conceived primarily in terms of economic growth (as this leads to increasing consumption opportunities).

These basic assumptions underlie neoclassical economics[2] and also, in attenuated form, behavioral economics.[3] They form the core of what we will call the "orthodox paradigm."

[1] The quote is noteworthy as coming from Marshall, a founder of neoclassical economics, which was responsible for the great narrowing in the scope of economic inquiry.
[2] Neoclassical economics focuses on the production, consumption and pricing of goods and services, driven by demands and supplies that originate from the independent decisions of individuals trading in economic markets.
[3] In behavioral economics (i) preferences and abilities are assumed to reside in the individual (though such preferences may be other-regarding), (ii) economic activity is conceived as the outcome of individual decisions rather than an emergent property of social relations, (iii) imperfect information is probabilistic, (iv) wellbeing is

The word "paradigm" dates back to the 15th century but today is associated primarily with the philosopher Thomas Kuhn (Kuhn, 1970). For Kuhn, a paradigm is an internally coherent system of thought that results in useful insights but also finds it difficult to escape its own assumptions. It defines a discipline by determining what is to be observed, what types of questions are to be asked, how the answers to these questions are to be structured, what kinds of empirical evidence is to be gathered in finding these answers, how empirical evidence is to be interpreted and what sorts of predictions are to be made. The ultimate purpose of a scientific paradigm is to enable us to navigate our environment successfully – avoiding dangers and exploiting opportunities predictably – and to shape our environment so as to reduce the dangers and augment the opportunities available.

Our proposed approach – which we call the "multilevel paradigm" – is sufficiently different as a configuration of ideas that it needs to be conceived and developed as a separate paradigm. The multilevel paradigm conceives economics as the discipline exploring how resources, goods and services can be mobilized in the pursuit of wellbeing in thriving societies, now and in the future.

Most of the major innovations in economics over the past half century have been conceived as deviations from the default paradigm of neoclassical economics. For example, the inclusions of adverse selection and moral hazard into microeconomic models are commonly portrayed as deviations from the neoclassical assumptions of perfect information or symmetric risk.[4] The inclusion of these phenomena into macroeconomic models are understood as deviations from the microfounded, neoclassical, market-clearing real business

utility-based (in the sense that wellbeing may be summarized in terms of a single utility indicator, though this indicator may depend on reference points and depend on whether utility is experienced, remembered or anticipated and though decision utility may be distinct from the wellbeing indicators), and (v) progress is assessed primarily with reference to consumption of goods and services.

[4] For example, the classic microeconomics textbook by Pindyk and Rubinfeld (2017), decisions under perfect information and clearing markets as well as general equilibrium are the default paradigm (ch. 1-16), while the final three chapters deal with "Markets with Asymmetric Information," "Externalities and Public Goods," and "Behavioral Economics."

cycle models or the New Keynesian models (which were themselves portrayed as departures from the microfounded neoclassical models).[5] Behavioral economics also grew out of well-defined deviations from neoclassical economics (the well-known behavioral "anomalies") (Thaler, 1992). By contrast, the approach proposed here is not conceived as a deviation from the orthodox paradigm. Instead, it is meant to represent a new point of departure for economic theory, which needs to be developed as a coherent body of thought, inviting its own "deviations." As an economic paradigm, it aims to be a coherent structure for organizing thought on economic activity and making sense of economic interactions, with significant explanatory power. As such, it differs from the "heterodox" and "pluralist" economics movements (for example, Davis, 2006; Foldvary, 1996; Lawson, 2005) that do not adhere to any particular paradigm and thus cannot offer such a coherent structure.

We approach economics from the perspective of evolutionary science. A mature evolutionary account of economic systems requires developments in evolutionary science that are very recent. Starting in the closing decades of the 20th century, evolutionary thinkers went back to basics by defining Darwinian evolution as any process that combines the three ingredients of variation, selection, and replication. In addition to genetic evolution, this includes epigenetic evolution (changes in gene expression rather than gene frequency), forms of social learning found in many species, and forms of symbolic thought that are distinctively human (Deacon, 1998; Jablonka & Lamb, 2006). Multilevel Selection (MLS) theory, which is central to our approach, has recently been revived in evolutionary science (Okasha, 2006; Wilson, 2015; Wilson & Wilson, 2007), especially in the case of human cultural evolution (Henrich, 2003, 2015; Turchin, 2005, 2015).

The prominent characteristics of the multilevel paradigm contrast sharply with those of orthodox economics:

[5] For example, the classic macroeconomics textbook by Romer (2019), where the chapter on "Nominal Rigidity" is deviation from the market clearing neoclassical "Real Business Cycle Theory."

(i) **Flexible, multiple levels of functional organization**: We claim that humans are not consistently individualistic decision makers. Rather, they function at flexible, multiple levels of functional organization, extending from individuals to social groups of various sizes and compositions. These networks of nested and overlapping communities constitute the "meso level" of economics, lying between the micro level of the individual and the macro level of the nation, and are essential organizers of human behavior.

(ii) **The primacy of social relations**: Economic behavior is rarely if ever socially disengaged. Instead, most economic interactions are to be understood as permeated by social interactions. In particular, economic decisions usually arise in the context of value-driven narratives. Values motivate behavior, shape the identification of causal relationships, and promote group-level functional organization. Furthermore, the socially permeated economic interactions can be viewed as a strict subset of the totality of social interactions. Economic activities and human wellbeing depends critically on which interactions are conducted through economic markets and which are left in the non-economic social sphere.

(iii) **Ignorance as uncertainty**: Ignorance involves not just risk, but also radical uncertainty. Most economic decisions are made, at least in part, in response to uncertainty – ignorance concerning the relevant probability distributions, the domain space and even the conceptual space for analysis.

(iv) **Multi-faceted, context-dependent wellbeing**: Wellbeing cannot be assessed through the single metric of utility, depending primarily on the consumption of goods and services. Rather, wellbeing encompasses multiple needs and purposes that are not well substitutable for one another. These needs and purposes include those underlying the two capabilities that have made homo sapiens so successful in the evolutionary process: cooperation beyond enlightened self-interest and innovation. Cooperation beyond self-interest is driven by the need for social solidarity (a sense of social belonging) and innovation is driven by the need for agency (the ability to shape one's prospects through one's own efforts),

together with elaborate feedback effects. These constituents of wellbeing are not closely related to the consumption of goods and services. Though we can and do trade off these multiple dimensions of wellbeing against one another, these tradeoffs tend to be highly context-dependent, so that we do not have some time-invariant measuring rod for overall wellbeing.

(v) **Multilevel cooperation and innovation as progress**: Encompassing social progress – in the sense of human flourishing – involves more than consumption-oriented economic growth. Rather, it also includes the pursuit and satisfaction of the needs for social solidarity and personal agency. Thus, economic progress (in terms of rising consumption opportunities) can become decoupled from social progress. When this happens, it calls for a process of purposeful cultural evolution whereby civil society, government and business change their behavior to "recouple" economic progress with human flourishing.[6]

On this basis, the gist of the multilevel paradigm may be summarized as follows. Economics cannot be understood as a self-referential intellectual silo. Instead, economic activities are embedded in the natural world, subsisting from it and transforming it. They are also embedded in society (conceived as the sum of all interactions among humans) and polity (conceived as the subset of social interactions dealing with the allocation of power). Some of the social interactions, taking place within the rules of the polity, can be anonymized sufficiently to become economic transactions. Over the past three centuries, a wide variety of non-economic social interactions have been transformed into economic activities.

The evolution of economic activities can be understood in terms of the economic counterparts of variation, selection and replication, namely: stochasticity, multilevel selection and cultural transmission. First, stochasticity covers all events that cannot be foreseen probabilistically, such as technological innovations (had they been foreseen, they would have

[6] For analyses of how economic progress has become decoupled from social progress over the past few decades and what recoupling involves, see for example Kelly and Sheppard (2017) and Snower (2018, 2019a,b).

occurred earlier). It is on this account that our ignorance involves uncertainty. Second, multilevel selection involves selecting outcomes or planned outcomes from the stochastically available alternatives. In the domain of people, the unit of selection may be the individual or the social group. The group can become the unit of selection when individuals – driven by internal mechanisms (such as moral values) and external mechanisms (such as institutions) – cooperate consistently in the pursuit of collective purposes. Levels of selection may change through time since humans are flexible in their ability to pursue individual and collective goals. Third and finally, cultural transmission involves the spread of selected ideas, intentions and behaviors, enabling people to acquire skills that they could not have developed over the course of their own lifetimes. Thus, skills are also located at various levels of functional organization. The processes of selection and transmission help people adapt to ever-changing circumstances.

Human well-being is the product of selection and transmission, in response to stochasticity. Our wellbeing is multifaceted (covering material, agentic and communitarian needs and purposes) and context-dependent (so that the relative salience of our various individual and collective goals depends on our physical and social contexts). Consequently, it is not useful to integrate all components of wellbeing into a single metric and progress should be assessed not just in terms of economic growth, but also in terms of meeting our needs for empowerment, social solidarity and sustainability.

In the following section we summarize the prominent features of orthodox economics and highlight difficulties that the multilevel paradigm shows promise of overcoming. Next, we introduce multilevel economics as work in progress. It is not meant to be conclusive in any respect, but rather recognizes that our economic environment is continually changing and thus our means of navigating and managing this environment must continue to change as well. Finally, in the last section we examine some practical applications of multilevel economics.

Part 1: Orthodoxy and its discontents

In examining the orthodox paradigm, we begin by considering neoclassical economics and then proceed to behavioral economics.

The orthodox definition and purpose of economics

Most introductory textbooks define economics as the study of how people use scarce resources to satisfy their predetermined, unlimited desires. Accordingly, the purpose of economics is understood as the analysis of the allocation and distribution of resources in relation to people's given desires for goods and services.

This conception of economics was popularized by Lionel Robbins in the 1930s and remains authoritative to the present day. He defined economics as "the science that studies human behavior as a relationship between ends and scarce means which have alternative uses" (Robbins, 1932, p.15).[7] All the other standard definitions of economics are merely variants on this theme. For example, Samuelson's influential definition is: "Economics is the study of how people and society end up choosing, with or without the use of money, to employ scarce productive resources that could have alternative uses, to produce various commodities and distribute them for consumption, now or in the future, among various persons and groups in society. It analyzes the costs and benefits of improving patterns of resource allocation." (Samuelson and Temin, 1976, p. 3).

[7] It is paradoxical that Robbins focused his definition of economics on scarcity during the Great Depression, characterized by excess supplies of labor and capital. On this account, the Robbins definition of economics was contested until around the 1960s, after which it became almost universally accepted among economists. A thoughtful account of this transition is given by Backhouse and Medema (2009).

Implications of the orthodox conception of economics

The Robbins definition has been so influential because it identifies economics as concerned with a particular conception of human objectives and behaviors, as well as the functional organization of economic decision-making units. The definition implies that the purpose of economics is to explain how best to satisfy unlimited consumption wants through the allocation and distribution of resources. At least with regard to the analysis of this allocation and distribution of resources, the consumption of goods and services is implicitly assumed to be the fundamental source of wellbeing. An individual's wellbeing springs directly from consumption – rather than from something else such as relationships of care and belonging – which consumption may or may not promote. Or, in the terminology of economics, an individual's utility depends on the amounts of goods and services consumed. Each individual's consumption wants are to be understood as "given," as if hard-wired in the individual's psyche. The purpose of economics, in sum, is to analyze how to analyze and distribute resources so that people can gain maximum utility from their consumption.

The existence of unlimited wants alongside limited resources implies that people never have enough resources to satisfy all their wants. On this account, resources are inherently scarce. The problem of scarcity is regarded as *the* fundamental problem of economics. At the microeconomic level, you can't have everything you want and thus you need to satisfy your wants efficiently with the resources that are available to you, i.e. use your resources in such a way that your make yourself as well off as possible in terms of want-satisfaction. At the macroeconomic level, a country can't fulfill all its citizen's wants and it should use its resources efficiently to satisfy these wants.

Thus, the economic notion of "efficiency" is the key to dealing with the problem of scarcity. Efficiency is the state in which it is impossible to improve one outcome without hurting another outcome. At the microeconomic level, an individual uses resources efficiently

when it is impossible to become better off through any alternative use of the resources. A commodity is produced efficiently when it is impossible to produce more of the commodity with alternative methods of using the resource inputs. Allocative efficiency is achieved when it is impossible to increase the production of one commodity without reducing the production of another commodity.

At the macroeconomic level, Pareto efficiency is achieved when it is impossible to make one person better off without making another person worse off. This involves allocative efficiency and efficiency in the distribution of commodities among individuals. Efficiency at the macroeconomic level can be achieved only through efficiency at the microeconomic level (efficient use of resources by individuals and efficient resource use across individuals within markets).

Beyond efficiency, a country's "social welfare" is commonly understood as some aggregation of the citizens' welfares, in terms of their consumption-based utilities. In this context, the aim of economic policy is to achieve the resource allocation and the commodity distribution that maximizes social welfare. Achieving this social optimum requires production efficiency, Pareto efficiency, as well as a distribution of commodities among individuals in accordance with the utilities they derive from their consumption of these commodities.

The concept of scarcity is closely related to the well-known notion that "there ain't no such thing as a free lunch," which is so widely held in economics that it is widely known by its acronym "TANSTAAFL."[8] In other words, you cannot get something for nothing, which economists interpret as "you cannot satisfy yours wants without paying something in terms of scarce resources." This notion underlies the crucial economic concept of "opportunity cost," which is the cost of a choice in terms of not enjoying the benefit of the next-best alternative. In other words, each choice requiring the use of resources implies a loss of potential gain from

[8] An influential book bearing this acronym is Utt (1949).

an alternative use of these resources. The Nobel Laureate James Buchanan has described opportunity cost as "the basic relationship between scarcity and choice" (Buchanan, 2017, p. 520). The efficient use of resources requires awareness of their opportunity costs.

Another important aspect of the Robbins definition is that, as long as the satisfaction of human wants requires the use of resources, anything can fit within the purview of economics. In Robbins' words, "any kind of human behaviour falls within the scope of Economic Generalisations. … There are no limitations on the subject-matter of Economic Science save this" (Robbins, 1932, p. 16). This approach set the stage of subsequent "economics imperialism," namely, the application of economic analysis to many aspects of human life lying beyond the allocation of resources and the distribution of commodities, such as the family (Becker, 1981, 1991), religion (Iannaccone, 1998), tastes (Becker, 1996), crime (Becker, 1968), and war (Friedman, 1984), as well as other disciplines such as sociology (Becker and Murphy, 2001; Swedberg, 1990), anthropology (Dasgupta, 2008; Fernández, 2008; Lazear, 1999), law (Coase, 1978; Friedman, 2000; Polinsky & Shavell, 2008; Posner, 2010), and political science (Tullock, 1972).

Problems with the orthodox conception of economics

The Robbins definition of economics – along with the related concepts of scarcity, efficiency, opportunity cost – are problematic for four main reasons: 1) an empirically misleading conception of human objectives; 2) an empirically questionable reliance on individualistic organization of decision making; 3) an empirically misleading denial of decision-making under radical uncertainty; and 4) an inappropriate basis for promoting human wellbeing.

First, this definition of economics is based on a conception of human objectives and behaviors that is at odds with the empirical evidence[9] from within and outside the economics

[9] For decades behavioral economists have been collecting "anomalies" with regard to the predictions of neoclassical economic analysis. (See, for example, Thaler, 1988.) Further contrary evidence comes from the

discipline. It is unwise to define a discipline in accordance with behavioral principles that are misguided. The objectives of individuals are not "given" (predetermined). Our objectives are influenced profoundly by our social and physical contexts. For example, when we make our decisions in social settings that are individualistic, grasping, materialistic, competitive, and selfish, our appetitive and competitive motivations are stimulated. But when we make our decisions in a cooperative, supportive, kind and compassionate settings, our caring motivations are stimulated. Different motivations are associated with different objectives. We can influence our objectives by choosing the social setting in which we make our decisions.

Furthermore, people's non-positional wants are not necessarily unlimited. There is only so much food that we can eat and only so much clothing that we can wear. What is potentially unlimited are our positional desires (Frank, 2011)[10]. The struggle to outdo the others is endless. For every winner, there is a loser whose positional desires have remained unsatisfied. But we have some influence over our positional desires as well. By choosing our social settings, we can get locked into battles for power and status, or live in mutually supportive communities of care.

Beyond that, people's objectives are all reducible to the individualistic enjoyment of the consumption of goods and services, in the sense that people either seek consumption per se or pursue goals that are associated with the individualistic enjoyment of such consumption per se. There is ample evidence from other social sciences that the value people impute to the consumption of goods and services is not necessarily associated with their individualistic consumption per se, but rather derives from their social relationships, generating needs and purposes, such as social belonging, love (promoting the wellbeing of others) and compassion (mitigating the suffering of others), social status, empowerment (shaping their environment

psychology, sociology and anthropology literatures. (See, for example, Henrich, 2017, 2020 and Akerlof and Kranton, 2010.)

[10] Frank makes the elementary point that when it comes to evolution, „life is graded on a curve". In other words, traits evolve on the basis of their fitness relative to other traits, not their absolute fitness.

and prospects through their own efforts) and achievement (pursuing and reaching goals that produce social esteem).

Second, the definition of economics implies an individualistic organization of economic decision making. It is individuals who are assumed to make the decisions concerning the alternative uses of their scarce resources to satisfy their own ends. Scarcity sets the relevant constraints on the attainment of individual objectives. Only when individuals use resources efficiently can these resources be used efficiently in the economy as a whole. Thereby the definition of economics presupposes methodological individualism.

Third, efficiency is considered to be a necessary condition for the achievement of socially desirable economic outcomes. Social optimality at the macroeconomic level cannot be achieved without efficiency at the microeconomic level. The fundamental problem of economics is implicitly conceived as dealing with a known relation between human ends and their scarce means. The human ends, the limited resources and the technologies that can transform the resources into commodities that satisfy the human ends are all assumed to be known by individuals, at least probabilistically (in terms of known probability functions). It is on this account that efficiency becomes essential in achieving socially desirable outcomes. If we recognize that the relationship between human ends and means, along with their alternative uses, is often unknown – that is, probabilities cannot be assigned to alternative states of the world, the domain of possibilities is not fully known, and the appropriateness of our concepts for understanding our environment is open to question – then it is no longer appropriate to conceive of economics as the study of the relationship between given ends and scarce means. In that event, other criteria of success, such as resilience, become important.

Fourth, since people's well-being is not restricted to the individualistic enjoyment of consumption, the commonplace depiction of individual utility in terms of consumption is not necessarily conducive to analyzing how humans can find ways of achieving wellbeing. The reason is that the satisfaction of people's other sources of well-being – belonging, care, status,

empowerment, achievement – may call for a different allocation and distribution of resources than what is appropriate for the satisfaction of consumption desires. If the purpose of economics is conceived as finding ways to maximize utility from consumption, then it may not be particularly helpful as a tool for discovering how to lead more meaningful and fulfilling lives through our use of resources.

Challenges to the orthodox paradigm

In this section we consider some fundamental weaknesses of the orthodox paradigm. Each of these weaknesses will be addressed by the central features of the new paradigm, outlined in Part 2.

Individualism

The orthodox paradigm assumes that economic decisions are invariably made by individuals. Each individual is assumed to have well-defined preferences, perceptions, beliefs and constraints.

In neoclassical economics, the preferences are assumed to be internally consistent and they constitute both the decision objectives of the individual and the measure of individual wellbeing. In behavioral economics, the preferences need not be internally consistent (such as in the case of loss aversion or hyperbolic discounting), but they are determined by fixed rules (such as the axioms of prospect theory) that are assumed to be timeless.

The individual's perceptions are assumed to be defined by her information set, which is conceived as a subset of the comprehensive information set on which the "real model" of the economy runs. The individual's information set may be updated as the individual learns about the "real economic model."

The individual's beliefs are assumed to obey the axioms of probability theory (the Kolmogorov axioms). Under the rational expectations hypothesis (a common feature of

neoclassical economics), the individual's beliefs are such that systematic expectational errors are impossible, subject to the individual's information set. In behavioral economics, systematic errors are possible on account of well-defined heuristics and biases.

The constraints that the individual faces are assumed to be the product of either the features of the "real economic model" or the features of the individual's beliefs.
The individual decision maker, who makes all decisions in the orthodox paradigm, is either a person or perfectly cohesive group of individuals (such as a household, firm, bank or government), making decisions in the same way as a person does (pursuing well-defined objectives with well-defined perceptions, beliefs and constraints). Orthodox economics ventures beyond individualist decision making, allowing for the possibility that people within an organization may pursue disparate goals, only by appealing to principal agent theory and contract theory. In principal agent theory, the "agent" is an individual who can make decisions that impact the "principal," an individual who runs the organization. The interests of the principal and agent may diverge from one another and the agent may have more information than the principal. The principal's aim then becomes to design a contract ensuring that the agent acts as closely as possible in the principal's interests, in view of the information asymmetry and economic interdependence. These contractual arrangements are the subject of contract theory. The principal and agent are understood as individuals, with well-defined preferences, perceptions, beliefs and constraints.

By contrast, the new paradigm recognizes that human decisions are made both individually and collectively. Individuals make collective decisions when they participate in the wellbeing of a social group, their objectives are formulated with respect to the group, their knowledge (from their perceptions and beliefs, shaping their constraints) is distributed across the group, and their actions are the outcomes of group interactions.

Regarding objectives, there is ample empirical evidence that people's decision objectives, perceptions, beliefs and constraints do not reside wholly in the individual, as if

hard-wired in the individual's mind (Shteynberg et al., 2020). Rather, people can also pursue collective objectives, such as they do when they follow social norms, share common moral values, or vote for their elected representatives (knowing that elections are never decided by a single vote). These collectives can encompass a diversity of social groups, e.g. the family, the neighborhood, the occupation, the colleagues at the workplace, the nation, the religious community, and so on. The need to participate in such collectives stems from our evolutionary past, in which *Homo sapiens* promoted their chances of survival and propagation through their participation in flexible social groups, designed to address challenges faced by these groups (Grove et al, 2012).

From the need to participate in collectives as an instrument of symbiosis come not only the pursuit of common goals, but also common perceptions and beliefs, generated through networks of mutual influence and regard. In these senses, goals, perceptions, beliefs and constraints may reside not only in individuals, but also their collectives.

Socially disengaged economic behavior

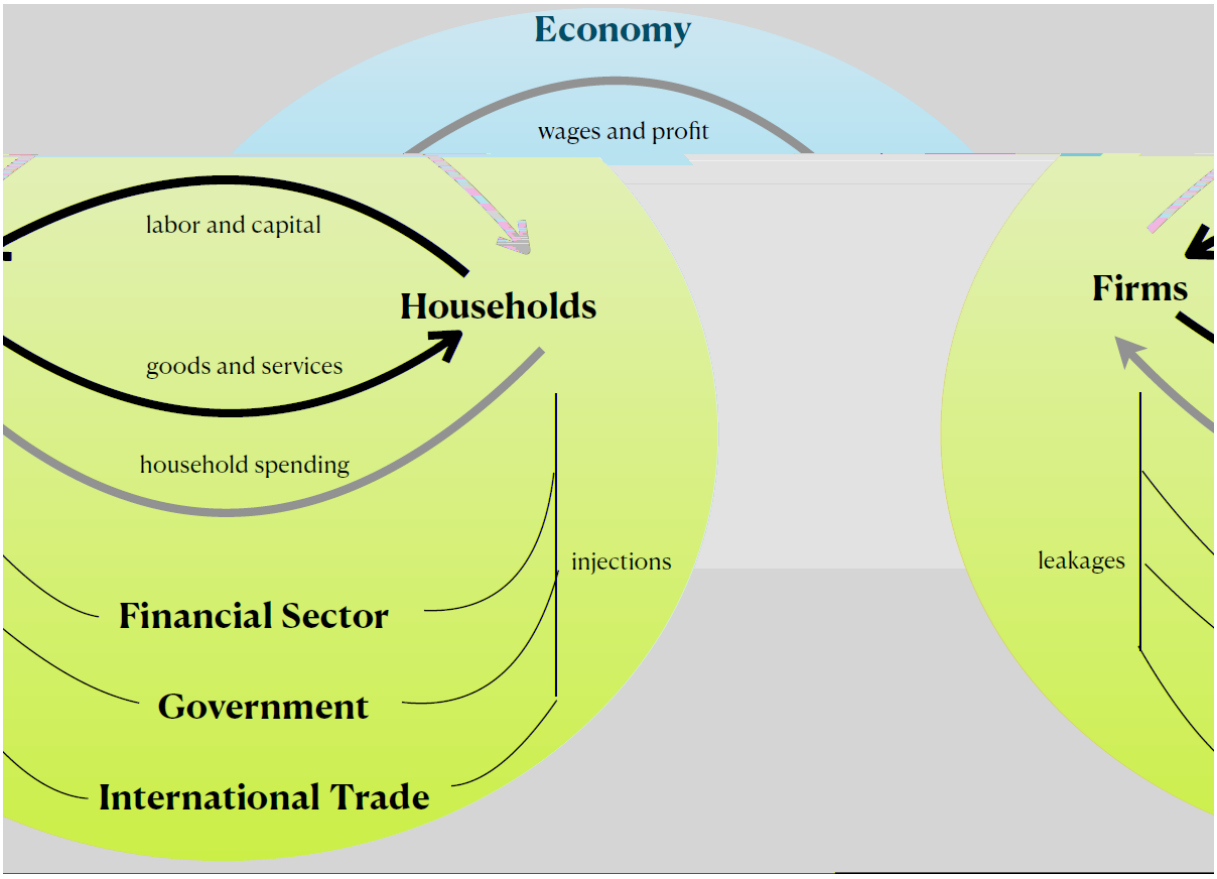
In the orthodox paradigm, economic behavior is socially disengaged. This means that an individual's economic behavior is generated by how they individually value the goods and services per se, not by the social relations among individuals. Economic agents are assumed to pursue their predetermined individual objectives subject to constraints. These objectives need not necessarily be egotistic; behavioral economics highlights the possibility that individuals may have "social preferences," i.e., their objectives may depend on the degree to which other individuals attain their objectives. In this framework of analysis, economic interactions are not grounded in social interactions. Even when individuals have social preferences, their welfare depends on other people's welfare outcomes, but not on the nature of the social relations within societies. Economies are viewed as independent of societies. This is the sense in which orthodox economics is socially disengaged.

This social disengagement is apparent in the conventional conception of the structure of the economy, which identifies the most important relations among economic decision makers.

The circular flow

This conception may be summarized by the most well-known diagram of macroeconomics: the **Circular Flow** diagram, first conceived by Paul Samuelson in his path-defining economic textbook.

Figure 1: Circular Flow



This diagram (Figure 1) shows how national income and product flow around the economy. Here the roles of consumers and workers are combined into a category labeled “households”. These households supply labor and capital to the firms, which send wage and profit income in

the opposite direction. Firms supply consumption goods and services to the households who pay for them (consumer spending). The financial sector uses the households' and firms' saving (income not consumed, viewed as a leakage from the circular flow) to finance the households' and firms' investment (additions to the physical capital stock, viewed as an injection to the circular flow). The government receives taxes (a leakage) and makes public expenditures (an injection). Through international trade, households and firms spend some of their incomes on imports (a leakage of income to countries abroad) and firms sell some of their goods and services abroad (an injection of income from abroad). Thereby the circular flow diagram is meant to provide a complete account of economic activities.

Observe that human interactions with the natural world, as well as human interactions with one another in the political and social domains, are omitted from this framework. Mainstream economics does little to explore how economic relations are embedded within political and social relations taking place within planetary boundaries.

Environmental scientists have pointed out that the natural world provides energy (in the form of renewable and non-renewable energy sources) as well as other raw materials (living and non-living matter) to the economy, while the production and consumption of goods and services releases heat and waste matter into the environment. Environmental economic models have extended the circular flow to take these interactions with the natural world into account. This means taking account of resource exchanges between the environmental and economic domains (for example, Nordhaus & Yang, 1996), the circular economy,[11] and economic activity within planetary boundaries (for example, Sterner et al., 2019).

Regarding politics, public policy can of course affect the leakages and injections into the circular flow of income (i.e. the government's tax receipts and expenditures, respectively). But that is all. What is missing in the circular flow diagram is an awareness that a country's

[11] For example, Ellen MacArthur Foundation (2020), and www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail .

legal and political framework defines the channels whereby the economic exchange in market economies takes place. Since countries differ markedly in terms of their institutions and legal practices, the rules whereby goods and services are bought and sold and the rules whereby these transactions are financed must differ accordingly. These differences are largely overlooked in macroeconomics.[12]

Regarding society, the interaction of the economy with society is missing from the economist's circular flow. Identity economics (Akerlof & Kranton, 2010) makes a revolutionary contribution by showing how economic activity influences and is influenced by people's choice of social belonging. It is a seminal step towards recognizing that economic relations are merely a subset of social relations, where the latter is to be understood in the context of non-commodified interactions.

Several other factors contribute to the oversight. Economic analysis focuses almost exclusively on utilitarian consequentialist values; that is, people are assumed to pursue the activities that yield most "utility," depending primarily on consumption of goods and services. There is no explicit description of the possibility that goods and services may derive their value from the social relations in which their exchange is embedded.

In addition, economics adheres rigorously to methodological individualism (the principle that the behavior of social groups can be explained exclusively in terms of individual motives, not in terms of group dynamics), so that the "firms" and "households" are to be conceived as individual decision makers with predetermined objectives. There is no recognition that these objectives may be the outcome of social relations.

The literature on happiness and wellbeing either conforms to these limitations (for example, Layard, 2005) or is not closely tied to mainstream economic analysis.[13] On these

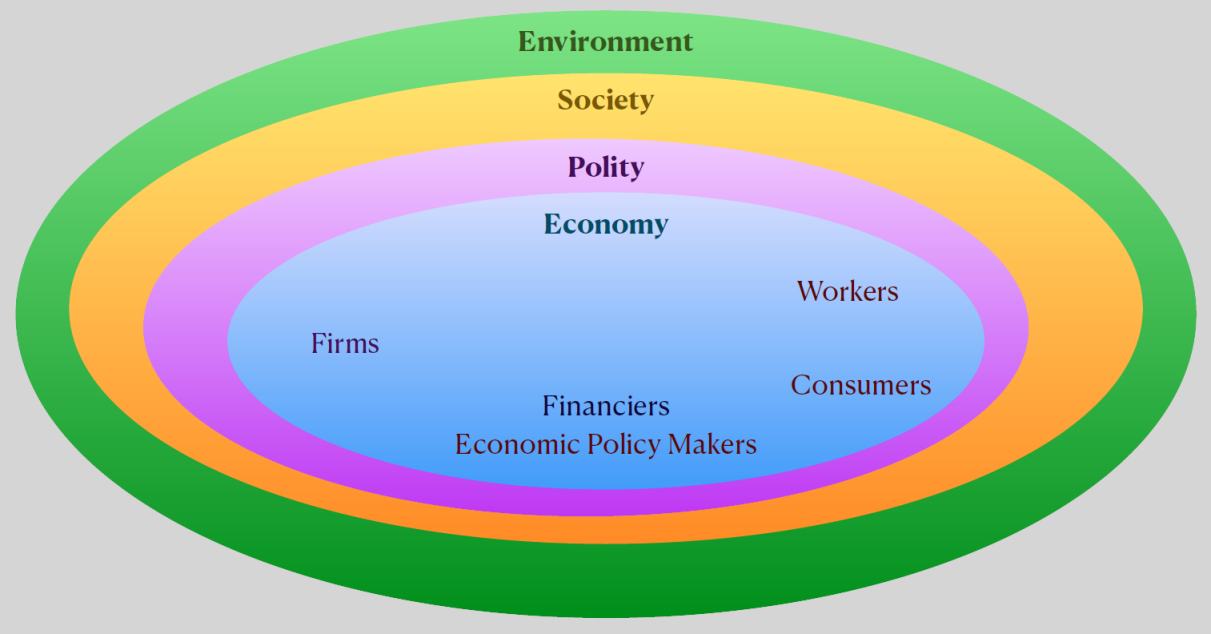
[12] The phenomena considered in the subdiscipline of political economy only skim the surface, since they do not cover the many differences in institutions and rules providing incentives and constraints for economic exchange.
[13] Lima de Miranda and Snower (2020) take a step towards incorporating agency and solidarity into economic analysis.

accounts, economics becomes blind to collective sources of wellbeing or wellbeing that is derived from doing the right things (deontology) or being a good person (virtue ethics). In the context of individualistic, consumption-based utilitarianism, there is little opportunity for understanding of the role society plays in shaping economic activities.

The socially embedded economy

In response to these considerations, the structure of the economy underlying our paradigm can be pictured in terms of the "socially embedded economy" of Figure 2.

Figure 2: The Embedded Economy



The broadest domain is the "**environment**," the natural world, within which all our activities take place.

Within this context lies the second domain, "**society**," the aggregate of all groups of people living in persistent interactions with one another. These social groups may be small (such as families) or large (such as nations), and they may comprise groups of groups. Most broadly, society may be conceived as the sum total of all human relationships.

In the absence of society, there are no interactions among people and consequently no political or economic interactions either. Different cultures are associated with different social interactions, which generally imply different political and economic interactions. This explains why there is more economic exchange among people who trust one another than among those who don't.

The third domain is "**polity**," the aggregate of all organized forms of institutionalized social relations that involve allocating power and mobilizing resources. It refers to groups of people organized for governance and refers to "a distinctive form of rule whereby people act together through institutionalized procedures to resolve differences, to conciliate diverse interests and values and to make public policies in the pursuit of common purposes" (Crick, 2004, p.67). Polity arises from society. Without groups of people living in persistent interaction, there would be no need for polity. In particular, polity is the subset of social interactions involving institutional relations to allocate power and mobilize resources.

Polity sets the rules whereby economy functions. These rules determine the channels whereby production, distribution, consumption and exchange take place. The most basic rules governing a market economy are laws of property, contract and crime. Since these and other economically relevant rules differ across countries, the market economy tends to function differently in different countries.

In the absence of polity, we have "failed states," where laws of property, contract and crime are not observed. Under these circumstances, the market economy cannot function, since powerful, selfish people will prefer to appropriate resources rather than conduct voluntary exchange. (Theft is not even definable in the absence of property rights.)

The final domain is "**economy**," the aggregate of all social relations involving the production, distribution, consumption and exchange of goods and services. The exchange generally occurs through a medium of exchange (money). A market economy is one where

the exchange is voluntary, in accordance with the demands and supplies of the economic decision makers.

These decision makers may be divided into broad groups depending on their economic roles: firms (producing goods and services), workers (supplying labor), consumers (demanding consumption goods and services), financiers (supplying financial services) and economic policy makers (producing public sector goods and services, imposing taxes and subsidies, and determining the rules of the economic game).

In short, environment represents the natural world of which we are a part; society represents the total of all human social relations; polity represents the subset of power-allocating institutional relations; and economy represents the subset of economic relations, conducted in the context of the power structures in the polity. All these domains of human interactions take place within our natural world (the environment). This explains why these domains are embedded within one another as pictured in Figure 2.

Moving from the circular flow of Figure 1 to the embedded economy of Figure 2 (in which the circular flow rests on the social relations among economic decision makers) involves a fundamental shift of perspective. Since society represents the sum total of all human social relations, the economy must be conceived as a subset of human social relations. People may decide to exchange goods and services outside economic markets, in the process of conducting their interpersonal relationships. They may, for example, give gifts to one another or perform services in fulfillment of social obligations. Other exchanges involve monetized, contractual relationships among people; these, by definition, take place within economic markets. There is no inviolable law of nature that determines which exchanges take place inside and outside the economy. Some exchanges – such as child labor services – took place within the economy at some times (e.g., during the early phase of the First Industrial Revolution), but remained outside the economy at other times (e.g., the feudal period in which children worked the fields for free and the modern times, when child labor has been made

illegal in many countries). Military services are performed outside the economy in countries that have the draft, but performed inside the economy in countries with a professional, paid military service. Some goods, such as human organs, are kept outside economic markets in most countries, on moral grounds.[14]

It is useful to think of the distinction between economic and social exchanges to be a difference of degree, rather than kind. At one extreme, there are gifts among people motivated by selfless love or care. These gifts do not entail any reciprocity. Many other gifts, however, do entail some reciprocity, even among adults within the same family or community. (When I bring a bottle of wine to your dinner party, I expect you to bring a bottle to mine.) The more remote the social ties, the greater is the need for equivalence or at least proportionality in the exchange. Most economic exchanges involve some degree of trust and thus rely on such equivalence. At the other extreme are pure commercial exchanges covered by complete contracts (very rare in practice), where the relation is purely economic and not social (since the transacting parties are anonymous).

This porousness of economic and social relations is ignored in mainstream economic analysis. On this account, economics has had little if anything to say about the growing "commercialization of life," whereby economic markets have penetrated more and more aspects of life, including medicine, education, art, sports and even family life. Mainstream economics usually treats economic exchanges as if they were purely contractual relationships among anonymous, self-regarding agents. Thereby the discipline misses an important force responsible for the success of Adam Smith's Invisible Hand, namely, the power of social expectations and obligations that accompany most economic transactions and constitute a major difference between vibrant market economies and failed states.

[14] Goods that are "not for sale" are analyzed in Sandel (2013) and Satz (2010), among others.

Ignorance as risk

The orthodox paradigm focuses on knowledge that is propositional; i.e., something that can be either true or false. This knowledge is "information," concerned with communicated facts. In order for a proposition to be knowledge, (i) it must be true, (ii) it must be believed and (iii) it must be justified.

If a proposition is either true or false, then propositional knowledge must be person- and perception-independent. In order for it to be believed, it must be unambiguous and transmissible without distortion. This conception of knowledge is consistent with the correspondence theory of truth. According to this theory, our beliefs are true whenever the mental representations of our internal world correspond to the objects and their relations in the external world. In order for knowledge to be justified, you must have a good reason for believing what you believe. Thus, knowledge depends on your exercise of rationality.

The truth condition ensures that our internal representations mirror external reality. The belief condition guarantees that we deem these true representations to be correct. And the justification condition ensures that we can be confident that our representations are indeed accurate. Within this framework of thought, orthodox economics focuses on information about objects (such as the price of apples) and phenomena (such as the relation between the price of apples and the quantity of apples demanded by a particular set of people), and this information may be unambiguously revealed to be either true or false.

Economists refer to gaps in our knowledge as "imperfect information." The term suggests that it is possible to have "perfect information" – which corresponds precisely to the objects and phenomena in the external world – but that such information is never available to us. Orthodox economics focuses on one particular type of imperfect information: risk. Under conditions of risk, we may lack accurate information, but we are able to take guesses that have the following features: (a) they are random variations around the true value, (b) we know

the range of values in which the true value is to be found – the "domain" of the true value, and (c) we know the probability that any particular guess is equal to the true value. In short, we can identify all possible outcomes and attach probabilities to these outcomes. Such conditions prevail when we can perform – actually or notionally – "repeated experiments." This means that can repeat the same operation (such as rolling a die) over and over again – either in practice or in our heads – and from this we can infer the probabilities of the outcomes.

However, very few if any aspects of our lives – and even fewer economic phenomena – are repeated experiments. This is true not just of the big life events – such as getting married, getting a job, living in a new neighborhood and retiring – but of the daily small events as well. The reason is that we are continually having new perceptions, creating new associations between these perceptions and remembered perceptions, and reinterpreting the past, present and future in the light of these associations. The economic phenomena that comprise only risk are human inventions such as games of chance (such as roulette). Most real-world economic situations are not repeated experiments, i.e., they are not the same operations performed over and over again with randomly varying outcomes under stationary probability distributions. This means that most, if not all, economic situations in practice comprise some form of uncertainty.

Utility-based wellbeing

In neoclassical economics, all the objects of preference for every individual are assumed to be unambiguously rankable. Thus, for any two commodity bundles, only three possibilities exist: the individual prefers A to B, prefers B to A, or is indifferent between A and B. An individual's preferences are assumed to be "rational," which means that they are "complete" (covering all the feasible options accessible to the individual) and "transitive" (so that if commodity bundle A is preferred to B and if B is preferred to C, then A must be preferred to C. These preferences are characterized by the "independence of irrelevant alternatives," i.e.

preferences over commodity bundles A or B are not changed by the inclusion of another commodity bundle C. For example, if A is preferred to B, then A+C must be preferred to B+C.

An individual's preferences are meant to be both descriptions of the individual's wellbeing and a description of the objectives guiding her decisions. In short, the goal of one's behavior is assumed invariably to be the maximization of one's wellbeing. These assumptions are the basis for the theory of revealed preference, which claims that the preferences of consumers are revealed by their economic activities.

An individual's wellbeing is directly related to her consumption of goods and services. In other words, these goods and services are intrinsically valuable to the individual, so that by observing her consumption, it is possible to make cardinal or ordinal inferences about her wellbeing.

An individual's preferences are assumed to be stable through time, at least for as long as is necessary to conduct the revealed preference experiments. Furthermore, an individual is assumed to be far-sighted with regard to her preferences, so that when she makes her current decisions, she can take her current and expected future preferences into account. Her preferences are intertemporally consistent, so that if commodity bundle A is preferred to B at a particular point in time, then the same is true at any other times.

Behavioral economics relaxes a number of these assumptions. In particular, it distinguishes between decision utility and experienced utility, and between experienced, remembered and anticipated utility. It also allows for a limited amount of preference dynamics by taking account of reference-dependent preferences (including endowment effects), loss aversion and some framing effects (including reflection and anchoring effects). In addition, behavioral economics allows for discrepancies between objective probabilities and decision-weighted probabilities. Though many of these features are incorporated into unified theoretical

frameworks – of which prospect theory is the most prominent – many others are simply recognized as "anomalies" with regard to the predictions of neoclassical theory.

Both neoclassical and behavioral economics assume that preferences are located unambiguously in the individual. Though behavioral economics recognizes that people may be "social preferences," these preferences are still properties of individuals, not expressions of people's participation in the wellbeing of their social groups. Furthermore, wellbeing may be unambiguously summarized by a single number ("utility"). The role of context-dependent psychological motives and moral values as drivers of behavior is left largely unexplored. Aside from the limited preference dynamics mentioned above, preferences are assumed to be essentially stable and largely context-independent.

Progress as economic growth

Orthodox economics focuses on product and process innovations as the fundamental sources of economic progress. Technological change is considered to be the main driver of economic growth, which is the economist's primary representation of progress. Technological progress accounts for the lion's share of economic growth in most empirical studies.

Since innovation rests on the creation of new ideas and since new ideas cannot be conceived as draws from a portfolio of known options, one would expect that analyses of innovation would involve a rigorous consideration of uncertainties. However, orthodox economics has not pursued this course. Instead, the mainstream theoretical and empirical analyses view technological progress as a predictable process that is either exogenously given (in traditional growth models) or economic inputs (such as human capital, education and R&D expenditures in endogenous growth models).

By contrast, as indicated in Part 2, the multilevel paradigm identifies the evolution of functional organization as a primary source of innovation. In this context, innovation is

generated primarily through the development of social networks and the accumulation of knowledge in the "social brain" that is distributed across people embedded in social relations.

Related literatures

Behavioral economics

In the previous sections we have considered three major challenges to the orthodox paradigm: the possibility of collective decisions, the existence of uncertainty, and the pervasiveness of motivation- and value-driven behavior. These challenges call into question three foundations of orthodox economic theory, namely, individualistic decisions, the ubiquity of risk and positive economics. It is these challenges that warrant classifying our approach as a new paradigm.

By these standards, behavioral economics is not a new paradigm, since it abides by the three above-mentioned foundations. First, the agents who make decisions in behavioral economics are invariably individuals. The objectives of the individuals may differ from those in neoclassical economics – in particular, they may value wealth relative to some reference point, their value function may have a kink at the origin (with losses weighted more heavily than gains), their preferences may be "present-biased" (leading to time-inconsistent behavior), and they may have "social preferences" (i.e. ones that are other-regarding, rather than purely selfish) – but these preferences still reside in the minds of individuals and drive all economic decisions.

Second, behavioral economics focuses on risk as the source of imperfect information, i.e. individuals are assumed to know the domain of all possible events and attach probabilities to these events. The disagreement with neoclassical economics lies in how these probabilities are formed. In particular, they may attach decision weights to the probabilities that they

objectively face, but these probabilities capture all the unknown variation in their environment.

Third, behavioral economics has little to say about motivation- and value-driven behavior. As in neoclassical economics, people's psychological motives and moral values are assumed to be embodied in their preferences, which are depicted as context-dependent only in restricted senses.

In his review of behavioral economics, Richard Thaler writes, "…the basic problem is that we are relying on one theory [the neoclassical theory] to accomplish two rather different goals, namely to characterize optimal behavior and to predict actual behavior. We should not abandon the first type of theories as they are essential building blocks for any kind of economic analysis, but we must augment them with additional descriptive theories [behavioral theories] that are derived from data rather than axioms." (2016, p. 1577). The multilevel paradigm calls into question that neoclassical theory is an essential building block for any kind of economic analysis, because this paradigm recognizes that humans are capable of higher levels of functional organization than individual decision making, from which psychological motives and moral values can arise, are also capable of responding to uncertainty (as distinguished from risk).

Neuroeconomics

Camerer et al. (2016) characterize neuroeconomics in the following terms: "Neuroeconomics is the study of the biological microfoundations of economic cognition and economic behavior… Economic cognition includes memory, preferences, emotions, mental representations, expectations, anticipation, learning, perception, information processing, inference, simulation, valuation and the subjective experience of reward. In general, neuroeconomic research seeks to identify and test biologically founded models that link cognitive building blocks to economic behavior." (Camerer et al., 2016, p.3).

Furthermore, neuroeconomics is motivated by the hope that "common patterns of [brain] circuitry will emerge which will inform debates about the computations that are performed and suggest new theories of behavior and new predictions" (Camerer et al., 2016, p.44). In particular, some neuroeconomists have voiced the hope that in the future economic models may be able to make joint predictions about observable choices and their underlying neural mechanisms. These predictions could be tested and the tests could give rise to novel predictions (for example, Camerer, 2007; Glimcher & Fehr, 2014).

As such, neuroeconomics could serve both old and new paradigms, depending on the predictions under consideration. Thus far, neuroeconomic experiments have been based primarily on individualistic conceptions of behavior. However, social neuroscience is a rapidly growing field and its empirical results – such as those on mentalizing, empathy, compassion and Schadenfreude (for example, Blair, 2005; de Vignemont & Singer, 2006; Singer, 2006) – have identified various neural mechanisms underlying perceptions, beliefs and decisions at levels of functional organization beyond the individual.[15] Some neuroscientific work has investigated moral reasoning with regard to moral dilemma tasks (for example, Greene et al., 2004; Moll et al., 2002). The examination of the economic implications of this research is still in its infancy (for example, Bault et al., 2014; Singer & Fehr, 2005).

Although neuroeconomics has investigated the neural mechanisms involved in decision making not only under risk, but also under ambiguity, other forms of uncertainty (described below) have as yet received little attention.

[15] Overviews of early work include Adolphs (1999), Ochsner and Lieberman (2001) and Blakemore et al. (2004).

Evolutionary economics

Evolution has played a role in economic thinking throughout its history, with Thorstein Veblen's "Why is Economics Not an Evolutionary Science?" (1898) and Nelson and Winter's "An Evolutionary Theory of Economic Change" (1982) as milestones. Geoffrey Hodgson has comprehensively reviewed the topic (2019, see also Witt, 2008), including a bibliometric analysis with Juha-Antti Lamberg (Hodgson & Lamberg, 2018). Hodgson reminds us that the word "evolution" has a much wider range of meanings than Darwin's theory of evolution, which is reflected in the economics literature. Evolutionary approaches loosely share five "ontological basics" in common: 1) It is a world of change (in contrast to the orthodox focus on equilibrium); 2) The generation of novelty; 3) The complexity of economic systems; 4) Human agents have limited cognitive capacities; 5) Complex phenomena can emerge through self-organization or piecemeal iteration rather than comprehensive overall design.

None of these ontological basics require a commitment to Darwinian evolution per se and evolutionary economists have drawn upon or distanced themselves from Darwinism to varying degrees. This is not surprising, given evolutionary biology's gene-centric focus and the dark connotations of the term "Social Darwinism" to many people, which we will address below.

Hodgson and Lamberg's bibliometric analysis of economic-related articles with the word "evolution" in the title or abstract reveals isolated clusters of topics without a central core. The authors reside in business and management schools more than economics departments. The impact of evolutionary economics on orthodox economics has been minimal, due to paradigmatic differences in basics such as equilibrium vs. change, rational actors vs. extended orders, and conceptions of theory.

Not only are clusters of evolutionary thinking isolated from each other within the economics, business, and management professions, but they are also isolated from

evolutionary perspectives in other disciplines. According to Hodgson, there is "an enduring disconnection of research gathered around Nelson and Winter from evolutionary anthropology, evolutionary psychology, work on the evolution of cooperation, and Darwin himself. Given that the core theory of Nelson-Winter-style evolutionary economics may benefit from further development, these lively, theoretically rich, and relevant evolutionary literatures would be obvious places to turn for inspiration. So far, this has not happened to any great degree" (Hodgson, 2019, p. 17-18).

This article can be considered an attempt to provide what Hodgson calls for.

Social Darwinism and other stigmatized words.

For many people, the words "Social Darwinism" implies moral acceptance of a ruthlessly competitive world, which makes it difficult to think about more benign applications of evolutionary theory. Likewise, the word "superorganism" raises the specter of Nazi Germany and the words "Social Engineering", without invoking anything biological, raises the specter of becoming a cog in a machine against our will. Even the word "manage" rings alarm bells for many people as a form of meddling, machine mentality, and infringement on personal choice.

Negative associations of key words and concepts must be acknowledged and interrogated before the words can be used more dispassionately in basic scientific research and policy applications. Some of the legitimate concerns behind the negative associations include: 1) The fear of being forced into arrangements against our interests and without our consent, which includes coercion by other members of our own groups, in addition to other groups; 2) the fear that highly cooperative groups—in fact, so cooperative that they invite comparison to a single organism—can easily become predatory on other groups.

It is indeed important to be vigilant about these dangers. As we will see, however, the multilevel paradigm that we are about to describe is fully cognizant of the dangers of

disruptive competition within and among groups—much more so than orthodox economic theory. In addition, as an historical fact of the matter, it is not the case that Darwin's theory led to an epidemic of cruel "survival of the fittest" policy applications. The tradition of Pragmatism, represented by progressive figures such as William James and John Dewey, was much more directly and accurately influenced by Darwin than Hitler, whose only recorded statement about Darwin's theory was that he disbelieved it (Richards, 2013). This is not to say that Darwin's theory has never been invoked in ways that resulted in harm. Anything that can be used as a tool can also be used as a weapon, and Darwin's theory is no different from any other theory in this regard.[16]

A final point, upon which nearly everyone can agree, is that doing nothing is not an option. Something must be done to address the problems confronting us. If the word "manage" rings the wrong bells, then it is necessary to interrogate the negative associations and choose other words that permit us to act on the basis of the best of our current knowledge.

[16] For more on Social Darwinism, see Hodgson (2004a); Leonard (2009); Wilson and Johnson (2016)

Part 2: The multilevel paradigm

We will begin our description of the multilevel paradigm by reconsidering the purpose of economics. In this context, we then proceed to address each of the four contributions above.

Rethinking the purpose of economics

Rethinking the theoretical foundation of economics calls for a new definition of economics, associated with a new specification of its purpose. We propose that economics be defined as the discipline that explores how resources, goods and services can be mobilized in the pursuit of wellbeing in thriving societies, now and in the future. The pursuit of wellbeing is to be conceived broadly, taking into account all human needs and purposes – at least insofar as they are relevant for the mobilization of commodities (resources, goods and services). The conceptual tools developed for this purpose may be expected to have more general validity for analyzing social systems beyond economics.

We have other needs and purposes, which also call for the mobilization of commodities. Human beings are social animals that have achieved great success as a species in the evolutionary process through their abilities of cooperation, innovation and niche construction (Odling-Smee et al., 2003). We cooperate in greater numbers than other mammals, enabling us to transmit knowledge from their innovations across time and space. Our cognitive abilities, combined with our ability to transmit knowledge, have made us particularly adaptable to changes in our environment. Our ability to shape the physical and social environment in which we live – constructing niches through new technologies, institutions, norms, values and identities – has enabled us to adapt our environment to our own needs.

On account of the important role that cooperation has played in our evolutionary success, it is not surprising that we have not just individual needs, but also social ones. Our

social needs manifest themselves proximately in a variety of psychological motives, ranging from cooperative motives such as care (seeking to promote the wellbeing of others and to alleviate the suffering of others) and affiliation (seeking to belong to social groups) to competitive and conflictual motives such as status seeking (looking for positional advantage), power (seeking influence over others), threat avoidance (felt through fear) and threat approach (felt through anger).

Insofar as our evolutionary success builds on our capacity for innovation and niche construction, it is not surprising that we have a fundamental need for agency, i.e. a sense of empowerment derived from shaping our environments. This need is manifest proximately in an achievement motive (pursuing excellence with regard to specified goals), which is usually operative within a social setting. To gain satisfaction from achievement, the underlying goals usually need to be recognized as significant by other people within one's social reference group.

Since we are social creatures, our wellbeing must be understood in the context of thriving societies. Though some human needs and purposes are individualistic (relevant only to the individual in isolation from other individuals), most are collective (relevant to the individual with reference to the individual's place within social groups). Care, belonging, status-seeking, exercise of power, and much of achievement are objectives that are inherently social. This means that the individual's decisions cannot be understood independently of the individual's position within social networks. Thus, the individual is not the exclusive entity of functional organization. Not only the individual's objectives, but also the group's objectives – defined in terms of its purposes, values and norms – are relevant for behavior. Human sociality also means that wellbeing is not just an individualistic phenomenon, but a collective one as well. One's wellbeing arises not just from the consumption of material things, for example, but also from one's participation in the aims of one's social groups. Thriving

societies, in which people enjoy fulfilling interpersonal relations, are an important source of wellbeing.

Thus, economics is concerned not just with economic incentives (such as prices, wages and profits), but also with social and political incentives, because all these incentives are relevant to the mobilization of commodities. Thereby our definition creates new boundaries of the economics discipline vis-à-vis the other social sciences.[17]

Economics in our definition focuses on wellbeing not just for the present generation, but also for future generations as well. Accordingly, economics is meant to help us examine how commodities can be mobilized to achieve sustainability in many respects – living within sustainable economic, social, political and ecological systems (Raworth, 2017). Economics must be concerned, for example, with the question of whether the allocation and distribution of resources resulting from the forces of globalization, automation and financialization lead to economic instabilities (such as financial crises), social fragmentation (such as the weakening cohesiveness of communities) and political fragmentation (such as declining trust in political institutions and declining willingness to seek compromise in the political process). Economics must also examine whether the allocation and distribution of resources is compatible with planetary boundaries.

On all these accounts, economics must be connected with other social and natural sciences, because the mobilization of commodities in the pursuit of wellbeing involves much more than economic markets.

Our new definition of economics implies that the purpose of the economy is to serve society, where individuals derive many of their capacities and objectives through the interactions with one another. Our definition of economics recognizes that the economy is embedded within society. Economic transactions take place in the context of social networks.

[17] The boundaries among the social sciences often overlap, so that a particular set of behaviors may be analyzed in different ways by different disciplines.

When these networks are broken – such as when trust collapses or when conflict breaks out – the economy suffers. When the economy generates great disparities of income, wealth, empowerment and social embeddedness, the society suffers and that, in turn, hurts the economy. An economy that does not serve society is one in which people fail to achieve wellbeing individually and collectively. Consequently, the purpose of economics must be to analyze how the purpose of the economy can be achieved.

Central features of the multilevel paradigm

We now consider the central features of the multilevel paradigm, corresponding to the central features of the orthodox paradigm.[18]

Flexible, multiple levels of functional organization

Whereas the orthodox paradigm is consistently individualistic – in the sense that all decisions are made by rational actors behaving like individuals – the multilevel paradigm allows for flexible levels of functional organization.

Functional analysis

We begin by describing the kind of analysis that is required to understand any functionally organized unit, whether a product of biological evolution, a human-designed implement such as a watch, or a whole economic system that functions well. Our initial examples will be drawn from biology, which might seem far afield from economics. Their relevance will become clear when we revisit some of the major concepts of economics in the light of the new paradigm.

[18] Previous efforts representing his approach include a 2013 special issue of the *Journal of Economic and Behavioral Organization* (Wilson and Gowdy, 2013) and an edited volume based on an Ernst Strungmann Forum (Wilson and Kirman 2015).

The root difference between a non-living physical system and a living system is *functional organization*. To appreciate the distinction, imagine being assigned the task of analyzing two objects; a snowflake and a fruit fly. The snowflake has plenty of structure that arose from the process of ice crystallization, but it is not designed to *do* anything. The only way to analyze it is in physical terms. In contrast, the fruit fly is designed by natural selection to survive and reproduce in its environment. This fact will inform your entire method of analyzing the fly. The individual organism will become an anchor of analysis. Everything below the level of the organism – its organs, cells, and molecules – will be analyzed in terms of their contribution to the functioning of the whole. Everything above the level of the organism – such as fly populations and multi-species ecosystems that include the fly – will be analyzed as a complex system composed of agents following their respective adaptive strategies.

In the study of complex adaptive systems (CAS), a critical distinction needs to be made between a complex system that is adaptive *as a system* (CAS1) and a complex system *composed of agents following their respective adaptive strategies* (CAS2) (Wilson, 2016; Wilson & Madhavan, 2020). A fruit fly qualifies as CAS1. A population of fruit flies or an ecosystem that includes fruit flies qualifies as CAS2. The most important point to keep in mind is that, except under special conditions discussed below, *CAS2 systems do not self-organize into CAS1 systems*.

Before outlining these special conditions, it is important to stress how often they *fail* to apply in both natural and human systems. Consider the following examples from nature (human-related examples will be provided later):

• Natural selection might increase the reproductive rate of individual fruit flies, resulting in population dynamics that become chaotic (Philippi et al., 1987).

• In many species, infanticide – killing the babies of others to have one's own babies – is a major source of infant mortality, thereby diminishing the population size of the species (Van Schaik & Jansen, 2000).

• In many species of migratory birds, females experience higher mortality than males during migration and on the wintering grounds because the males claim the best habitats for themselves. This benefits the males but at the expense of females and contributes to the decline of the bird populations (Greenberg et al., 2005).

• When beavers move into an area, they transform the ecosystem in ways that are best understood as increasing the fitness of beavers. Collateral effects on other species and changes to ecosystem processes such as nutrient cycling are primarily byproducts of the adaptive strategies of a single keystone species (Bailey et al., 2004).

The fact that CAS2 systems do not robustly self-organize into CAS1 systems calls the very concept of a balance of nature into question – and, as we will see, the concept of the invisible hand in economics[19]. Evolutionary ecologists have largely abandoned the notion that nature, left to itself, strikes some kind of harmonious balance (Bodkin, 1990). Instead, natural biological systems are frequently out of equilibrium or can settle into one of many basins of attraction. The word "ecological regime" is used to describe a stable assemblage of species (Biggs et al., 2009), a term that aptly invokes what we already know about human political regimes. In human life, the word "regime" implies a degree of stability but says nothing about how well the regime functions for the common good. Human regimes span the range from despotic to inclusive (Acemoglu & Robinson, 2012). Biological regimes are no different.

[19] Both concepts can be traced historically to the pre-Darwinian Christian cosmology of harmony at all scales; Gowdy et al., 2013.

To summarize, because the individual fruit fly is a functionally organized unit, it becomes an anchor of analysis, governing how we study everything below the level of the individual (its organs, cell, etc.) and everything above the level of the individual (populations, ecosystems, etc.), although in different ways. We could make the same points for a human-made implement such as an old-fashioned pocket watch or even an animal construction such as a bird nest or a beaver dam. Strictly speaking, these constructions are not living systems, but they are extensions of living systems – what Richard Dawkins called an extended phenotype (1982) – and therefore qualify for functional analysis. Knowing that a watch is designed for the purpose of keeping time, you would study all of its parts in terms of their contribution to the whole. You might also study watches as part of larger systems, but you wouldn't necessarily assume that those larger systems are themselves like a watch, with the watch serving as a kind of a cog.

Another basic point about the study of functionally organized units is that they are seldom *entirely* functionally organized. This is true for a human social group as much as for a biological unit such as a fruit fly or a human artefact such as a watch. Evolution – including technological evolution – is an historical process, resulting in adaptations that are more like Rube Goldberg devices or what a tinkerer would assemble from spare parts, rather than what an engineer would produce on a drawing board (Jacob, 1977). Adaptations have byproducts that themselves have no function, such as the color of blood or the triangular spaces (spandrels) that are formed when arches are placed next to each other (Gould & Lewontin, 1979). Some traits evolve by chance (e.g., genetic or cultural drift) rather than by contributing to survival and reproduction. Any given trait is part of a developmental system and cannot be analyzed in isolation[20].

[20] For example, the selection of docility in domesticated animals results in a whole suite of other traits called the domestication syndrome, which also exists in humans as a self-domesticted species (Dugatkin and Trut, 2017; Wrangham, 2019; Hare and Woods, 2020)

Another important reason for dysfunction is called evolutionary mismatch (Giphart & Van Vugt, 2018; Lloyd, Wilson & Sober, 2014). As an example from nature, many species of aquatic insect evolved to use reflected light as a cue to find bodies of water when they are in flight. This results in a fatal attraction to manmade reflective surfaces such as glass buildings and solar panels (Horvath et al., 2010). An adaptation to an earlier environment has become maladaptive in the present environment and only subsequent evolution or a human intervention can remedy the situation. Evolutionary mismatches abound in human life and our impact on the planet has created mismatches for nearly every species on earth. In the economic sphere, the unhealthy predilection for sugary drinks and dysfunctional attraction to digital cues emitted by one's smartphone are examples of evolutionary mismatch.

Individualism

It is important to understand Individualism as an intellectual worldview that includes but also goes beyond economics (Hodgson, 2007). Broadly, it is a commitment to treating the individual person as a fundamental unit of analysis and reducing all things social to the thoughts and actions of individuals. It was preceded by a view of society as an organism in its own right, associated with figures such as Emile Durkheim, which was so common that nearly every important thinker in the formation of the social sciences held a similar view (Wegner, 1986). At the same time that the rational actor model was becoming dominant in economics, social scientists were embracing their own form of methodological individualism and evolutionary biologists were explaining all adaptations as for the good of individuals and their selfish genes.

A criticism that can be leveled against both group-level functionalism and the individualism that replaced it is that they are axiomatic about the unit of functional organization, without a strong theoretical justification for how societies or individuals got that way. This weakness is signaled by the adjective "methodological", which is so often placed in

front of the word “individualism”, as if the main justification for individualism is its practical utility, regardless of its theoretical or philosophical underpinnings.

In contrast, the multilevel paradigm does not axiomatically declare any unit as a unit of functional organization. Instead, it provides the resources for determining when a given entity becomes functionally organized; namely, when it is a unit of selection. The multilevel approach is also capable of identifying the absence of functional organization in a given entity for plurality of reasons; such as when it is a CAS2 system rather than a CAS1 system; due to historical constraints, byproducts, and drift; and due to evolutionary mismatch.

Once the study of evolution is broadened to include all variation-selection-replication processes, including the multilevel cultural evolution that is taking place all around us, the conceptual toolkit that has proven itself for the study of genetic evolution can be applied more broadly to identify the presence and absence of functional organization and to bring about functional organization where it does not currently exist, as we will show in Part III of this article.

Multilevel functional organization

At first glance, our discussion of functional organization thus far might seem to support Individualism, which treats the individual organism as a fundamental unit of analysis. But this is true only insofar as the individual is the unit of selection. This point is easily understood with regard to biological examples. Imagine repeating the example of the fruit fly with a social insect species such as honeybees. The individual bee is a unit of functional organization in some respects but in other respects it is more like a cell participating in the functional organization of a multicellular organism. Or, continuing the example of a watch, a single honeybee is both a watch and a cog in a larger watch. This is due to the fact that many traits in honeybees evolved on the strength of causing hives to survive and reproduce better

than other hives, as opposed to individual bees surviving and reproducing better than other bees within the hive. Insofar as the hive becomes the unit of selection, it becomes the anchor of functional analysis (Gordon, 2010; Holldobler & Wilson, 2008; Seeley, 1995, 2020).

Cancer can be used to make the same point (Aktipis, 2020). Cancer is the process of natural selection among cells within multicellular organisms. A cell that proliferates at the expense of neighboring cells is adaptive in the evolutionary sense of the word. Since evolution has no foresight, the fact that cancer cells eventually bring about their own demise is only to be expected – like fruit flies that destabilize their population dynamics with their high reproductive rates. With honeybees, we need to go above the level of the individual organism to find the unit of functional organization. With cancer, we need to go below the level of the individual organism to find the unit of functional organization.

The key to identifying units of functional organization in nature is by making a nested series of relative fitness comparisons. Genes that outcompete other genes within the same organism become like cancers. Genes that cooperate with other genes within the same organism to outcompete other organisms lead to functionally organized individuals, who often behave cancerously toward other individuals. Individuals (and their genes) that cooperate with other individuals in their social groups to outcompete other social groups become part of functionally organized units that are larger than themselves, but these groups often compete harmfully with other groups. Even whole ecosystems can become functionally organized if they are selected as units. For example, when multicellular organisms differentially survive and reproduce, their microbiomes are being selected along with their genes. The degree to which our genes interact with ecosystems composed of trillions of microorganisms comprising thousands of species is only in the process of being discovered (Yong, 2006).

This nested series of fitness comparisons is called *Multilevel Selection (MLS) theory* (Wilson, 2015). Its history begins with Darwin, who realized that prosocial behaviors are

selectively disadvantageous within groups and require a process of between-group selection to evolve (Sober, 2010). MLS theory was widely rejected in the 1960's in favor of the view that selection operates only at the level of individuals and their selfish genes (Dawkins, 1976; Williams, 1966). At the time, this was celebrated as a great intellectual achievement. In retrospect, it can be seen as merely the advent of Individualism, coinciding with the advent of Individualism in economics, in the human social sciences, and (to a large degree) in everyday life of Western societies.

Today, there is widespread acknowledgement that MLS theory's nested series of fitness comparisons is a fully legitimate accounting method for evolutionary change. In addition, all other theories of social evolution (e.g., inclusive fitness theory, evolutionary game theory, selfish gene theory), even when they were initially conceptualized as alternatives to MLS theory, must acknowledge the same "stubborn facts" to remain biologically realistic (Okasha, 2006; Wilson & Sober, 1998; Wilson & Wilson, 2007; Wilson, 2015). These include: 1) All evolving populations are metapopulations, which are subdivided into groups of various sizes and duration and 2) As a basic matter of tradeoffs, prosocial agents are by their nature vulnerable to exploitation by more self-serving agents in their immediate vicinity, so that fitness differentials favoring prosociality at larger scales are required to counterbalance the negative fitness differentials at smaller scales.

The basic assumptions of n-person evolutionary game theory can be used to make these points with mathematical rigor (Maynard Smith, 1982)[21]. Evolution takes place in a large population subdivided into groups of size n. Although n is allowed to vary in some models, it is treated as a constant in most models (e.g., 2-person game theory) as a simplifying assumption. Within each group, selfish strategies such as ALL-DEFECT (ALLD) have an advantage over cooperative strategies such as TIT-FOR-TAT (TFT). TFT never beats its

[21] Interpreted from a MLS perspective by Wilson and Sober (1994) and Sober and Wilson (1998).

partner in within-group interactions. It only loses when paired with defecting strategies or draws when paired with cooperative strategies. To find the selective advantage of cooperative strategies, we must compare relative fitness at the level of the groups of size n. In two-person evolutionary game theory, for example, pairs of TFT outproduce mixed TFT-ALLD pairs, which in turn outproduce pairs of ALLD.

N-person evolutionary game theory is a tinker toy model of social evolution in large populations subdivided into ephemeral groups of size n. A diversity of models is required to explore the diversity of metapopulation structures in the natural world[22]: groups of longer duration; group composed of genealogical relatives; groups that form on the basis of partner choice; groups where all members disperse at periodic intervals; groups that reproduce by fissioning; groups where most of the dispersal is between neighboring groups; group where only one sex disperses; groups with fuzzy boundaries; groups that compete indirectly; groups that compete by direct warfare. Every set of assumptions alters the outcome of multilevel selection in important ways but does not alter the basic fact of multilevel selection. It is on this basis that Wilson and Wilson wrote their 2007 article titled "Rethinking the Theoretical Foundation of Sociobiology", which ended with the words "Selfishness beats altruism within groups. Altruistic groups beat selfish groups. Everything else is commentary." (Wilson & Wilson, 2007, p.345).

Homo sapiens differ from other animals in terms of the extraordinary flexibility of our functional organization. We are able pliant creatures, able to switch our allegiances and our understanding of ourselves, as individual agents and as members of social groups. On this account, we are able to belong simultaneously to a plethora of social groups, within each of which we have different functions, defined by our social roles in these groups. We have used this flexibility to our evolutionary advantage; it has enabled us to populate all corners of the

[22] This is similar to Savage's (1954) distinction between small worlds and large worlds discussed earlier.

earth and adapt to a plethora of challenges, many of which we have created ourselves in the process of niche construction.

This means that our levels of functional organization may be understood as solutions to problems of cooperation. Some of the challenges we face require little cooperation and we can address these as individuals. Other challenges require the cooperation of particular constellations of individuals performing particular functions with respect to particular environmental stimuli. With regard to these, we can form the requisite social groups. Our sense of social belonging within these groups may be understood as a psychological mechanism promoting intrinsic incentives for group cohesion. In addition, we produce extrinsic rewards for other group members to comply with group norms and extrinsic punishments for norm violators. Many of our institutions, laws and regulations can also be understood as extrinsic incentives to promote group cohesion around higher levels of functional organization.

Another way of understanding the multiple levels of functional organization that humans can flexibly inhabit is through identity economics, which represents a major conceptual breakthrough in examining the implications of social identities for economic activity. In what we may call the "Lineaus phase" of identity economics, important social groups were identified and classified with regard to their economic functions.[23] The objective of this analysis was to show that social identities matter for economic behavior. This was followed by what we may call the beginnings of identity economics' "Darwinian phase," the functions of social groups were analyzed as solutions to problems of cooperation, such as challenges in education (Akerlof & Kranton, 2002), the workplace (for example, Akerlof & Kranton, 2008) and other organizations (for example, Akerlof & Kranton, 2005). Further contributions investigate challenges addressed by religions (for example, Carvalho, 2013),

[23] Akerlof (1976) and Akerlof and Kranton (2000) can be interpreted as representing aspects of this phase.

ethnicities (for example, Bodenhorn, 2003), classes, nations and other social groupings. These are important steps towards a fuller understanding of roles that higher levels of functional organization play in economic, social and political activities.

Yet another approach to multilevel functional organization is offered by the principle of biological relativity (Ellis & Noble, 2021; Noble 2012; Noble, 2016; Noble & Noble, 2020), whereby there is no privileged level of causation in the emergent hierarchy of life, from atoms to social groups and ecosystems. At each level there is bottom-up stochasticity and top-down causation through which higher-level objectives guide the selection of lower-level outcomes. Within this system of causal loops, concepts, ideas and social groups have causal roles. In the presence of stochasticity, sure decisions (based on a complete understanding of the options and the relation between means and ends) is impossible. Thus attention, perception, intuition and imagination play important roles in the selection of perceived options. Emotions play a key role in guiding our reason (for example, Damasio, 1994), communicating our affective states to others, and even in maintaining homeostasis (Ellis & Solms, 2017). Due to the human flexibility in switching among levels of functional organization, social groups can be represented as either a higher level of functional organization or as a "surrounding influence" (Ellis & Noble, 2021).

The primacy of social relations

Whereas the orthodoxy regards economic relations among the suppliers and demanders of goods and services as the outcome of decisions whereby individuals pursue their individual objectives subject to their individual constraints, the multilevel paradigm views economic relations as a subset of social relations. Social relations are conceived as the sum total of all interactions among humans, whereas economic relations pertain to that subset of social relations which can be anonymized sufficiently to permit contractual relationships to be

specified independently of personal identities. In other words, economic activities may be understood as special kinds of social relations. Many economic activities have both transactional and social-relatedness components. Economies are firmly embedded within societies (see, for example, G. Akerlof, 2007; G. Akerlof & J. Yellen, 1990; R. Akerlof, 2017). Embedding a standard economic model into a model of social relations can be shown to have dramatic consequences: the fundamental theorems of welfare economics lose their relevance, new notions of efficiency and equity are called for, various market failures can be overcome through social relations, various social rigidities can be overcome through economic relations, reducing inequality may enhance socio-economic efficiency, economic and social cooperation may be mutually self-reinforcing, and much more (see Fleurbaey, Kanbur & Snower, 2021a).

Conceptually, there are various ways of embedding economic activities into social interactions. The multilevel paradigm uses functional analysis for this purpose. Fleurbaey, Kanbur and Snower (2021) embeds a Walrasian general equilibrium model into a Nash model of society. Gintis (2010) uses the concept of a "choreographer" (who sends signals to the social actors to produce social norms that generate a correlated social equilibrium[24]) in the context of models that use decision, evolutionary and game theory extended to encompass other-regarding preferences (Gintis, 2007).

Over the course of history, humans have discovered endless ways of moving from socially determined barter relations to economic transactional relations. These moves have been accompanied by substantial productivity gains, since economic transactions are far more flexible than social relations, which rely heavily on principles of reciprocity and a variety of social norms. In the process, however, something is frequently also lost, since social relations

[24] In the spirit of Aumann (1987).

often arise to address collective challenges, such as overcoming negative externalities and inequities arising from economic relations.

Moral values in economic activity

Moral values may be understood as a central feature of multilevel functional organization in humans. Due to the human flexibility in shifting across different levels of functional organization, there is an ongoing conflict between individual-level selection (with individuals competing with one another in each social group) and group-level selection (with groups competing with one another). The former is responsible for selfishness and greed; the latter promotes tolerance, respect, care, altruism and other forms of cooperation beyond enlightened self-interest – primarily within the relevant social groups. An essential purpose of moral values is to promote intrinsic cooperation within groups and suppress destructive selfishness.[25]

Many of our virtues can be recognized as supporting our positive regard for others and most of our vices involve the pursuit of our gain at the expense of others. Even values that appear individualistic – such as achievement and self-direction in Schwarz's value circumplex or liberty in Haidt's foundations of morality – gain their normative force through their support for new ideas ("variation" in the process of cultural evolution) that ultimately benefit society.

The conflict between selfishness and care can also arise at higher levels of functional organization, such as between unions and employers' associations regarding wage formation at the national level or between nations regarding international climate negotiations. Moral values clearly play a major role in helping people address collective challenges, such as public good and common pool resource problems. [26]

[25] Impressive empirical evidence for this theory, based on ethnographic records of 60 societies, is provided by Curry, Mullins and Whitehouse (2019).
[26] From this perspective, Collier (2018) provides an analysis of the future of capitalism and Mayer (2019) examines the future of business.

Much can be gained by understanding morality in terms of biological (including psychological) and cultural solutions to the problem of cooperation in our social lives. The human flexibility in shifting across different levels of functional organization – together with cultural transmission and improvisational intelligence – have enabled us to design moral systems with the deliberate purpose of promoting cooperation (see Boyd, Richerson & Henrich, 2011; Pinker, 2010). In this vein, morality has several important functions: (i) motivates us to pursue mutually beneficial outcomes beyond enlightened self-interest, (ii) it provides criteria by which we can recognize and evaluate the intentions and behavior of others in terms of such outcomes, and (iii) it motivates us to promote cooperative intentions and behavior in others through policing, rewards and punishments.[27]

Since humans face many different problems of cooperation, they have developed many different moral systems for addressing them. Through our cultural and religious heritage, we have inherited a variety of moralities. Many of the conflicts among these moralities – different virtues, deontological moral precepts, act utilitarianism, rule utilitarianism, and so on – may be resolved by understanding the moralities in context of the underlying problems of cooperation (see Lehmann & Keller, 2006).

This context dependence of moral values is a core feature of virtue ethics, but has been given scant attention in the universalist secular moralities of the European Enlightenment. In the deontological rules focus on the intrinsic rightness or wrongness of actions, usually without regard to context. Consequentialism evaluates actions in terms of their consequences for wellbeing, which is commonly depicted as context-independent (such as the standard, context-independent utility functions of orthodox economics). In practice, however, most people feel drawn to a variety of moral approaches (across the virtue, deontological and

[27] Fleurbaey, Kanbur and Snower (2021b) analyze moral motives as psychological devices to induce people to cooperate beyond enlightened self-interest, providing intrinsic rewards and punishments.

consequentialist domains) that conflict with one another and the relative salience of these approaches generally depends on their social context (for example, Fox & Kahneman, 1992).

Since orthodox economics does not consider the social foundations of economic relations, moral values play no essential role in neoclassical and behavioral analyses. In fact, one of the first things that economics students learn is the distinction between "positive economics" (based on propositions that are objective and verifiable, without recourse to moral values) and "normative economics" (based on "value judgments," which turn out to be distributional choices). While the lion's share of conventional economic analysis is devoted to positive economics, normative choices are portrayed as "preferences" of policy makers. This creates the widespread impression that economics is value-free.

Orthodox economics has insulated itself from moral considerations through a variety of assumptions: (a) It is individualistic, whereas moral principles generally address collective concerns. (b) It is primarily focused on how scarce resources are used to satisfy exogenously given "wants," rather than worthy social goals arising collectively through interpersonal interactions. (c) The object of these wants are commodities, not social relationships with a moral valence.

The multilevel paradigm, by contrast, recognizes that moral values pervade all economic decisions, since they influence the motives underlying our actions, the identification of causal relationships, and the level of human functional organization.[28] They do so through value-driven narratives that help us make sense of our environment, focus attention on particular events and characters, assign social roles and identities, define power relations and convey social norms (see Akerlof & Snower, 2016). These narratives also help us make conditional predictions concerning the consequences of our actions, thereby giving us the conviction to act (see Tuckett & Nikolic, 2017). Values play an important role in generating

[28] For seminal work in this area, see for example Gintis (2017) and Bowles (2016).

conviction, since values evoke emotions, influence the degree to which a narrative reduces anxiety, shape our perception of the plausibility of the narrative, and affect our trust in others who believe in the narrative – all significant determinants of the degree to which we are convinced of the conditional predictions underlying our actions. As these convictions arise within social networks, the underlying narratives spread through such networks as well (see Shiller, 2019).

Values as motivators: In orthodox economics, values can affect behavior only via an individual's utility function and thus values are indistinguishable from tastes. For example, it makes no difference whether my disinclination to kill arises from a moral imperative or an aversion to seeing blood; both are simply sources of individual preferences.

The new paradigm acknowledges that all behavior is motivated (See, for example, Bosworth, Singer & Snower, 2016) – as described in motivational psychology – and that values are drivers of human motives. In the value circumplex of Schwartz (1992, 1994), for instance, the cooperative social motives are associated with the values of benevolence and conformity. The competitive motives are associated, in the Schwarz circumplex, with the value of power. The agency motive is associated with Schwarz's values of self-direction, stimulation and achievement.

The need for consumption, on which all of conventional neoclassical economic analysis is focused, is only one of many human motives – associated with Schwarz's value of hedonism – and there is no reason to believe that this consumption motive is primary. Even the consumption of goods and services often does not generate wellbeing directly, but rather indirectly, as an input into the pursuit of social motives, such as affiliation and agency. The same bundle of consumption goods and services may give rise to quite different degrees of wellbeing, depending on whether they serve cooperative, innovative or niche-constructive goals.

Values in the identification of causal relationships: None of our perceptions are value-free. The reason is that values affect our psychological motives, which shape our attentional field, determining the causal relationships that we identify. For example, the value of love may drive our motive of care, while dishonesty may drive our motive of anger. These motives induce us to attend to quite different aspects of our physical and social environment – the former associated with opportunities to promote the well-being of others and the latter with opportunities to diminish their wellbeing. The resulting observations are different, since each motive brings distinctive phenomena to our notice and suppressed recognition of others. On this basis, it is not surprising that the observed causal relationships turn out to be different as well.

Particularly in the face of uncertainty – that the new paradigm recognizes as being almost omnipresent – it is clear that our identified causal relationships are not drawn from a determinate "reality" of causal relationships, but are rather human constructs that are meant to enable us to navigate our physical and social environment. This navigation is facilitated by value-driven motives.

Values as drivers of group-level functional organization: As values are also an essential channel inducing human cooperation, they become a distinctive driver of group-level functional organization. Insofar as humans face similar problems of cooperation across cultures – such as in the allocation of resources among kin, coordination to mutual advantage within social groups, reciprocal exchange without free riding, and conflict resolution through hawkish and dovish displays, property rights, and norms of fair resource division (Curry, Mullins & Whitehouse, 2019) – the moral values associated with such cooperation problems can also be expected to have commonality across cultures (Curry, 2016; Haidt, 2012; Joyce, 2006).

Promoting cooperation beyond enlightened self-interest

Whole economic systems are separated from the individual person by a dense network of groups nested within larger groups, with every grouping struggling to become a unit of functional organization and succeeding only to a degree (see also Gowdy & van den Bergh, 2003.

To achieve higher levels of functional organization, humans have created a variety of mechanisms that induce them to cooperate beyond enlightened self-interest[29] by participating in collective entities with collective goals. This ability has been crucial in overcoming a wide variety of collective action problems, particularly when the level of the collective entities was well matched with the level of the collective action problem (e.g. family affiliations to deal with child-rearing issues, national affiliations to address challenges that are national in scope). The mechanisms have been both external (that are "out of the head," such as institutions and laws) as well as internal, (that are "in the head," such as psycho-social motives such as care and affiliation).

From the ancient Greek philosophers, to the Christian apostles, to Enlightenment philosophers such as Thomas Hobbes, to the first architects of the human social sciences such as Emile Durkheim, the metaphor of *a human society as like an organism* was a guiding metaphor for actually constructing such societies. What we can say from a modern evolutionary perspective is that the concept of a human society as like an organism is not obsolete, but requires qualification.

What distinguishes human communities from insect colonies is the flexibility with which humans can switch among various types and levels of functional organization. Whereas honey bees, for example, are invariably groupish, humans may act as individuals in some

[29] Cooperation beyond enlightened self-interest involves cooperative behavior that extends beyond considerations of reciprocity and reputation (indirect reciprocity).

contexts, affiliate with a wide variety of different social groups (such as those based on religion, ethnicity, gender, nationality, class, race and many other criteria (see, for example. Appiah, 2018) and various levels of aggregation (such as from neighborhood self-help groups to national affiliation). Thus, it becomes important to study both internal and external mechanisms that induce humans to act at particular levels of functional organization and to switch from one level to another.

External mechanisms

Regarding external mechanisms that promote levels of functional organization that enable people to cooperate at the scales relevant to their collective challenges, Elinor Ostrom comes closest among Nobel laureates in economics to appreciating the importance of the "meso" scales that link microeconomics (as a study of individual behavior) to macroeconomics (as a study of national or supra-national activity). Her work marks an important step toward a multilevel evolutionary view. Ostrom was a political scientist by training and was awarded the Nobel prize in economics in 2009 for her work on groups that attempt to manage common-pool resources such as forests, pastures, fisheries, and the ground water (Ostrom, 1990, 2010a,b). These resources are vulnerable to exploitation by members taking more than their fair share, which the ecologist Garrett Hardin dubbed "the tragedy of the commons" (Hardin, 1968). Conventional economic wisdom held that the only solutions to the tragedy of the commons were to privatize the resource (if possible) or impose top-down regulation.

By compiling a worldwide database of common-pool resource groups, Ostrom showed empirically that groups are capable of self-managing their common-pool resources if they implement certain core design principles (CDPs) shown in the first column Table 1. Later, Wilson worked with Ostrom and her postdoctoral associate Michael Cox to generalize the CDPs from a multilevel perspective, applying them to all collective goods (including public

goods as well as commons) (Wilson, Ostrom & Cox, 2013). A generalized version of the CDPs and how they relate to multilevel theory is shown in the 2nd and 3rd columns of 1.

Ostrom's Principle	Generalized Version	Function
1. Clearly defined boundaries	1. Shared identity and purpose	Defines group
2. Proportional equivalence of benefits and costs	2. Equitable distribution of costs and benefits	Ensures effectiveness within groups by balancing individual and collective interests
3. Collective choice arrangements	3. Fair and inclusive decision-making	
4. Monitoring	4. Monitoring agreed-upon behaviors	
5. Graduated sanctions	5. Graduated responding to helpful and unhelpful behaviors	
6. Conflict resolution mechanisms	6. Fast and fair conflict resolution	
7. Minimal recognition of rights to organize	7. Authority to self-govern (according to principles 1-6)	Appropriate relations with other groups, reflecting the same CDPs
8. Polycentric governance	8. Collaborative relations with other groups	

Table 1: Generalizing Elinor Ostrom's core design principles (CDPs) for the efficacy of groups

CDP1: For a group to function well, there must be a strong sense of identity and purpose. Members must know that it is a group; that the work of the group is valuable and worth doing; the specific objectives; who is a member, and so on. All functionally-oriented groups can benefit from this clarity. Note that CDP1 is intrinsically value-laden, in contrast to the orthodox view that economics can somehow be value-free.

CDP2-6: These principles govern social interactions within the group and, coordinating the cooperative activities and suppressing behaviors that might benefit members at the expense of the common good defined by CDP1. CDP2 ensures that what members get from the group is proportional to what they contribute. CDP3 ensures that all members take part in decision-making, which protects against unfairness and makes use of everyone's knowledge. CDP4 monitors agreed-upon behaviors so that failures of coordination and lower-level advantage-seeking can be detected. CDP5 brings behaviors back into alignment in a graduated fashion, starting out friendly and non-judgmental and escalating only when necessary. Also, positive reinforcement of good behavior is as important as graduated sanctions against bad behavior.

CDP6 resolves conflicts quickly and fairly, since all parties in a dispute typically think that they have a reasonable point of view.

CDP7-8: These principles govern between-group relations. A group must have a degree of autonomy to manage its own affairs (CDP7) and relations among groups (CDP8) must reflect the same CDPs as relations among individuals within groups for cooperation and coordination at higher scales. This concept of polycentric governance (McGinnis, 1999; Ostrom, 2010a,b) reflects the insight that: 1) life consists of many social spheres of activity; 2) each sphere has an optimal scale; 3) good governance requires finding this optimal scale for each sphere and appropriately coordinating among the spheres.

In her study of metropolitan police departments, for example, she determined that forensic labs could regional but cops walking the beat should be local so that they can get to know the neighborhoods that they are protecting (Boettke et al., 2013; Ostrom & Parks, 1973). Real-world cultural systems, including economic systems and the larger social systems within which they are embedded, exhibit this kind of polycentric governance to the extent that they are products of system-level selection, due to a combination of intentional planning and blind evolution favoring cultural arrangements that hang together, compared to the many that fall apart.

These core design principles are not meant to be a conclusive or comprehensive summary of measures required to ensure cooperation in the management of collective goods. Rather, they should be treated as work in progress: on the basis of existing evidence, they appear to be necessary conditions for the self-management of collective goods. Nor are they meant to represent a comprehensive list of such necessary conditions. Further conditions may be identified in the future. The core design principles are simply to be understood as a

promising point of departure for identifying predominantly external mechanisms[30] to promote cooperation in the public interest.

The principles of federalism and subsidiarity have arisen throughout history because governance at a larger scale is simply impossible without levels of governance at smaller scales (Turchin, 2015). In ancient Athens, the smallest unit was called the deme and consisted of 150-200 free adult males, roughly the size of a single village. The next level of governance combined demes from coastal, inland, and urban areas into a unit called the tribe. These tribes had no historical precedence and were strategically created, along with many other institutions and processes, so that democratic governance could take place at the scale of the whole city state (Ober 2015; Ober & Wilson, 2021). A similar story can be told for the concept of subsidiarity, in which lower-level units have authority over their affairs unless they cause disruption at higher scales, which arose within the Catholic church and became an important principle in the formation of the European Union (Holmes, 2010).

Internal mechanisms

The internal mechanisms promoting higher levels of functional organization have received much attention in various disciplines, primarily outside economics. These internal mechanisms include mindfulness,[31] mindreading,[32] empathy,[33] perspective-taking,[34] compassion[35] and loving-kindness.[36] There is ample evidence that these mechanisms can all be trained (see, for example, Condon & Makransky, 2020).

Attempts to identify core principles for internal change, analogous to Ostrom's core design principles for external change, are still in their infancy. Some examples include

[30] Only CDP 1 is an internal (in-the-head) mechanism. The rest are external (out-of-the-head).
[31] Mindfulness is non-judgmental awareness of one's sensations and feelings.
[32] Mindreading is the ability to understand the mental states of others.
[33] Empathy is the ability to feel the feelings of others.
[34] Perspective-taking is the ability to understand a situation from the perspective of others.
[35] Compassion is concern for the suffering of others and the will to alleviate this suffering.
[36] Loving-kindness is the concern for the wellbeing of others and ability to participate in this wellbeing.

principles of effective altruism (MacAskill, 2016; Singer, 2015), principles of positive psychology (for example, Seligman, 2012), and religious principles such as the Nine Elements of Universal Spirituality,[37] the Eightfold Path of Buddhism, and widespread religious principles such as "love your neighbor as yourself" (promoting cooperation within social groups), "love the stranger" (promoting cooperation across social groups) and "you shall not covet" (discouraging destructive selfishness). What all these approaches have in common is the promotion of human interconnectedness (such as by expressing gratitude, practicing acts of kindness and nurturing social relationships) and the suppression of conflict within and across social groups (such as by practicing forgiveness). Appreciation of the sacred and transcendent also discourages destructive selfishness and encourages the appreciation of higher levels of functional organization. It is striking that these principles are also the ones that promote happiness (see, for example, Lubomirsky, 2007; Seligman, 2012).

Furthermore, there are important feedback effects between these internal mechanisms (on the one hand) and culture and the physical environment (on the other). Our understanding of these feedback effects extends across a number of disciplines. Evolutionary psychology seeks to explain psychological traits (such as perception, memory and language) as the functional products of natural selection, acting on genetically inherited variation (for example, Buss, 2005; Confer et al., 2010; Pinker, 2002; Tooby & Cosmides, 2005). These adaptations have evolved to address recurrent problems in human environments. Many of these traits are social, enabling us to cooperate in small and large groups. Cultural evolutionary theory studies how human cultural traits – including ideas, practices and technologies – have evolved through a process of variation, selection and transmission (for example, Mesoudi, et al., 2006; Richerson, 2005). This theory covers both internal and external measures. Further approaches

[37] See https://catholicnetwork.us/2019/02/17/points-of-agreement-among-worlds-religions-and-guiding-our-spiritual-traditions-through-higher-levels-of-ethical-and-moral-behavior/

relevant for in-the-head adaptations enabling people to cooperate in social groups include theories of intentionality, concept acquisition and constructed emotions.[38]

To understand the scope for promoting internal mechanisms for interpersonal cooperation – and thereby develop in-the-head Core Design Principles that are complementary to Ostrom's out-of-the-head ones – it is useful to consider the role of "cognitive gadgets" (mechanisms of thought that are transmitted through social learning)[39] and "cognitive artefacts (the mental products of cognitive gadgets). Whereas genetic evolution has provided humans with general-purpose mechanisms such as memory and the ability to learn, cognitive gadgets – including mechanisms such as imitation, mindreading, normative thinking, metacognitive social learning strategies, and causal understanding – emerge from the interaction between social learning and cultural evolution. Thus, our cultural development is able to transform our cognitive development. By implication, if we manage to create cultures of cooperation to tackle particular, recurrent collective action problems, we can thereby change the way we think, creating a virtuous feedback loop between culture and cognition (in terms of thoughts and feelings). The cognitive gadgets may be understood as the sources of cognitive artefacts, which include capacities such as elements from the Christakis' "social suite" (Christakis, 2019): the capacity to have and to recognize individual identity, love for partners and offspring, friendship, in-group bias, and mild hierarchy (according more prestige to some group members than to others). They also include a variety of prosocial norms and various forms of self-domestication (see Henrich, 2016), as well as an array of mindfulness and compassion training programs (for example, Gilbert, 2013; Williams et al., 2007). These cultural artefacts can generate further feedback loops between culture and cognition.

[38] See the shared intentionality theory of Tomasello (2014), the representational redescription theory of Karmiloff-Smith (1995) and the constructed emotion theory of Barrett (2017).
[39] See the cognitive gadgets theory of Hayes (2018).

Thus far, orthodox microeconomic theory has taken little notice of the internal mechanisms above or their interactions with culture.[40] A promising avenue for taking account of how internal mechanisms affect individual economic decisions is through their influence on motives. A motive, as used in motivation psychology, is a force that gives direction and energy to one's behavior, thereby determining the objective, intensity and persistence of the behavior (Elliot & Covington, 2001, following Atkinson, 1964). The psychology literature has identified various motives that clearly affect economic behavior, such as the care,[41] achievement (Atkinson & Feather, 1966; Pang, 2010), affiliation (McClelland 1967; H. Heckhausen, 1989; Heckhausen & Heckhausen, 2010), power (H. Heckhausen, 1989; J. Heckhausen, 2000; Heckhausen & Heckhausen, 2010), and wanting.[42] Lately several contributions seek to incorporate such motives into economic models of decision making (Bartke, Bosworth, Chierchia & Snower, 2019; Bosworth, Singer & Snower, 2016; Chierchia, Parianen-Lesemann, Snower, Vogel & Singer, 2017; Snower & Bosworth, 2016).

Implications for economics

The external and internal mechanisms described above have far-reaching implications for meso- and macroeconomics that remain largely unexplored. Needless to say, people form many communities other than households, firms, and governments, and these other communities – insofar as they make or influence decisions concerning the allocation of resources and the production of goods and services – shape economic activities.

[40] There have been significant forays by economists into the domain of motivation – such as the theory of reason-based rational choice by Dietrich and List (2013), social reputation theory of Benabou and Tirole (2006) and the theory of motivated decision making by Bosworth, Singer and Snower (2026) – but these are just first steps toward a thoroughgoing treatment of the internal mechanisms above.

[41] This motive is concerned with nurturance, compassion, and care-giving, e.g. Weinberger et al., (2010).

[42] This motivation system -- the closest, though imperfect, match for the standard economic assumption of self-interest -- does not receive much attention in the motivation psychology literature. See for example McDougall's (1932) propensity for foraging and ownership and Reiss' (2004) desire for eating, and Gilbert's (2013) seeking drive, an acquisition focused system.

Though households are commonly treated as cohesive decision-making units (superorganisms) or as bargaining partners (for example, Chiappori & Lewbel, 2015) in microeconomic theory, in practice households are neither of these. They are neither bee-hive-like (with members routinely sacrificing themselves for their family) nor composed exclusively of negotiating egotists. Rather, their effectiveness in achieving collective goals depends significantly on their ability to implement the CDPs 1-6, with due regard to the various needs and abilities of the group members. Within a family, children have different needs and abilities than their parents, but the family unit nevertheless needs a sense of shared identity and purpose, equitable distribution of costs and benefits, fair and inclusive decision making, monitoring behaviors, graduated responses and fast, fair conflict resolution. Failure to observe these principles is responsible for endless family conflicts and estrangement among family members.

In the same vein, firms can be viewed not merely as a set of contractual relations, but also as a community of interest and purpose, containing members with different needs and abilities. With regard to these needs and abilities, as well as the physical, technological and social environments in which the firms are embedded, the firms' effectiveness in achieving their collective goals again depends significantly on their implementation of the CDPs. Though orthodox economics treats firms either as perfectly cohesive decision-making units (superorganisms) or as arenas in which principal-agent problems are solved, the analysis of imperfectly cohesive firms – in which their effectiveness depends on the degree to which they foster inclusive identities, with equitably distributed rights and obligations, distributed decision making, graduated responses to monitored behaviors in participative processes and prompt and fair conflict resolution – is still in its infancy. Along analogous lines, global supply chains can also be viewed as communities of interest and purpose, with varying degrees of cohesiveness.

Naturally, the same also holds for governments and other policy-making institutions, at local, regional, national and supra-national levels. Political economy as a sub-discipline of economics still has far to go in exploring the implications of the CDPs for the direction and implementation of economic policies, as well as the relation between market failures and government failures.

Beyond households, firms, and governments, people form a wide variety of other groups that are engaged in the allocation of resources and the production of goods and services. These include religious, environmental, sports, cultural and countless other groups. The importance of households, firms, and governments – rather than these other groups – as shapers of economic activities should be an empirical matter, not a methodological predilection. In practice, each individual belongs to multiple groups, performing different social roles in different groups. Though these roles – as consumer, employee, congregant, activist, etc. – are often quite distinct from one another, the psychological need for personal integration (see, for example, Reid & Deaux, 1996) (self-representation that includes both personal and social identities) often requires some coordination among these roles. The degree of coordination depends, among other things, on social norms, values and information flows. The growing number of environmentally and socially conscious consumers – who, for instance, willing to pay more than the prevailing prices for fairtrade products – are an example of such coordination. These issues have received no attention in orthodox economics thus far.

Ignorance as uncertainty

The multilevel paradigm has a fundamentally different approach to knowledge and ignorance than the orthodox paradigm. As noted, orthodox economics focuses on propositional knowledge and ignorance as risk (lack of knowledge about the realizations of known

probability distributions). This approach ignores intuitive knowledge (understanding without conscious reasoning), affective knowledge (the ability to feel emotions of self and others) and psychomotor knowledge (see, for example, Anderson & Krathwohl, 2001). It inhabits a world in which history continuously repeats itself in a probabilistic sense, much as a game of roulette involves just repeated draws from a known, unchanging probability distribution. Any changes in this time freeze are classified as "structural breaks" or "permanent shocks," which are understood as exogenous to the economy.

In the multilevel paradigm, history does not repeat itself, i.e. the evolution of human affairs is a non-stationary process, understood in terms of variation, selection and replication. Our internal and external environment is continually changing. Internally, we continually relate our current experiences to our memories of past experiences and, in the process, continually generating new insights. Externally, the forces of natural selection and artificial selection (such as niche construction and construction of social networks) generate an ever-novel, ongoing dynamic process that produces ever-novel problems demanding ever-novel solutions. Our lives may be understood as an ongoing quest for such solutions.

In this quest, we are conscious of pursuing objectives subject to physical, psychological and social constraints. The objectives are driven by our needs and values; they may not be precisely specified and may not call for optimization. The resulting behaviors, in interaction with the behaviors of others, generate experiences that may change our objectives. We are most likely to thrive when we change our objectives in ways that promote the survival and propagation (in the sense of inclusive fitness). The pursuit of our objectives is commonly identified as the exercise of agency (or "free will"). Since our environment is characterized by stochasticity (containing features that are not predictable in a probabilistic sense), much of this agency is expended in finding creative solutions to new problems.

Of course, there are also many aspects of our environments that are predictable and this is the domain where we construct empirical regularities that guide the mental models

whereby we navigate our world. When making our decisions, we must continually try to assess the degree to which our experiences are the outcomes of the identified empirical regularities and predictions of the associated mental models and to what degree they arise from the stochasticity of our environment. These assessments inherently involve guesswork. On this account, we often seek to envisage the outcomes of alternative decisions before deciding on a course of action. The resulting experiences lead to new problems demanding new solutions.

Our exercise of agency involves seeking solutions to ongoing challenges and choosing a course of action in the light of envisaged outcomes. In this exercise of agency, we are driven by our bodily and psychic needs and constrained by our physical and social environment. This process draws not just on our cognitive knowledge, but also our intuitive, affective and psychomotor knowledge. The cognitive process whereby we ascribe agency to our actions involves providing reasons for our actions. Actions performed in accord with these reasons are deemed rational.

This exercise of agency can occur at various levels of functional organization. Like individuals, social groups face ongoing collective-action challenges calling for collective responses. Participation in the collective involves participating in the social process of finding solutions to these challenges and choosing a course of action from these solutions. The resulting collective decisions constrain the individuals belonging to the collective.

A theoretical framework for understanding this epistemological framework has been articulated by Denis and Raymond Nobel and George Ellis (see, for example, Noble, 2012; Noble & Noble, 2020; Ellis, 2016; Ellis & Noble, 2021. They represent organisms as nested within higher levels of functional organization, just as organs are nested within organisms, tissues within organs, cells within tissues, and so on, down to the subatomic particles. Within these nested systems, higher levels constrain the dynamics of lower levels (downward causation), while each level “harnesses stochasticity” in terms of influencing its dynamics

through the conscious or unconscious choice among alternatives. At the level of the individual, this involves the application of perception, attention, memory and values to the choice among feasible courses of action. At the level of the immune system, it involves sensing an antigen invasion, triggering hyper-mutation in a fraction of the genome, sensing the correctness or incorrectness of the outcome, and reproducing an effective antibody to the antigen.

This approach permits an appreciation of the two capacities that have arguably been most important in the evolutionary success of the human species: the capacity for social cooperation (permitting cooperative social interactions among people as well as the accumulation of cultural knowledge through time) and the capacity for innovation (resting on human creativity in finding new solutions to new problems, particularly through sharing one's knowledge with others). Both of these capacities receive little attention in the orthodox paradigm, which views cooperation primarily in terms of synergies associated with voluntary exchange and innovation primarily as either exogenous (in traditional growth models) or as the output from factor inputs (in the endogenous growth models).

Types of uncertainty

It is useful to distinguish among four types of uncertainty:

(i) "chance uncertainty:" we do not know the probabilities attached to the set of feasible possibilities,

(ii) "domain uncertainty:" we do not know the domain of all feasible possibilities, and

(iii) "ontological uncertainty:" we do not know whether our conceptual tools are appropriate for studying the phenomena under investigation.

An example of chance uncertainty is the outcome of an election, after the candidates are known. The outcome of a U.S. election, just after the Democratic and Republican parties

have chosen their candidates, is uncertain. We know the domain of possible outcomes, but we can't attach a probability to these outcomes, because an election of this sort has not been run repeatedly in the past.

A dramatic example of domain uncertainty is the advent of the internet, which was impossible to predict in the 1950s on the basis of everything that was known about technologies then. Early in 1914, it was impossible to predict the outbreak of World War I. Nor was it then possible to predict the rise of Hitler. These were all one-time events, the like of which had never occurred before. They were inconceivable occurrences; people at the time were not aware of the full domain of possible outcomes. All technological innovations, responsible for the lion's share of economic growth, are by their nature domain-uncertain. Had we known of these innovations in advance, the innovations would have occurred before.

Ontological uncertainty occurs when new experiences don't fit into our existing mental models. The degree of ontological uncertainty is always relative to our current experience. Whereas chance and domain uncertainties can be classified as "puzzles," – things to be figured out within our existing paradigms of thought – ontological uncertainties are "mysteries," since we are unable to resolve them with the existing paradigms. New paradigms are called for.

The new paradigm recognizes the existence of chance, domain and ontological uncertainties. This has important implications for our understanding of decision making. The concept of efficiency has limited applicability, since the presence of uncertainty make it impossible to assess whether an objective can be reached without waste. Waste can be eliminated only when the objective and the best means of achieving this objective have been identified. Instead, adaptability (the capacity to adjust to new situations), resilience (the capacity to recover readily from an array of shocks), and robustness (the ability to maintain operations and accommodate a variety of uncertain future events) become intrinsically

important properties of economic decisions as well as economic policies. These properties have received far less attention in economic analysis thus far than efficiency has done.

Acknowledging uncertainty also means recognizing that economic models are always simplified abstractions of the real world. Such abstractions are useful only so long as they enable us to navigate our environment successfully, avoiding dangers and approaching opportunities, but since the environment is uncertain we cannot tell for sure when our models cease to be useful. Models – from closed-form analytical equation systems to complex numerical agent-based models – as well as the theories that underlie them, always pertain only to the "small worlds" for which they were conceived. This concept of a "small world" was introduced by Leonard Savage (1954, p. 15), who noted that it would be "preposterous" and utterly "ridiculous" to apply his theory of Bayesian decision making to anything outside a "small world."

Since economic behaviors are the outcome of decisions formulated in human brains, which are continually restructuring themselves in response to lived experiences and continually responding to an ever-changing physical and social environment, we cannot assume that there are timeless "laws of nature" governing human interactions, analogous to laws of physics and chemistry. Under these uncertain conditions, we are not justified in applying a theory that works well in one sort of environment (e.g. stable times when such uncertainties are relatively small) to other environments (e.g. unstable times, such as in the aftermath of a novel pandemic). Forecasts based on standard statistical techniques are valid only in the presence of pure risk. In the "large world," confidence that we face only risk is usually misplaced.

To address the uncertainties of the "large world" in which we live, it is wise to entertain theory-pluralism. The greater the diversity of mutually incompatible theories, all supported by evidence from a variety of data sets, the more open-minded we are likely to

become and the more likely we are to extend our creative imagination beyond its current confines. Thereby we become more likely to adapt our thought processes to new situations. In the analysis of most economic problems – particularly macroeconomic ones – this theory-pluralism will embrace both small-scale analytical models (with closed-form solutions) and large-scale, numerical, complex models. On the one hand, the complexity economics models (applying complexity science to economics) are able to trace the adaptive behavior of heterogeneous agents in the economy in ways that are beyond the reach of analytical models.[43] On the other hand, the analytical models provide a transparency and flexibility that make it easier to investigate the effects of modifications and alternative conceptualizations of large-world situations. Thereby they may help us identify important causal chains and parameters in the diagnosis of economic problems.[44] It is important to keep in mind that both the analytical and the complex models are both small-world attempts to understand the large world. Both have their uses and misuses.

In the presence of uncertainty, the fundamental economic concept of "equilibrium" –a state in which there is no tendency for changed behavior – becomes irrelevant as a description of the "large world." Even if we fully understood the full physical environment in which we live – which is inherently unknowable – we could still not be confident that people have no tendency to change their behavior, since people are continually learning and innovating and continually interacting with one another in new ways.

[43] For example, the nonlinear dynamic behavior patterns of these agents do not aggregate straightforwardly into nonlinear dynamics of analytical models. Furthermore, complex systems can trace dispersed interactions among agents, mediated by legal institutions and social norms, with cross-cutting hierarchical organizations and ongoing adaptation. See, for example, Arthur, Durlauf and Lane (1997) and Arthur, Beinhocker and Stanger (2020).

[44] The early efforts to model the spread of HIV are a good example. The complex model produced by the World Health Organization in the 1980s did not predict the severity of the epidemic as well as the simpler analytical model of May and Anderson (1987), since the latter was able to identify the number of sexual partners as a crucial factor determining the spread of the disease, whereas the WHO model was too complex, in terms of country-specific demographic data, to permit ready identification of this factor. The superiority of complex models over analytical models cannot be assumed without empirical investigation. (See, for example, Green and Armstrong (2015) for cautionary results.)

At best, the concept of equilibrium is useful only with regard to a small world in which the environment is understood (such as in roulette and other man-made games). Then we can ask whether human behavior would settle down to some stationary pattern if this environment were to remain unchanged. If the answer is affirmative, then the "equilibrium" is the answer to this hypothetical question. The applicability of this concept to economic activities is bound to be quite limited.

The role of theory

A thorough appreciation of our ignorance in terms of uncertainty – rather than merely risk – calls for a new understanding of the role of theory in economics. Needless to say, neither of the authors of this article is hostile to formal theorizing. Snower is fully at home with it in economics and Wilson is fully at home with it in evolutionary science. But both authors believe that the current role of theory in economics is more like a straightjacket than an enabler of productive inquiry. In what follows, we seek to clarify the sense in which orthodox economic theory is a straightjacket and the sense in which the multilevel approach suggests a new role for economic theory.

As with so much of orthodox economics, its conception of theory is rooted in 19th century physics, where a non-living system such as the orbits of the planets could be modelled with mathematical precision. Emulating this conception of theory for a "physics of social behavior" required the simplifying assumptions associated with *Homo economicus* and markets at equilibrium (Beinhocker, 2006). Relaxing the assumptions is difficult or impossible because it makes the math difficult or impossible. This is the sense in which formal mathematical models become a straightjacket rather than an enabler of productive inquiry.

Darwin's theory of natural selection never attempted to emulate physics and didn't need to. Its assumptions (individuals vary, resulting in differences in survival and

reproduction, which are transmitted to offspring) were so simple and self-evident, at least in retrospect, that they could be described in words. The major predictions emanating from the theory, concerning such things as identity by descent, biogeography, and adaptations of organisms to their environments, made sense of existing information and organized the search for new information without requiring mathematical models.

Formal mathematical models of evolution began to be developed with the advent of Mendelian genetics. Genes that code for single traits that differ in their survival and reproduction are sufficiently mechanical that their change in frequency can be modelled with mathematical precision – but only for the simplest cases. Complex cases such as multiple loci, gene-gene interactions, frequency dependence, and fluctuating environments quickly prohibit anything that could be called a mathematically derived fundamental theorem of evolution[45].

Instead, formal models play a different role in evolutionary theory. They are constructed around specific topic areas, such as the many different multi-group population structures that we listed earlier in this section. Each model makes assumptions that are tailored to the particular real-world context, such as ephemeral groups vs. permanent groups with dispersal between adjacent groups. Each formal model results in predictions that were not obvious from verbal modeling, which is the power of formal modeling. However, each formal model also must be compared to the real-world context to make sure that its assumptions capture the essence of what is being modeled. Otherwise, the formal model runs the risk of becoming detached from reality. And many formal models are required because there are so many contexts. This is what it means for formal models to become enablers of productive inquiry rather than straightjackets.

[45] Ronald Fisher (1930) attempted to formulate a fundamental theorem of natural selection, defined as the rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time. Like economic theorems, however, this one applies only under highly simplified circumstances and does very little useful work in evolutionary theory. See Edwards (1994) for a discussion.

What we have described for evolutionary theory affirms what Leonard Savage wrote about "small worlds" and is needed for the study of any complex system, including purely physical systems such as the weather. In his 1988 book *Chaos: Making a New Science,* James Gleick describes how over-reliance on formal mathematical models prevented physicists from understanding even something as simple as the dynamics of a dripping water faucet. Computer simulation models were looked down upon because they merely examined special cases and didn't offer general proofs. A change in mindset about theory was required for the science of complexity to emerge. In a complex world, there is no alternative to the construction of models tailored to specific contexts and testing them against reality at frequent intervals.

To see how the change in mindset applies to economic systems, consider the three great crises of the twenty-first century – the 9/11 attack (in the political domain), the financial crash of 2008 (in the economic domain) and the Covid-19 pandemic (in the natural domain). None of these events was probabilistically predictable, for the simple reason that we had not encountered such events before. Naturally, world history is replete with terrorist attacks, financial crashes and pandemics; but what made these events unprecedented was the contexts in which they occurred. The 9/11 attack appeared as a backlash against American hegemony, liberalism, democracy and capitalism after the fall of the Iron Curtain. The financial crash of 2008 emerged out of the proliferation of financial derivatives and subprime mortgage lending practices, along with deregulation and the regulatory capture of financial rating agencies. The Covid-19 pandemic out of the relentless disappropriation of wild animals of their habitats by human beings. These contexts – each playing a crucial role in shaping the effects of the crises on human wellbeing – were all unprecedented in human history.

These events were radically uncertain, in the sense that we did not know the probability distributions from which they were drawn. The reason is simple: They were not, in fact, drawn from probability distributions. Probabilities can be derived only when we are

confronted by replicable experiments, such as the roll of a dice. In principle, this experiment can be repeated countless times with a fair dice, enabling us to calculate that the probability of rolling a “2” is 1/6.

The three crises above are not replicable in this way, for many reasons, not least because we learn from our experiences and this new learning creates a new context in which events take place. Thus repetitions of 9/11, the financial crash and the pandemic would lead to quite different outcomes. These political, economic, and natural events are truly as unpredictable as the weather.

It should be obvious that an orthodox economic theory which attributes all unknowns to “risk” (unknown events whose probability distributions are known), to which statistical techniques are applied, is hopelessly maladapted to responding to the problems of our age. Instead, we must formulate systemic goals and work toward them with models tailored to the situation, which are tested against reality at frequent intervals. In other words, we must consciously manage the process of cultural evolution as agents of system-level selection. In the final section of this article, we will provide examples of managed cultural evolution in real-world settings.

Multifaceted, context-dependent wellbeing

In the multilevel paradigm, wellbeing is intrinsically multifaceted, comprising both individual and collective sources. Which sources of wellbeing are salient depends on our social and physical contexts. These contexts are the outcomes of our individualistic and collective intentions and behaviors. In this sense, our wellbeing is the outcome of a reflexive interaction between individual decisions and social forces.

The wellbeing of agency differs from that of sociality. The wellbeing of individualistic agency (shaping my fate through my own efforts) differs from that of collective agency

(contributing to shaping the fate of my social groups). The wellbeing of care and affiliation (distinct forms of prosociality) differ from that of status-seeking and power (distinct forms of self-interested sociality). Our different ways of interconnecting with others in and across social groups generate different kinds of wellbeing.

These individual and collective sources of wellbeing have two important characteristics: (1) They are context-dependent. For example, the salience of our relative need for personal agency and social solidarity depends on our social and physical contexts. (2) They are not substitutable for one another, at least beyond particular threshold levels and time periods. For example, it may be impossible to compensate you for solitary confinement by offering you more consumption opportunities. It may be desirable to sacrifice one's individual wellbeing for social purposes in the short run, but not in the long run.

On account of these two characteristics, it is not useful or even possible – for the purposes of decision-making – to combine all sources of wellbeing in a single, time-invariant unit of measurement. This does not imply that people are unable to make tradeoffs between these components – on the contrary, they routinely do so – but the tradeoffs are limited and not identifiable independently of the social and physical context.[46]

In short, wellbeing is not a homogeneous entity that can be measured by a single metric, such as the utility functions of neoclassical and behavioral economists or the indexes of happiness and life satisfaction. Rather, a dashboard of wellbeing indicators is called for. This dashboard is to be viewed as analogous to the dashboard of an airplane: The dials for direction, speed, altitude and fuel are not to be aggregated into one number, from which the health of the plane can be inferred. Rather, the various elements of the dashboard must stand in particular relationships to one another. If the plane is losing height, the pilot cannot compensate by increasing the speed. If the plane is short of fuel, the pilot may have to change

[46] Adler and Fleurbaey (2016, Part 3) provides an insightful overview of different approaches to the evaluation of wellbeing and the tradeoffs among the components of wellbeing.

direction (aiming for the nearest landing strip). The relative significance of the dashboard components depends on the context. Similarly, people require material sustenance, empowerment and social belonging within a stable environment,[47] with the appropriate mix depending on the context. Both the individualistic and collective needs of an individual must be satisfied in order to live a thriving life. Within any particular social group, individuals differ in terms of the relative importance of their individualistic and social needs for their wellbeing. Cultures differ dramatically in terms of the weight they give to the individualistic and social determinants of wellbeing.[48]

These needs must stand in context-specific relationships to one another. Wellbeing is ubiquitously context-dependent. It mirrors the successes and failures of people in their competitive and cooperative efforts within and between social groups. This context-dependent wellbeing is an important driver of the evolution of people's preferences within their social groups (see, for example, Bosworth & Snower, 2016; Bosworth, Singer & Snower, 2016).

The laughter and friskiness of your child may induce you to play; the child's cries of pain elicit your care and compassion; the child's screams of fear in the presence of a growling dog prompt protective goals; and so on. We are pained by the pain of our loved ones, but we may feel Schadenfreude at the pain of our adversaries (Singer, Seymour, O'Doherty et al., 2006). In short, wellbeing is both multidimensional and contextual. The various endeavors to measure wellbeing in economics have not confronted this context-dependence.

On this account, the single-minded accumulation of material wealth may be a mixed blessing for everyone except the poor. For once people are materially secure, the quest for material things may come at the expense of other sources of wellbeing. The more we value

[47] These elements of wellbeing are measured explicitly in the SAGE dashboard of Lima de Miranda and Snower (2020), where S represents "Solidarity," A represents "Agency," G stands for "material Gain," and E signifies "Environmental sustainability."

[48] Henrich (2020) distinguishes between "regulated-relational worlds" (where the social determinants of wellbeing are predominant) and "individualistic worlds" (where the individualistic determinants predominate). Koreans and Japanese belong to the former; Americans, Australians and British belong to the latter. For empirical evidence, see Hofstede (2003).

material things and the more aspects of our lives we allow to be governed by market forces, the less we are able to partake of the non-material sources of wellbeing – and particularly those associated with compassion and care. We are psychologically incapable of being competitive and caring at the same time. Market transactions may crowd out non-market norms, such as duty, responsibility and faithfulness.

These considerations affect the conduct of many aspects of our lives. If we give our children cash as reward for good school performance, we may teach them more about accumulating cash than accumulating knowledge. If a country sells immigration quotas to foreigners, it may instill more avarice than virtues of citizenship in them. When military service is delegated to private contractors, it spreads the drive for profit maximization rather than patriotism.

Economic progress may become decoupled from encompassing social progress, for the simple reason that economic growth (and the associated rise in consumption opportunities) need not be closely related to the growth of social solidarity or personal agency.[49] It has been argued that the forces of globalization, digital technological advance and financialization over the past four decades have weakened the connections between economies and societies. In particular, shifting global supply chains, automation and the pressure to generate short-term financial returns have weakened communities and disempowered workers with routine skills (see Kelly & Sheppard, 2017, and Kelly & Snower, 2021). This decoupling of economic from social progress can be identified as a source of populist discontent and social discord (Bosworth & Snower, 2021). Recoupling economic and social progress calls for new approaches to government policy, business strategy and leadership.

[49] Lima de Miranda and Snower (2020) provide empirical evidence for a variety of countries.

With regard to government policy, for example, active and passive labor market policies generally a quite different effects on empowerment, even after differences in material living standards, economic security, and the work-leisure balance have been taken into account. Giving long-term unemployed workers incentives to become skilled and employed through hiring subsidies has a different influence on personal agency and social embeddedness than do wage subsidies (see, for example, Snower, 1993, 1994). Regarding business strategy, recoupling economic and social progress calls for a shift from the pursuit of shareholder value to the pursuit of stakeholder value. When the latter is combined with socially inclusive legal obligations, targets and incentives from the government – an example of purposeful cultural evolution – business activity can deliver more social progress (Kelly & Snower, 2021). Cooperation and competition in the workplace have quite different effects on social solidarity (for example, Lindbeck & Snower, 1988). The recoupling agenda also calls for participatory, empowering, inclusive approaches to leadership, in line with Ostrom's Core Design Principles (for example, Atkins, Wilson & Hayes, 2019; Sheppard, 2020).

In the economic world of goods and services, it is unwise to follow single-mindedly a "the more the merrier" strategy with respect to our wellbeing. There are tradeoffs to be recognized and choices to be made. The more we focus on the satisfaction of our material resource desires, the less opportunity we may have to fulfill our needs for connecting and giving. The more concerned we are to protect ourselves from external threats, the less latitude we have to open ourselves to others in trust and mutual reliance. It is important to look beyond capital and wealth in assessing the success of economies (see, for example, Snower, 2018).

Multilevel evolution as a driver of progress

The multilevel paradigm has a profoundly different notion of progress than that of orthodox economics. First, "progress" is specified in terms of multi-faceted wellbeing, rather than in terms of the accretion of consumption goods and leisure. This wider concept of wellbeing includes the exercise of agency and the sense of solidarity within one's communities. Second, our understanding of "progress" recognizes that humans owe much of their evolutionary success to their capacities for cooperation and innovation. We have a deep-seated drive to belong to social groups (see, for example, Walton et al., 2012) and we derive our social identities from our group memberships. Solitary confinement is painful and psychologically destabilizing. We naturally cooperate with other group members, deeming them to be trustworthy and well-meaning. We also have a deep-seated drive for the exercise of agency and empowerment. Since the Enlightenment, this has grown into a widespread desire to exercise creativity and innovation[50] as a process of self-realization (see, for example, Phelps, 2013).

Whereas orthodox economics ignores all forms of social cooperation that are not built on enlightened self-interest[51] and conceives of technological advance as either the outcome of exogenous discoveries (outside the realm of economics) or of a predictable production process (involving inputs of human and physical capital), the multilevel theory guides our attention to the internal and external mechanisms to promote creativity and intrinsically-driven cooperation. The latter, based on care for and affiliation with others, extends beyond enlightened self-interest. Both the creativity and the intrinsically driven cooperation can be motivated and trained (in-the-head processes) and promoted through institutional design (out-

[50] We may distinguish creativity from innovation by considering the former to be the act of conceiving something new and the latter to be the act of putting something new into practice.

[51] This enlightened self-interest may support prosocial behaviors, such as people seeking the "warm glow" from philanthropic activity or pursuing social preferences. In these cases, individuals are helping others as by-product of their individualistic utility-maximization. They are not participating in the ends of their groups, generating group dynamics that shapes their collective goals.

of-the-head processes). Furthermore, institutional design can channel enlightened self-interest into directions that serve higher-level social interests.

Progress may be understood in terms of variation, selection and transmission. Creativity and innovation in the economic realm are aspects of variation. The processes of multilevel selection (economic and cultural) promote those new products and processes that are particularly effective at addressing challenges and opportunities that we face. The process of transmission involves imitation of the selected products and processes. Promoting progress is about encouraging sufficient variation in terms of ideas, ensuring that selection is in the public interest (rather than merely in the interest of the most powerful), and encouraging the transmission of wellbeing-enhancing innovations.

Each of these aspects calls for cooperation at the appropriate levels of functional organization. First, creativity and innovation are promoted through cultures of "dynamism" that value originality and discovery (see Phelps, 2013). Second, the selection of beneficial ideas, products and processes requires forward-looking cultures that welcome new ideas, submit them to rigorous empirical investigation, protect them from special interests of incumbents and bureaucratic red tape, and promote the adoption of excellence. And finally, the transmission of ideas and innovations also benefits straightforwardly from individuals' internal and external participation in higher levels of functional organization.

So far, we have used examples from nature to describe the basic demands of functional analysis and the concept of levels of functional organization. A key point is that complex systems of agents pursuing their respective adaptive strategies (CAS2) do not robustly self-organize into complex systems that are adaptive as systems (CAS1). The evolution of CAS1 systems requires a process of selection at the level of the whole system, which must be strong enough to prevail against disruptive selection operating at lower levels.

Now we will bring the same concepts to bear upon the study of economic systems. A common refrain of behavioral economists is that economic theory must be based on the actual species *Homo sapiens*, not the imaginary species *Homo economicus* (Thaler, 2000; Thaler & Sunstein, 2008). We will show that *Homo sapiens* is very much a product of higher-level selection, operating first at the scale of small groups during our genetic evolution and then at increasingly larger scales during our cultural evolution. The same multilevel processes that can explain our genetic and cultural natures can help to manage our economic systems and the larger social and environmental systems within which they are embedded.

Human genetic evolution

Despite sharing 99% of our genes with chimpanzees, there is a night-and-day difference in the degree of cooperation. Chimpanzee communities exhibit a little cooperation and a lot of disruptive competition. Naked aggression is over 100 times greater than in small scale human societies. Even cooperation typically takes the form of alliances competing in a disruptive fashion against other alliances within the same community. The main context for community-wide cooperation is solidarity against other chimpanzee communities (Boehm, 1999; Wrangham, 2019). In laboratory experiments, chimpanzees are so disinterested in each other's welfare that, when given a choice between a reward for themselves vs. the same reward for themselves plus a reward for another chimpanzee (similar to behavioral economics experiments performed on humans), they are indifferent to the choice (Silk et al., 2005).

Something happened during the evolution of our species that resulted in a quantum jump of cooperativity. That "something" was in large part social control. Our distant ancestors found ways of suppressing bullying and other forms of disruptive self-serving behaviors within small groups (Boehm, 1993, 1999, 2011). Increasingly, this is being studied as a form of self-domestication, similar to the domestication of our animal companions (Hare & Woods, 2020; Wrangham, 2019).

In terms of MLS theory, social control suppressed disruptive within-group selection, making between-group selection the primary evolutionary force – although only at the scale of very small groups. At this point in human evolution, there was no context for the evolution of cooperation at larger scales. This is called a major evolutionary transition (MET) and it is similar to other transitions in the history of life, such as nucleated cells as cooperating bacterial cells, multicellular organisms as cooperating nucleated cells, and even the origin of life as cooperating molecular reactions (Maynard Smith & Szathmary, 1995, 1999).

To say that we are a strongly group-selected species at the scale of small groups does not imply that within-group selection was entirely suppressed. Even multicellular organisms are afflicted with cancer after billions of years. Human social control mechanisms are like an immune system that protects against "cancerous" self-serving behaviors, which is always vigilant, often challenged, and sometimes overwhelmed.

A corollary is that part of the human behavioral repertoire is to operate in "cancer" mode in addition to "solid citizen" mode, depending upon the context. Because individuals operate in multiple group contexts, they can even operate in both modes simultaneously.

Despite these complexities, group selection during our genetic evolution resulted in an increase of cooperativity in all its forms, both mental and physical. Physical forms of cooperation included hunting, gathering, childcare, modification of the physical environment, defense against predators, and offense and defense against other human groups. Mental forms of cooperation included perception, memory, decision-making, the formation of norms enforced by punishment, and a capacity for symbolic thought vastly greater than any other species (Deacon, 1998; Jablonka & Lamb, 2006).

The degree to which cooperative social interactions have become embedded in our brains and bodies as individuals is only beginning to be appreciated by psychologists, neuroscientists, and health scientists (Beckes & Coan, 2011; Coan & Sbarra, 2015; Gross &

Medina-Devilliers, 2020; Shteynberg et al., 2020). Consider that our ancestors *never* lived alone. They *always* lived in small and for the most part highly cooperative groups. This means that individuals always had social resources to draw upon in addition to their own resources. In a food shortage, for example, there were other people to share their food in addition to one's own fat stores. The human brain and body evolved to integrate both personal and social resources in making their myriad tradeoff decisions, such as what to remember, what to pay attention to, or how much energy to allocate to one's immune system. Most of these tradeoff decisions take place beneath our conscious awareness, similar to the unconscious regulation of our breathing and heartbeats.

It follows that to live as an isolated individual in modern times is one of the biggest evolutionary mismatches imaginable. Our brains and bodies react to the absence of social resources as an emergency situation. Our minds struggle to regulate our thoughts and behaviors without the social reinforcement that comes naturally in small cooperative groups, at least when they are appropriately structured. The single most therapeutic action that can be taken by isolated individuals is not to seek therapy as individuals but to seek membership in small and appropriately structured groups with meaningful objectives, as we will show in part III of this article (Wilson & Coan, 2021).

Human cultural evolution

It should be obvious that while the orthodox economic paradigm begins with the false portrayal of human individuals as autonomous units and must struggle to incorporate anything social, MLS theory begins with a conception of the human individual as inherently part of cooperative groupings. This does not mean that individuals lack agency within cooperative groups. To the contrary, since bullying and other forms of disruptive self-serving behavior are the greatest threat to cooperative enterprises, group members must always be ready to assert their own rights. Hunter gatherer-egalitarianism is a combination of stubborn independence

and communal values. Members take an active role in deciding what "we" should do, abide by the norms that are created, and punish those that don't. The very same members can be quick to game the system when opportunities allow.

Nowhere is the communal nature of human society more on display than our capacity for cultural evolution. Other species have cultural traditions, including so-called "lower" animals such as fish and birds in addition to the so-called "higher" primates (Laland, 2017; Whiten, 2021). But only humans are cooperative enough to maintain an inventory of symbols with shared meaning and to transmit the inventory in a cumulative fashion across generations. It is notable that the only other outstanding example of symbolic communication in nature – the waggle dance of the honeybee – evolved in another ultra-cooperative species.[52]

Once the human capacity for symbolic thought was sufficiently developed, it resulted in a new process of evolution – cultural evolution – that evolved by genetic evolution and has been coevolving with it ever since (Boyd & Richerson, 1985; Richerson, 2017; Richerson & Boyd, 2005).

Genetic evolution is so slow relative to cultural evolution, that – with the exception of genetic engineering – we can ignore it from a public policy perspective, focusing exclusively on cultural evolution. In this regard, however, a comprehensive knowledge of genetically evolved mechanisms of cultural transmission is desirable. It is sobering to reflect that every cultural adaptation worth wanting, including those winnowed from the past and those that we bring about in the present, must somehow be replicated in the minds of others, including children during their development. Conscious attempts to manage economic systems must include the entire culture, not just the institutions and market processes that are the typical targets of economic policy.

[52] See Gowdy and Krall for an informative comparison of humans and other ultrasocial species.

Because cultural evolution is much faster than genetic evolution, it enabled our ancestors to spread throughout the planet, adapting to all climatic zones and dozens of ecological niches. Then the ability to produce our own resources (agriculture) and access previously untapped sources of energy (fossil fuels) led to an increase in the scale of human society, leading to the megasocieties of today.

Of course, symbolic thought can operate on behalf of disruptive lower-level selection in addition to higher-level selection. Human cultural evolution is a multilevel process, no less than genetic evolution. Cooperation at any given scale is vulnerable to disruption from within (the social equivalent of a cancer) and itself can disruptive at larger scales. Self-preservation is a good thing – until it becomes self-dealing. Helping family and friends is a good thing – until it becomes nepotism and cronyism. Growing a nation's economy is a good thing – until it overheats the earth. In this fashion, much that is called pathological and corrupt at higher scales is virtuous as smaller scales – merely a CAS2 system rather than a CAS1 system.

A new breed of historian is reinterpreting human history from a cultural MLS perspective (Henrich, 2015, 2020; Nunn, 2021; Turchin, 2005, 2015). As a striking example, Josiah Ober, professor of political science and classics at Stanford University, explicitly compares the Greek city-states (poleis) to ant colonies and attributes the remarkable efflorescence of culture during Greece's classical period to the establishment of democratic governance within some poleis, giving them an advantage in economic and military competition against other Greek poleis and adjacent empires (Ober, 2015; Ober & Wilson, 2021).

What took place in ancient times is also taking place in the present (Acemoglu & Robinson, 2012; Fukuyama, 2012; Putnam, 1992). Authors trained in the humanities and social sciences, especially the "New Institutional Economics" pioneered by Douglas North, are increasingly appreciating the value of MLS theory (Nunn, 2021). They are joined by

authors such as Peter Turchin (2005, 2015, 2016) and Joseph Henrich (2015, 2020), whose primary training is in evolutionary science.

Rethinking the invisible hand

This is the background for the most far-reaching and influential insight of economics, namely, that the uncoordinated decisions of countless selfish decision-makers can produce collectively desirable economic outcomes. In particular, people transacting in "perfect markets" can satisfy consumer's demands as efficiently as possible. This means that once the transactions have taken place everywhere in the economy, it is impossible to make one individual better off without making another individual worse off – a concept known as Pareto efficiency.

The orthodox interpretation of the invisible hand

The notion of people transacting in "perfect markets" – economic markets that are not encumbered by "frictions" and "imperfections" – is meant to be analogous to the notion of a perfectly round ball rolling down a perfectly straight incline in a perfect vacuum (so that its speed is exactly in accordance with Newton's laws of motion). Perfect markets are ones in which there are no externalities (uncompensated costs and benefits), no exercise of market power, no asymmetric information and no transactions costs. In an economy composed of such markets – as well as uniqueness and stability conditions, ensuring that there is only one set of prices at which the demands for all goods and services are equal to the their corresponding supplies and that if these demands are initially not equal to their corresponding supplies, then voluntary exchange will bring about a change in prices, so that equality is speedily achieved – then it can be shown that the general equilibrium (the quantities and prices transacted in clearing markets) is Pareto efficient. This result – known as the First Fundamental Theorem of Welfare Economics – occupies such a central place in economic analysis since it appears to explain why goods and services requiring many different inputs

from many different countries and many different firms – such a piece of paper, a computer, an internet connection, or the water supply in a residential dwelling – get produced reliably and remain responsive to changing consumer demands without any central coordination. This is magic of Adam Smith's Invisible Hand, described in *The Wealth of Nations* in what is probably the most famous citation in economics:

> "… every individual … neither intends to promote the public interest, nor knows how much he is promoting it. (…) he intends only his own gain, and he is in this, as in many other cases, led by an **invisible hand** to promote an end which was no part of his intention. Nor is it always the worse for the society that it was not part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good. It is an affectation, indeed, not very common among merchants, and very few words need be employed in dissuading them from it." (Smith, 1776, Book IV, Chapter II, paragraph IX)

The underlying phenomenon is pervasive and counterintuitive. The production of a sheet of paper nowadays requires the coordinated efforts of many thousands of people around the globe – from the miners who extract the minerals contained in the machines that refine the pulp and mix it with water and other additives, to the operatives who press and dry the paper, to the wholesalers who cut it into sheets, to the drivers who distribute it to the retailers, and so on. Since paper production is not vertically integrated, there is no central coordination of the many people involved in this process. Instead, these people are simply purchasing and selling the plethora of raw materials, labor services, physical capital services and intermediate inputs that flow into the production of each sheet of paper. That such highly complex chains of

personal interactions, along extensive stages of production, can satisfy consumers' paper demands without central coordination, strikes many as surprising.

Not only is it possible to satisfy consumption demands through uncoordinated voluntary market activities, but this free-market system appears to function much better than central coordination does. The Invisible Hand is commonly invoked to elucidate why capitalist economies (characterized by private property, free enterprise and voluntary exchange in decentralized market activities) have been much more successful in generating material affluence than communist economies (characterized by state ownership and control of the means of production, as well as central planning).

The economists' depiction of Adam Smith's Invisible Hand through the First Fundamental Theorem of Welfare Economics presupposes strict individualism. Each economic agent – each household and each firm – strives only to maximize the payoff accruing directly to him- or herself. The people in this economy are not connected through bonds of empathy, compassion, mutual obligation, or social norms. They are rational, calculating, greedy and lazy, but lack any feelings for one another. Prices are the only mechanism through which their actions are coordinated. The concept of Pareto efficiency also presupposes strict individualism, as each individual's wellbeing is assumed to depend on her own consumption. Thus increasing one individual's consumption without reducing another individual's consumption makes the former better off without making the latter worse off.

Problems with the orthodox interpretation

The standard portrayal of economic agents in neoclassical and behavioral economics is compatible with the American Psychological Association's definition of psychopathy, as a synonym of anti-social personality disorder, which is "a pattern of disregarding or violating the rights of others. A person with antisocial personality disorder may not conform to social

norms, may repeatedly lie or deceive others, or may act impulsively."[53] This implies that the First Fundamental Theorem of Welfare Economics identifies the conditions under which a population of psychopaths can satisfy each other's consumption demands efficiently through voluntary exchange. Since people with psychopathic personalities represent no more than 1 percent of the population (Tsopelas & Armenaka, 2012), this is clearly not a useful description of people's actual patterns of thinking, feeling and behaving. The important question, however, is whether the economists' portrayal of economic agents is a suitable simplification for explaining why people in market economies manage to satisfy consumers' demands without central coordination.

There are many reasons to suspect that this is not so. If people were indeed GASLARF (greedy, asocial, selfish, lazy, autonomous, rational and far-sighted), we would need police guarding virtually every shop window and CCTV continually following everyone, for otherwise many people would find it cheaper and more convenient to steal than to buy. Instead, most people are kept from stealing by moral values and social norms that they have internalized, not by the fear of punishment from law-enforcement officers. If you asked a GASLARF stranger for directions, you would receive no answer or a lie that benefits the stranger. A country populated by GASLARFs would require prodigious legal, judicial and penal systems, since contracts would not be honored unless enforced. Countries would be unable to defend themselves, since soldiers would fulfill their duties only if monitored, the monitors would need monitoring, and so on. No one would vote in a national election, since such elections are never decided by a single vote. Parents would not care for their children unless they had a well-founded expectation that these children would repay them later on. Furthermore, people would always exploit all potential gains from trade, regardless of whether they belonged to the same culture or a different one. In practice, however, people

[53] APA Dictionary of Psychology, https://dictionary.apa.org/psychopathy, 2020.

generate far more opportunities for mutually beneficial transactions within their social groups than outside them. When people are mistrustful or hostile to one another (like some Israelis and Palestinians, Shia and Sunni Muslims, Hindus and Muslims, natives and immigrants), few gains from trade are exploited and the market economy withers.

So if the economists' standard interpretation of the Invisible Hand cannot explain many empirical regularities, then how can we explain the success of market economies in satisfying so many consumer demands?

The multilevel interpretation

Among the Enlightenment philosophers who compared human society to a beehive was Bernard Mandeville (1670-1733) and his Fable of the Bees (Mandeville, 1714; Wilson, 2004). Not only did Mandeville portray human commerce as a teeming beehive, but he portrayed solid citizens as no different than knaves in their contribution to the common good.

> *As Sharpers, Parasites, Pimps and Players,*
> *Pick-pockets, Coiners, Quacks, Sooth-Sayers,*
> *And all those, that, in Enmity*
> *With down-right working, cunningly*
> *Convert to their own Use the Labour*
> *Of their good-*
> *These were called Knaves; but, bar the Name,*
> *The grave Industrious were the Same.*
> *All Trades and Places new some Cheat,*
> *No Calling was without Deceit.*

Adam Smith was critical of Mandeville and was amply aware that knave-like behavior is often just plain bad for the common good (Wright, 2005), but his metaphor of the Invisible

Hand (which he invoked in print only three times) conveys the same idea that economies run as much or even more on self-interest than overtly other-oriented behaviors. The metaphor of the Invisible Hand is formalized in economic theory by the First Fundamental Welfare Theorem, as discussed above.

The multilevel paradigm suggests that the orthodox conception of the Invisible Hand is profoundly misleading. The entire thrust of multilevel approach is that the only way for CAS2 systems (composed of agents following their respective adaptive strategies) to become CAS1 systems (that function well as systems) is by a process of system-level selection. In orthodox theory, the beneficial workings of the Invisible Hand are specified as the Pareto efficiency of the general equilibrium, in the absence of externalities and other market failures and the presence of clearing markets. Under these conditions, CAS2 systems can indeed become CAS1 systems merely through the exploitation of individual-level synergies through voluntary exchange. Though this is technically correct, the conditions for Pareto efficiency are never fulfilled in practice. Thus, in the real world of widespread market failures and non-clearing markets, it is necessary to explore the processes of system-level selection that could make the Invisible Hand work.

In a way, this might strike some economists as old news. Only the most vulgar rendering of the Invisible Hand metaphor pretends that the unfettered pursuit of self-interest robustly benefits the common good. In some domains of their discipline – such as competition theory – economists know that economic markets need to be structured to avoid disruptive forms of self-interest and by constructing such markets are performing system-level selection in their own way. Many standard economic policy proposals — such as measures to promote competition or tax-subsidy schemes to enable economic agents to "internalize" externalities – may be understood as policies to promote system-level selection.

But the multilevel paradigm offers a much broader toolkit for system-level selection than orthodox theory. Take equity as an example. The multilevel approach treats it as a fundamental aspect of cooperative governance at all scales. Without safeguards for ensuring that the benefits of cooperation are proportionate to one's contribution, then disruptive lower-level selection will take over. Equity begins at the "cellular" level of small functionally organized groups (e.g., families, schools, neighborhoods, businesses, etc.) and continues in the participation of these groups in larger scales of governance and multiple spheres of activity. In contrast, orthodox economic theory sees its purpose as the maximization of efficiency in a way – given its assumptions – that trades off negatively with equity. The main tools for increasing equity are taxes and subsidies.

Within the multilevel paradigm, a new conception of the Invisible Hand can be achieved by observing the need to operate in two capacities: 1) as *designers* of social systems; and 2) as *participants* of the systems that we design (Wilson & Gowdy, 2015). As designers, we are agents of selection at the scale of the whole system and must have the welfare of the whole system in mind. This is the opposite of the Invisible Hand metaphor. As participants, we can indeed follow our lower-level interests (which is not the same as behaving like *Homo economicus*) without having the welfare of the whole system in mind, in keeping with the Invisible Hand metaphor. In short, system-level selection *is* the invisible hand that winnows lower-level behaviors that contribute to the common good from the much larger set of set of lower-level behaviors that would disrupt the common good. In part III of this article, we will provide an extended example in the context of the Smart Cities movement.

Part 3: Putting the new paradigm to work

Parts I and II of this article contrast the individualistic and physics-based paradigm of economics with the multilevel and evolution-based paradigm that is in a position to replace it. In this final section we will focus on the practical applications of the multilevel paradigm in real-world settings, which requires managing the process of cultural evolution at multiple scales.

The practical applications are all based on a central insight: Most collaborative human endeavors – whether in economic policy, social policy, national defense, business strategy or neighborhood initiatives – may be understood as communities of people coming together to manage their cultural evolution in the pursuit of their collective goals. Their collective goals arise at many different levels: climate action requires global cooperation; water security calls for primarily regional collaboration; interfaith outreach requires cooperation across different religious groups; urban planning calls for partnership among inhabitants in a city; and so on.

Achieving such collective goals at diverse levels means exercising the human flexibility in achieving functional organization at diverse levels. In order for people to thrive, they need to identify the level at which each collective action problem lies and to respond by partnering at a level of functional organization corresponding to the level of the problem. Much of the human-made suffering throughout history can be understood in terms of a misalignment between the level of the problem and the level of functional organization that meets it. Such functional misalignment happens, for example, when an actual or perceived military threat is used to justify despotic rule, when interest groups lobby for legislation that threatens public health, or when the business pursuit of shareholder value leads to environmental damage. Policy initiatives – at the international, national, regional or local levels – may be understood as courses of action that are meant to enhance the wellbeing of identifiable social groups. Whether these initiatives are helpful or harmful to the people

affected by them depends on the degree of functional alignment and the degree to which each policy manages to achieve its intended goals in an uncertain world. Thus, the most important challenge of policy making is to achieve the appropriate alignment between the domain of functional organization and the domain of the collective action problem. Reaching such alignment usually requires not just the appropriate formation of social groups, but also the appropriate collaboration among social groups in pursuit of the common goal.

From individuals to functionally organized groups

Arguably the most significant difference between orthodox theory and multilevel theory is the identification of the typically small, face-to-face, functionally-oriented group as a fundamental unit of human society. As we showed in part II, humans *never* lived alone for our entire history as a species. We *always* lived in the context of small groups whose members needed to coordinate their activities to collectively survive and reproduce. We always participated in not one but many such groups, oriented around particular tasks such as hunting, gathering, childcare, predator defense, and offense and defense against other human groups. Amazingly, evolution has endowed us with an ability to recognize the appropriate group context and coordinate our activities accordingly.

This level of functional organization remains just as important in modern life: Our families, neighborhoods, schools, churches, workplaces, military and policing units, volunteer and recreational activities. Not only are these groupings important in their own right, but they are often the building blocks of larger social organizations. They can truly be regarded as the "cells" of "multicellular" society – and if the cells aren't healthy, then the larger "organism" can't be healthy either.

It is important to be clear about the limits of this analogy. For a small human group to function as a cell in a larger society does not imply that it is mindless or expendable. As we

have already stressed and will elaborate further below, individual participation and consent is crucial for both within-cell and between-cell interactions.

The importance of social "cells" is nearly invisible to standard economic theory and this is reflected in real-world settings such as workplace environments. When employees are imagined as entirely self-regarding agents, then this will dictate the entire strategy for aligning their interests with the interest of the firm. These well-meaning strategies, which only "make sense" against the background of orthodox theory, can easily interfere with the actual individual motivations and organizational design principles required for groups to function as cooperative units.

For example, linking CEO compensation to corporate performance can result in maximizing short-term earnings at the expense of long-term sustainability. "Rank and yank" hiring and firing practices can result in a culture of cutthroat competition among the employees. In the words of one corporate manager quoted in sociologist Robert Jackall's book Moral Mazes: The World of Corporate Managers: "What is right in the corporation is what the guy above you wants from you. That's what morality is in the corporation." (Jackall, 2009, p.109).

Whether the Core Design Principles, elaborated in Part 2, are needed for all cooperative endeavors is an empirical question. In a recent survey study, participants were asked to provide information on two groups that they knew well: a workplace group and any other kind of group. They rated these groups for implementation of the CDPs and five group performance variables: trust, satisfaction, needs, cooperation, and commitment (Wilson et al., 2020). The main results were: 1) A strong correlation between implementation of the CDPs and group performance outcomes; 2) the correlation was as strong for workplace groups as for other kinds of groups; 3) On average, workplace groups were deficient in the implementation of all eight CDPs, with the largest deficits in CDP7, CDP3, and CDP1. In plain English, many people are not allowed to do their jobs as they see fit, do not take part in decisions that

influence their jobs, and do not find much meaning in their jobs. These are average deficits; some business groups were reported to implement the CDPs well and other kinds of groups were reported to be sadly lacking them. In all cases, the degree of implementation correlated strongly with group performance outcomes.

The CDPs deserve to be called "core" because they are needed for cooperation in all their forms, which is a common denominator for all functionally oriented groups. In addition, auxiliary design principles (ADPs) are needed by some groups but not others to accomplish their particular objectives. For example, a division of a corporation designed to manufacture products with a very low defect rate will require different ADPs than a division designed to develop new product lines, but both will require the same CDPs. For the groups that need them, the ADPs are as important as the CDPs.

In addition, there is an important distinction between a functional design principle and its implementation. All groups need to monitor agreed-upon behaviors (CDP4), for example, but the best way to monitor can be highly sensitive to context. In a small group that meets frequently, it can take the form of casual check-ins. In larger groups, more formal mechanisms might be required. The particular form of decision-making (CDP3) might need to vary depending upon the complexity of the problem, the speed with which decisions must be made, and so on.[54] For these and other reasons, identifying and implementing the appropriate design principles for a group is an ongoing evolutionary process that can be strongly guided by theory but also requires constant experimentation.

Why the average deficit for workplace groups? This too is an empirical question, but insofar as the reason lies in the individualistic bias of orthodox economic theory, this is an example of how a paradigmatic change in economic theory could lead to substantial improvements in workplace environments, where most economic activity takes place. The

[54] See Wilson (1997) for a review of group decision-making from a multilevel perspective.

excessive reliance on extrinsic motivation that guides HR management has doubtlessly been promoted by orthodox economic analysis. This may well have contributed to a common workplace culture that views work as the outcome of management pressure on intrinsically lazy workers.

The business world is not entirely influenced by orthodox economic theory. Many business practices are based on other theoretical frameworks, hard-won experience, or Joseph Schumpeter's creative destruction, which winnows successful from unsuccessful practices, even if no one knows how they work. Elinor Ostrom is little known or cited in the sprawling management literature, but this literature can still be searched using key terms that approximate the CDPs (Atkins, Wilson & Hayes, 2019; Hayes, Atkins, & Wilson (in press)). For example, a shared sense of identity and group cohesion (CDP1) increases group performance, stability, and loyalty (Ashforth & Mael, 1989; Chang & Bordia, 2001; De Cremer & Stouten, 2003; Mathieu et al., 2015; Van Vugt & Hart, 2004). Workers whose purpose matches that of their organization produce 72 percent more output than unmatched workers (Carpenter & Gong, 2016) and workers were willing to be paid 44 percent less for the same job once they learned that their prospective employers had a social responsibility mission statement (Burbano, 2016).

With respect to equity (CDP2), in a meta-analysis of 493 studies in the area (Colquitt & Rodell, 2015), all forms of fairness significantly predicted social exchange quality (trust, perceived organizational support, leader-member exchange and organizational commitment) which in turn significantly predicted task performance, organizational citizenship (prosociality) and negatively predicted counterproductive work behaviors (antisociality). Distributive, procedural and interactional justice predicted positive and negative affect in expected directions. In other words, not only does justice affect performance and prosociality, it significantly influences individual wellbeing.

The current management literature provides extensive support for the other CDPs as well. Perhaps the most compelling single study, from a cultural evolutionary perspective, followed the survival of 136 companies over a five-year period, starting from the time that they initiated their public offering on the US Stock Market (Welbourne & Andrews, 1996).[55] The management practices of the companies were coded using information available from their offering prospectuses, which were publicly available. Statistically controlling for other factors, companies that placed a high value on human resources and shared profits with employees had a much higher survival rate over a five-year period than companies that treated their employees as expendable.

If the CDPs are needed for the very survival of companies, then why hasn't "creative destruction" made them more common in the business world, in contrast to the average deficit in all eight CDPs that actually exists? The two main answers to this question are 1) countervailing selection pressures, including businesses run for the benefit of elites rather than for the good of the business or the economy as a whole; and 2) the individualistic approach to decision-making in orthodox economic theory, which obscures the group dynamics that are actually taking place. Here, as elsewhere, the flourishing of the group can be undermined by lower-level selection pressures.

Once the importance and generality of the CDPs are recognized, then CDP training (along with identification of the appropriate ADPs) can become a powerful practical tool for increasing the performance of groups of all sorts and wellbeing of their members. An added benefit is that the CDPs are inherently democratic, equitable, and participatory. These virtues can go along with increased economic performance, rather than trading off against them, as in the orthodox paradigm. Even better, the very same principles needed to increase performance in contexts that are clearly economic (e.g., workplace environments) can be applied to

[55] Discussed along with much other evidence by Pfeffer (1998).

contexts that are not typically associated with economics (e.g., families, neighborhoods, churches, schools, hospitals, nonprofits).

Experimental tests of CDP implementation are in their infancy. Doubtlessly they would have received more attention if they had a place in orthodox economic theory. In one randomized control trial, at-risk high school students in a school designed around the CDPs performed far better than their comparison group and even on a par with the average student in the public school system. Most of the gains were achieved within the first quarter of the school year, suggesting that the students, despite a lifetime of hardship, could respond very quickly to a social environment designed to safeguard prosocial behaviors. Thus, not only can CDP coaching be efficacious, but it can also deliver its results quickly (Wilson et al., 2011).

Social "cells" are the first level of functional organization above the individual person. Adding additional levels requires organizing interactions among groups of groups. First, however, we need to make a distinction that is important at all scales, between being *adapted* to one's current environment and *adaptable* to environmental change, including conscious efforts to change in valued directions.

From well-adapted to adaptable

It is a perverse fact, familiar to all of us on the basis of our experience, that changing in valued directions is not easy. Every year we make our new year's resolutions and typically fail to keep them. The mission statements and strategic plans that we write as groups typically suffer the same fate.

Why is this? To a large degree, it is not because we lack flexibility, but because we are flexibly pulled in other directions. Some of these other directions reflect equally valid goals, such as spending quality time with family in addition to doing a good job at work. Even for the time and effort that we allocate to a given context, however, we are pulled in directions

that are not aligned with our valued goals. We want to lose weight but are tempted by that bag of potato chips. We want good relations with our loved ones but also want to control them. We want to be team players at the office but also want to climb the corporate ladder. We want to avoid global warming but also like to drive our cars and be toasty in our homes.

In each of these cases, what we are pulled to do is not senseless but actually achieves a goal that is limited both socially (e.g., me but not you or us but not them) and temporally (e.g., now but not later). This comes as no surprise from an evolutionary perspective. Those who study genetic evolution already know that it doesn't make everything nice, merely resulting in CAS2 systems rather than CAS1 systems, and that system-level selection is required to evolve CAS1 systems. Once we think of both intra-individual behavioral change and inter-individual cultural change as evolutionary processes, the same conclusion applies. If we want to achieve goals that are beneficial to ourselves and others over the long term, we must become the active agents of selection: defining the target of selection, orienting variation around the target, suppressing disruptive competing strategies, and replicating best practices, realizing that they are likely to be sensitive to context. This is true at all scales, from individuals to the planet.

To make matters more complex, we must often become the active agents of selection under conditions of radical uncertainty. This involves aiming to create a supportive setting for mutual solidarity that fosters individual and collective flourishing, but remaining cognizant of our inability to understand the system in which our efforts are embedded. The world is too complex to understand in all the ways relevant to us. We must therefore act with appropriate modesty, supplemented by constant ongoing experimentation – which is just another word for a carefully controlled process of cultural evolution.

A brief description of how mindful cultural evolution works at the scale of a small functionally oriented group will serve as a comparison to individualistic accounts of microeconomics, including both neoclassical and behavioral economics. In neoclassical

economics, every individual is an island with preferences that are not influenced by other individuals. Individuals are also completely self-disciplined and farsighted in pursuit of their self-regarding goals. When individuals combine into groups such as households and firms, these higher-level entities miraculously take on the properties of the individual, as if no work is required to achieve collective unity.

As we stressed in Part I, while behavioral economics has advanced beyond neoclassical economics in many respects, it remains firmly trapped within an individualistic paradigm. Individuals in behavioral economics are much more fallible than *Homo economicus* – their thinking and actions handicapped by heuristics and biases at every turn, requiring clever nudges to cause them to behave in their own individual interests – but the individual is still the center of analysis. Though behavioral economics considers "social preferences," these preferences are located in individuals.

Here is how a mindful process of cultural evolution can take place at the scale of a small, functionally oriented group (Atkins, Wilson, & Hayes, 2019). First, members are encouraged to reflect upon the purpose and values of their group. Why is it important to work together? What will the group accomplish that is meaningful for its members and the larger world? This reflection takes an important step toward implementing CDP1, a strong sense of identity and purpose. Note that it is inherently values-based, in contrast to pretense of the orthodox paradigm that economics can be value-free.

Second, group members are encouraged to think about the behaviors that will take them toward their valued goals. These behaviors become the explicit target of selection, similar to the new year resolutions that individuals make for themselves, but now with the backing and consensus of a nurturing group.

Third, group members are encouraged to reflect on the mental obstacles that get in the way of reaching the valued goals and how they manifest as counterproductive behaviors. These are the lower-level selection pressures that "hook" us because they are adaptive in a

limited sense but disrupt the higher-level target of selection for the group. The reflection concludes with a discussion of how to work around the obstacles to achieve the target of selection, especially by implementing the core and relevant auxiliary design principles.

This exercise results in immediate performance outcomes, which increase further as it becomes habitual through practice.[56] In economic terms, individual members of the group do not have fixed preferences. Their preferences are malleable and converge with each other for the purpose of interacting as a group. Members are typically not entirely self-regarding. Although it is possible for an individual to participate thinking only of their personal gain, for most people both the voluntary and compulsory dimensions of human moral psychology are activated. The voluntary dimension involves a genuine interest in the welfare of other members and their common objectives as an end in itself, accompanied by emotions such as empathy, sympathy, friendship, and love. The compulsory dimension is the establishment of norms that are monitored (CDP4) and enforced, both with rewards for good behavior and punishment for bad behavior, which starts out mild and friendly but escalates when necessary (CDP5).

In short, CDP and adaptability training *creates* what standard economic theory *assumes* to exist at small scales such as the "household" or "firm": Groups capable of acting with the unity of a rational actor. The next step is for these groups to become functionally organized at larger scales.

[56] The Association for Contextual Behavioral Science website maintains a list of randomized control trials (RCTs) demonstrating the efficacy of this kind of reflection for improving a constellation of behaviors, including behaviors associated with therapy, such as anxiety and depression, and behaviors associated with training, such as academic and sports performance. The rapidly expanding list of RCTs is nearing 500: https://contextualscience.org/act_randomized_controlled_trials_since_1986

From cells to multicellularity

In real-world economic and other social systems, the transition from a single functionally oriented group to a multi-group cultural ecosystem can take place very quickly. Even a moderately sized firm differentiates into subgroups that divide labor in various ways. Each subgroup can ideally be regarded as an "organ" in the firm as a "superorganism" – even if many groups fall short of the ideal. The organ-like status of a subgroup defines its purpose, which requires cooperation and therefore the CDPs just as much as if the subgroup was an independent entity. As organs, the subgroups must cooperate closely with each other to achieve their collective purpose, which requires the very same CDPs. Consent and participation are now required at two levels: for individuals within each group and for groups within the multi-group organization.

As multi-group "superorganisms" (again, recognizing that many firms fall short of this ideal and are compromised by disruptive within-group processes), firms operate in a larger cultural ecosystem including shareholders, customers, the supply chain, and the larger community impacted by the firm, which are collectively referred to as the stakeholders. All of these must coordinate their activities if they are to become a CAS1 system at a meso scale, as opposed to merely a CAS2 system composed of agents pursuing their respective adaptive strategies.

The main difference between the multi-group social organization of a firm and the multi-group social organization of a collection of stakeholders is that firms typically have a greater amount of control over the multi-group operation. Even this distinction becomes blurred, however, when we consider the full range of corporate and state governance structures. Some corporations exert strict top-down control over their operations, but others provide more autonomy to their subunits. Likewise, national-level governance structures span the range from top-down socialism to bottom-up laissez-faire economies with the state

playing an attenuated role. And each economy is forever and irreversibly part of the entire planetary system, where human and natural realms interact and where governance structures are often weak to the point of non-existence.

Two generalities emerge when we consider the full spectrum of multi-group governance structures at the meso and macro scales, especially when it comes to managing positive change at these scales. First, *centralized planning in the absence of experimentation seldom works*. Why? Because the world is too complex for any group of experts to comprehend and implement their grand plan without experimentation. In systems engineering, a point is reached very quickly when optimization models must be supplemented with computer simulations and experimentation with prototypes (Madhavan & Wilson, 2018).

The second generality is that the uncoordinated pursuit of lower-level interests won't work either. Why? Because when agents in a complex system follow their respective adaptive strategies, they become merely a CAS2 system and not a CAS1 system. It is well known by systems engineers that you can't optimize the whole system by separately optimizing its parts. Multilevel theory confirms that if the whole system is not made the target of selection, then it will inevitably result in merely a CAS2 system and not a CAS1 system.

Paradoxically, this conclusion is reinforced by economic general equilibrium theory. The conditions under which the pursuit of selfish ends leads, as if by an invisible hand, to Pareto efficient outcomes are unrealistically demanding. One of these conditions, for example, is the absence of externalities, which implies that all costs and benefits that people impose on one another are fully compensated. Given that humans are social creatures with collective goals, this assumption is utterly at odds with reality. The moral of this story is different from the one that economists usually derive from the first fundamental theorem of welfare economics: It is not that self-interest is in the public interest, but rather that in practice self-interest is never in the public interest (which is another way of saying that the conditions for Pareto efficiency are never achieved in practice).

The first generality usually forbids the kind of top-down management often practiced by socialist governments and command-and-control corporations. Instead, top-down management must take the form of orchestrating a process of experimentation at the appropriate scales. After a system-level target of selection is identified, there must be a search for candidate solutions. These solutions must be implemented cautiously and at a pilot scale. The outcomes must be measured at the scale of the whole system to avoid unforeseen consequences. When a better practice is identified, it must be replicated with context-sensitivity in mind. "Small world" models play an important role and should be constructed and tested against data at frequent intervals.

The principle of polycentric governance provides a guide for organizing large-scale systems into appropriate sub-groups. As noted in Part II, the principle notes that: 1) life consists of many spheres of activities; 2) each sphere has an optimal scale; and 3) good governance requires determining the optimal scale for each activity and appropriately coordinating among the spheres. For many spheres of activity, the optimal scale is more local than current scales of governance. This makes Ostrom popular among Libertarians, but the true implications of polycentric governance are more nuanced.[57] In the first place, even the smallest groups need to be governed by the CDPs and appropriate ADPs, which is a far cry from individuals having the freedom to do whatever they please. In the second place, higher-level governance is the optimal scale for some spheres of activity. The principles of subsidiarity and federalism, which as we noted in Part II have arisen again and again by multilevel cultural evolution throughout human history, provide a useful rule of thumb. The default rule for governance is "smaller is better." Larger scales of governance develop as needed to regulate interactions among the smaller scales. The similarity between polycentric governance and multilevel selection theory should be obvious.

[57] See Wilson and Boettke (2020) for an extended discussion of Libertarianism from a multilevel evolutionary perspective.

Experimentation – which is just another word for a carefully managed process of cultural evolution – is required regardless of whether the target of selection is the productivity of an automobile plant, the short- or long-term profits of a firm, a smart city, a regenerative agricultural system, a vaccine development and delivery system, or a global economy that respects planetary boundaries. Any target of selection at a lower scale (e.g., a smart city or national-scale economy), must be evaluated for its consequences elsewhere in the larger system, which means ultimately the global system. MLS theory leads inevitably to a whole-earth ethic. This was not the case 10,000 years or even a few centuries ago, but it is the case now. The whole-earth ethic does not replace lower-level identities, but is needed to orient them toward the global common good.

This prescription for meso- and macro-economics might be new for economists operating within the paradigm of individualism, but pragmatic social planners of all stripes have converged upon it again and again, for the simple reason that it appears to be the only thing that works. The bold prediction is that when any type of social governance and change effort is examined, such as national governance, corporate governance, urban planning, entrepreneurship, rural and international development efforts, software development, and systems engineering, efforts that err on the sides of centralized planning and uncoordinated laissez faire fail and a managed process of cultural evolution at the scale of the whole system is what works.[58] Here are four illustrative examples.

[58] See Wilson (2020) for a series of print conversations and podcasts on this theme.

Illustrative examples

Manufacturing

An experimental approach to manufacturing, such as steel and automobile assembly plants, began in the late 19th century, associated with names such as Frederick Winslow Taylor and Henry Ford. It became known as scientific management and in retrospect can be seen as an explicit cultural evolutionary process. Scientific management involved identifying a target of selection, comparing alternative practices, and implementing the better practices in the manufacturing process.

This mindful process resulted in a much faster rate of cultural evolution in the manufacturing sector, leading to huge gains of productivity in some respects but also huge negative externalities in other respects. For example, when the target of selection is the elimination of wasted time and motion in a given manufacturing process, this can result in mind-numbing repetitive activities that are toxic to the welfare of the workers, as Charlie Chaplin hilariously portrayed in the movie *Modern Times*. When the time and motion studies are conducted by an elite class of managers, the worker's experience is not consulted and there is little scope for cultural evolution outside the narrow context of the experiment. There is also a tendency for increased profits to be captured by the elites and not shared with the workers, especially when unskilled labor can be hired to replace skilled labor. These pathological outcomes are due, not to the absence of cultural evolution, but to the presence of cultural evolution acting in ways that are not aligned with the welfare of the whole system. The result is merely a CAS2 system, not a CAS1 system.

The current generation of scientific management practices goes by names such as the Toyota Production System, Lean Manufacturing, Agile, and Sigma Six. These tend to do a much better job of improving the performance of the whole manufacturing system, sometimes

even including the welfare of the workers, by making the performance of the whole system the explicit target of selection. In a Toyota automobile assembly plant, for example, workers are expected to signal any minor dysfunction on the assembly line, resulting in a swarm of activity to address the problem. The assembly line workers are included in the decision-making process, along with the managers, whose offices are on the shop floor rather than the top floor. When the decision-making group arrives as a potential solution, it is implemented experimentally and the consequences for the whole system are monitored, since small changes in a complex system often have cascading effects for the whole system. If the assembly plant is working so well that few dysfunctions are reported, then production quotas are increased to expose more imperfections. A mentoring system aids in the cultural transmission of knowledge within the assembly plant and top managers tend to be recruited internally rather than from the outside (Rother, 2009).

Viewed from a cultural multilevel perspective, the Toyota Production System is an impressive example of system-level selection, where the system is a manufacturing process. There is top-down control, but it takes the form of creating the architecture for the system-level evolutionary process to take place, as opposed to a class of managerial elites able to do what they wish without constraints or without seeking input from other appropriate parts of the whole system.

This example illustrates the need to operate two capacities, which we stressed in Part II: 1) As designers of social systems; and 2) as participants in the systems that we design. As designers, we must have the whole system explicitly in mind as the target of selection. As participants, we can attend to our local concerns (such as workers signaling dysfunctions at their particular stations) without having the whole system in mind.

Smart cities

A city is a much larger social unit than an automobile assembly plant. There is less top-down control over its operations and what it takes to function well as a unit is more multi-dimensional. Nevertheless, the process required to make a city "smart" is *not different in kind* than the example that we just provided. The whole unit must be made the target of selection, alternative practices must be evaluated with respect to the target, and better practices must be replicated with context sensitivity in mind.

The pretense that "laissez-faire leads to the common good" in economics does not exist for urban planning. To pick one of innumerable examples, no one expects that individuals optimizing their driving decisions will lead to smooth traffic flow. Some form of planning and regulation is required, but the kind of centralized planning associated with figures such as Robert Moses, who became known as "the master builder" (Christin, 2014), can be disastrous in its own right, as Jane Jacobs documented in her classic book "The Death and Life of Great American Cities" (Jacobs, 1961).

The term "Smart Cities" aptly captures the need to turn cities into something like a single organism, capable of the same kind of decision-making leading to effective action that we associate with smart individuals. The first efforts associated with the term were highly technocratic and oriented toward narrow definitions of efficiency, not unlike the start of the scientific management movement. Also, they were dominated by large technology firms such as IBM, with the goal of implementing a proprietary system. And the process of experimentation relied more on consulting with sensors ("the internet of things") then the flesh and blood residents of the city who were supposed to be the beneficiaries. Nevertheless, just as with the start of the scientific management movement, an experimental whole-system approach resulted in a rapid increase in the rate of cultural evolution with some positive

outcomes, such as improving traffic flow in the city of Stockholm without requiring large changes in physical infrastructure (Letaifa, 2015).

The Boston Area Research Initiative (BARI) represents a more enlightened approach to the smart city movement (O'Brien, 2019). Rather than a tech firm trying to implement its own system, it is a consortium of universities than consults with the Boston city government. There is a strong big data and technology component, but it is designed to address multiple objectives and to complement and facilitate, rather than replacing, direct interactions with the residents of the city.

An example is 311, a three-digit telephone number that can be called to report minor dysfunctions, such as a pothole, a fallen tree, or failed trash pickup, as opposed to the emergencies that merit a call to 911. This example is instructive because it is functionally equivalent to workers being instructed to report minor dysfunctions in a Toyota automobile assembly plant. But the residents of Boston cannot be required to do this as part of their jobs. How can they be motivated and how can inevitable differences between demographic categories such as young vs. old, rich vs. poor, and tech-savvy vs. tech-naïve be taken into account?

One strong bias identified by research is *localism*. Most Boston residents who use 311 only report dysfunctions that are close to their own homes. In a study that used flyers to promote the use of 311, the prospect of improving one's neighborhood was effective while the prospect of improving the whole city had no effect at all (O'Brien 2018, ch 6).

One solution to this problem might be to cultivate a stronger sense of identity and purpose for the city as a whole (CDP1). Another solution, which could take place in parallel, is to create a stronger connection between the city government and neighborhoods, not just with respect to 311 but more generally. In the city of Buffalo, New York, a multi-block neighborhood association created "block clubs" that became adept at managing their own affairs by employing the Ostrom CDPs (Oakerson & Clifton, 2011; discussed in Wilson et al.,

2013). The city government helped out by providing a formal block club designation with light reporting requirements, making small amounts of money available, and stepping in with strong sanctions against deviant behavior (e.g. citing negligent landlords with housing court violations) when milder efforts at persuasion by block club members failed, in keeping with CDP5.

This is an example of a coordinated four-level governance structure (individuals, block clubs, neighborhood associations, city) that emerged spontaneously and without the trappings of the smart city movement. Many other success stories like this could be cited in the sprawling literature on cities, just as for the sprawling management literature. Each success story is an example of *convergent cultural evolution,* similar to the way that different species such as snails, turtles, and armadillos converge upon the same defensive strategy of a hard shell. No matter how successful, however, each success story tends to be limited in its spread and unknown beyond its borders. For positive cultural evolution to proceed more rapidly, there must be recognition of the general principles at play, a way to identify and compare better practices that have arisen independently, and a way to combine this kind of "natural" variation with more controlled experiments. It is here that the technology and big data associated with the smart city movement can make a contribution by creating an architecture for the system-level cultural evolutionary process to take place at the city-wide scale and then to be shared across cities, adding another layer to multilevel cultural evolution. At the end of the day, individual residents are nested within the optimal social environment of small and appropriately structured groups, where they are meaningfully consulted in governance at larger scales. The city is approaching the ideal of a multi-cellular superorganism in a way that respects individual consent and participation.

Governance at the national scale

The school of thought known as New Institutional Economics (NIE) was initiated in the 1970's by economists who were disenchanted by the individualistic perspective of neoclassical economics (Brousseau & Glachant, 2008; Hodgson, 2004b). The pioneers of NIE did not explicitly adopt a multilevel cultural evolutionary perspective, which at that time had not even developed within evolutionary biology, but their emphasis on institutions as units of functional organization that arise over the course of history caused them to converge upon some of the same insights. At the national scale, this is represented by books such as *Why Nations Fail*, by Daron Acemoglu and James A. Robinson (2012).

Acemoglu and Robinson show that nations fall along a continuum from *inclusive* to *extractive*. Benefits are widely shared among the citizenry in inclusive societies but restricted to a small class of elites in extractive societies. Their main conclusion is that *inclusive societies function better at the societal level*. Even though it might seem that despots would run their nations well for their own benefit, in fact they are preoccupied mainly with staying in power over the short term and bullying can only go so far in forcing the citizenry to do one's own bidding.

Hopefully, it is obvious to the reader by now that this is nothing more or less than cultural MLS taking place at the national scale. Peter Turchin, who has evolutionary training, makes this explicit in his books *War and Peace and War* (2005) and *Ultrasociety* (2015). The positive feedback loop between the production of food (along with the tapping of previously unused energy sources such as fossil fuels) and the scale of society has been a continuous tug of war between levels of selection. Empires tend to form in zones of incessant between-group conflict, favoring within-group cooperation. Whenever an exceptionally cooperative society arises, often aided by a new technological innovation, it expands to become an empire. Then factionalism, elitism, and other forms of lower-level interests spread like a cancer, causing the

empire to collapse. New empires seldom arise from the centers of old empires but rather at their edges.

Major events in human history, such as the so-called Axial Age and the emergence of democracy in ancient Greece, can be understood from this perspective. In the case of the Axial Age, what became the major religious traditions, such as Christianity and Buddhism, acted as a social glue for binding together larger societies than ever before – but always in the context of between-group competition at a still larger scale (Hoyer & Reddish, 2019). Greek democracy emerged as a product of economic and military competition among hundreds of city states, which the classics scholar and political scientist Josiah Ober explicitly compares to ant colonies (Ober, 2015).

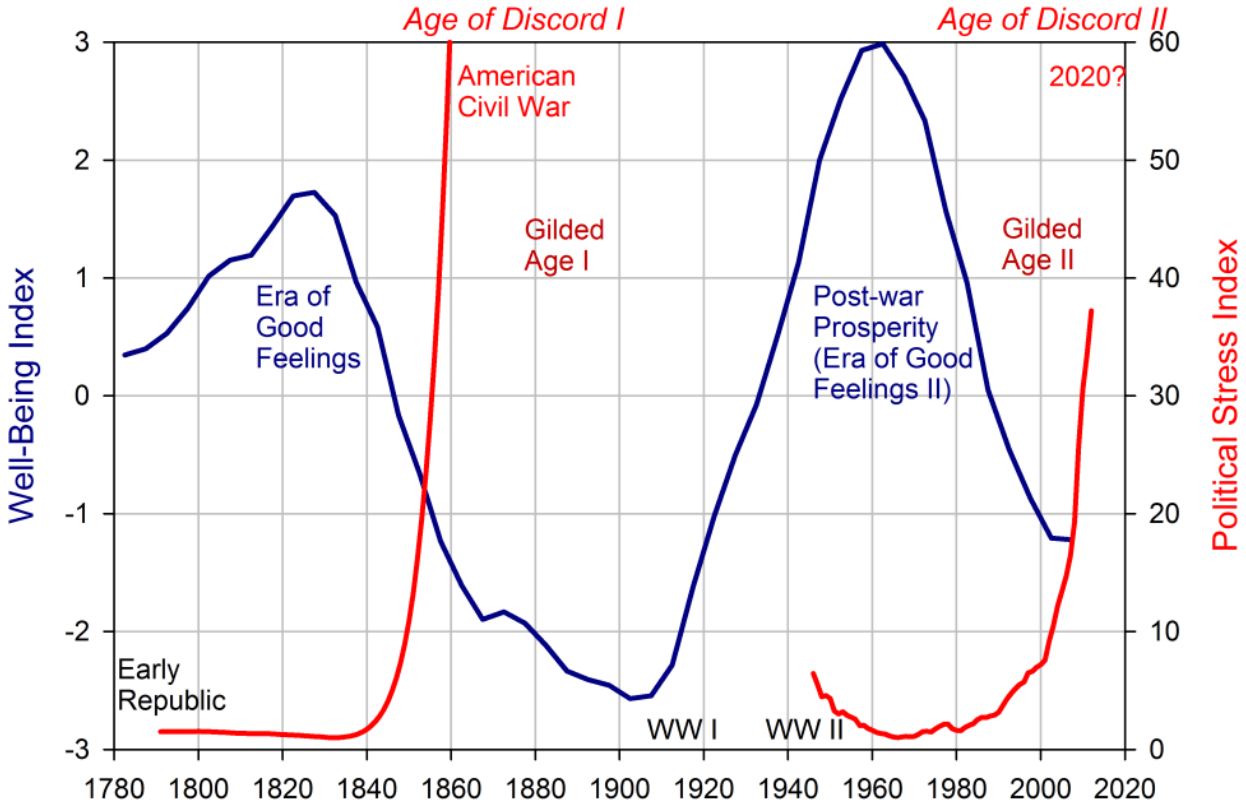
Returning to modern nations, they are larger than an automobile plant or a city, but the challenge of turning them into functionally organized units *is not different in kind*. Centralized planning is unlikely to work. The unregulated pursuit of lower-level interests is unlikely to work. And a managed process of cultural evolution with the welfare of the whole nation in mind is likely to be the only thing that can work.

History and the spectrum of variation among current nations, from highly inclusive to highly extractive, bears out this prediction. Every experiment with socialism that relied upon centralized planning, rather than the autonomy and flexibility of markets, has been an abject failure (Hodgson, 2019). Not only did top-down governance fail to predict unforeseen consequences, but concentration of power in the hands of a few elites inevitably became extractive, even in socialist movements that started out well-meaning as far as intentions were concerned. Yet, every experiment with capitalism that failed to appropriately regulate the pursuit of lower-level interests has resulted in an extreme concentration of wealth and has become elitist and extractive by a different route. These two types of failure can only be expected from a MLS perspective (Hodgson, 2015).

The most successful nations today manage to combine the vibrancy of market economies with institutions and laws that have the welfare of the whole nation in mind. Seen through the lens of MLS theory, they have managed to implement Ostrom's CDPs at the national scale. The three major sectors of capital, labor, and the state are all strong and work collaboratively with the welfare of the whole national system in mind (Mazzucato, 2015). In Denmark, for example, labor unions have accepted the right of companies to hire and fire employees on short notice in exchange for an insurance system designed in such a way that the lowest-paid workers are entitled to benefits equal to 90% or their former wage for up to two years (Anderson & Svarer, 2007). This "flexicurity" model enables businesses to rapidly adapt to changing markets and employees to change jobs without catastrophic financial hardship. Taxes are relatively high (although no higher than in the United States during its New Deal period) but deemed acceptable because social services are also high, such as free healthcare and higher education. Many nations have oil reserves but Norway, with a population of less than six million, has used theirs to create the world's largest sovereign wealth fund for the benefit of the whole nation, with over US$1 trillion in assets.

In addition to cross-national comparisons from a cultural MLS perspective, we can also compare single nations at different points in their history, as Peter Turchin has done for the United States in his book *Ages of Discord: A Structural-Demographic Analysis of American History* (2016). The solid line in Figure 3 is an index of well-being, based not only on economic markers but biological markers such as body height, age of first marriage, and life expectancy.

Figure 3: Temporal variation in wellbeing and political stress in American History. From Turchin (2016)



It's hard to argue with the biological markers as indicators of wellbeing! The peaks and valleys of the curve reveal that America has spanned the range, from inclusive to extractive, twice during its own history. What historians call "the Era of Good Feelings", which was memorably described by Alexis d'Toqueville in *Democracy in America* (1835), gave way to the extreme inequality of the Gilded Age and the Great Depression. Then America pulled back from the brink, in part due to the New Deal policies of Franklin Delano Roosevelt, an elite who was called a "traitor to his class" by governing with the welfare of the whole nation in mind (Brands, 2009). This, in turn, led to a second period of extreme inequality that we are experiencing today.

The gray lines in Figure 2 are a political stress index, which is based on the voting records of the two major political parties in the United States Congress (currently the

Democrats and Republicans). The ideological differences between the two parties were minor up to the 1840s and then spiked upward just prior to the Civil War. And the same trend is occurring today. That's what happens when a sizable fraction of the citizenry concludes that their nation is not working on their behalf. They cease to identify themselves with the nation and seek a strong identity and purpose elsewhere. Only discord can result at the national level, not to speak of the global level.

While the trends in Figure 3 are alarming, the fact that we can diagnose them provides guidance for how to pull back from our current brink: to once again formulate policies with the welfare of the whole nation in mind, learning from other success stories at the national scale in addition to the inclusive periods of American's own history. Every other nation on earth can do the same.

International governance

It has become inescapable that the whole planet is a complex system with physical processes, living processes, and specifically human-caused processes thoroughly intertwined. Human cultural evolution is taking place at breakneck speed, with every decade seeming different than the last. Many positive benefits have been achieved, but only for some and not others and over the short term without the long term in mind. In short, human cultural evolution has resulted in merely a CAS2 system, composed of agents following their respective adaptive strategies. Unless we can convert the earth into a CAS1 system, which is adaptive as a system, then catastrophes such as global warming, extreme inequality, social unrest, and disease pandemics will inevitably result.[59]

Managing cultural evolution at the scale of the whole earth is more challenging than an automobile assembly plant, city, or nation, but *the requirements are not different in kind*.

[59] An excellent summary of these challenges as well as multilevel governance responses is provided in Fleurbaey (2018).

The welfare of the whole earth must be the target of selection, variation must be oriented about the target, and better practices must be identified and replicated with context-sensitivity in mind.

Given that formal governance at the international scale is weak to the point of nonexistence, then managing cultural evolution at the scale of the whole earth might seem like an impossibility. Yet, there are grounds for optimism if we take Marshall McLuhan's metaphor of the Global Village seriously. Individual members of real villages are able to manage their own affairs when they implement the CDPs, and perhaps nations and other leviathans such as transnational corporations can too. The mechanisms of formal governance can follow upon informal governance rather than being a prerequisite.

The first step is to imagine the whole earth as the salient group. We are first and foremost human beings and citizens of the world. This was beyond the imagination of most people even a few centuries ago. Among religions, the Baha'i faith, which originated in the 19th century, is arguably the first to explicitly reject religious provincialism, nationalism, and racism (Esslemont, 2006). The League of Nations originated in 1918 following the First World War and was a failure (Pedersen, 2017), but it did have the welfare of the whole earth in mind.

Increasingly, adopting a global identity is not only possible but seems like the only thing that makes sense. Pope Francis's encyclical "Our Common Home" speaks on behalf of the whole earth, not just Catholics.[60] Contrast this with the Crusades of 1095-1492 or the Pope regarded as the antichrist by Protestant reformers of the 16th Century. Pope Francis's stance toward the earth is one of stewardship, compared to dominion in past centuries. Likewise, His Holiness the Dali Lama saw fit to write a book titled *Beyond Religion: Ethics for the Whole World* (H. H. Dalai Lama, 2011).

[60] http://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

For environmentalists, treating the whole earth as the salient group is a no-brainer and is reflected in the United Nations Sustainable Development Goals, which begins to set up a monitoring system at the global scale (CDP4). For the average person, viewing the earth from space, a global supply chain, the opportunity for global travel, massive migration, and the ability to see and talk with someone halfway around the world on the Internet, as easily as with someone by one's side, all contribute to a sense of the whole earth as the most salient social unit. In the tiny city of Binghamton in upstate New York, over 20 different first languages are spoken by the public school students.

Even the economics profession is coming around, led by renegades such as Kate Raworth, whose "doughnut economics" framework is designed to keep economic systems within boundaries defined by both environmental parameters (the outside of the doughnut) and social parameters (the inside of the doughnut). Basing economic policy on a dashboard of metrics, rather than just short-term economic growth is becoming commonplace. For the most part, however, the economics profession has contributed to a form of globalization that is merely a CAS2 system, not a CAS1 system.

Against this background, the multilevel approach makes two major contributions. First, it adds scientific authority to the case for adopting a whole-earth focus in the formulation of economic, social, and corporate policy. It is simply not the case that policy formulation at lower scales, such as nations putting themselves first or transnational corporations attempting to maximize their shareholder profits, will work out well for the global common good. The metaphor of the invisible hand, other than within systems that are designed with the welfare of the whole system in mind, can forever be placed on the ash heap of history.

Yet, the multilevel approach also tells us that a focus on the global good is not sufficient. Earth-friendly policies must be implemented at multiple scale and the small, functionally organized group is the most important unit as far as individual welfare and

efficacious action are concerned. Existing institutions and processes, such as nations, religions, ethnic identities, banking systems, and economic markets, are the starting point and raw material for future managed cultural evolution. These identities can and should remain strong, as long as they are coordinated with the global common good in mind.

The distinction between status achieved by dominance vs. reputation is critical (Henrich & Gil-White, 2001; Van Vugt & Ahuja, 2011). In a chimpanzee society, status is achieved largely by the exercise of raw power, at the level of warring coalitions in addition to individuals. Within small-scale human societies, status is achieved largely by cultivating a good reputation, which requires acting for the good of the group. This, in turn, requires the monitoring and social control provided by the CDPs. Otherwise, the exercise of raw power will have its way.

The idea of making a name for oneself by cultivating a good reputation is so common at a small scale that we take it for granted. Many examples can also be found at larger scales, such as corporate CEOs and national leaders who seek success in the form of responsible leadership within larger communities. This stakeholder value norm was even the rule among corporations prior to the advent of the shareholder value norm in the mid-20th century (see, for example, Collier, 2018; Collier & Kay, 2020; Frank, 2000).

Of course, the mere sentiment isn't good enough without the protections of the CDPs. A true commitment requires being transparent about how a corporation or nation conducts its affairs and a willingness to correct deviant behavior. Predatory behaviors of other corporations or nations must be successfully opposed or else power will have its way. This is true at all scales, including the global scale.

What is required to increase implementation of the CDPs and also to make policy formulation and implementation more adaptable at the global scale? A giant step forward can be achieved by *seeing the problems for what they are*. Imagine, if you can, the evolutionary paradigm becoming the consensus view among politicians, economists, corporate heads, and

public policy experts of all stripes. Every important action would be evaluated with the global system in mind. In many cases, what takes place at a lower scale will be benign at larger scales and the time-honored principle of subsidiarity (the authority of lower-level units unless causing a problem at higher scales) applies. If lower-level activities do cause problems at higher scales, then this will be recognized as *wrong* and in need of adjustment. The corrective need not be harsh or morally disapproving. Just as in an automobile assembly plant, there simply needs to be a swarm of activity to solve a systemic problem. But there must also be a capacity to oppose willfully predatory practices. And prosociality at all scales should be showered with the benefits of having a good reputation, in addition to correctives for behaving wrongly.

We submit that if this conceptual sea change took place, there would be a quantum jump of good governance at all scales, including the global scale, and further improvements would take place over the longer term as institutional and procedural shortcomings are addressed with the welfare of the whole earth system clearly in mind. Human cultural evolution in the near future could be just as fast as it has already become, but this time resulting in a CAS1 system rather than merely a CAS2 system.

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