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Introduction to a Symposium on William N. Butos and Thomas J. McQuade's *Hayekian Systems: Research into the Structure of Social Interaction*

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Too often, even the best scholarship on F. A. Hayek fails to advance the Hayekian research program beyond where Hayek left it. The majority of Hayek scholarship focuses (in many cases, skillfully) on historical understanding of Hayek's ideas or their meaning in relation to the contributions of other thinkers. It is rare to find an addition to Hayek scholarship that not only gets Hayek *right*, historically and analytically, but also moves the Hayekian paradigm *forward*. William N. Butos and Thomas J. McQuade's *Hayekian Systems: Research into the Structure of Social Interaction* is one such book, opening up new avenues of research into Hayek's ideas and suggesting previously unnoticed applications.

The Hayekian research program considers the problem of *social order* through an epistemological lens. How is it that persons dispersed across society, possessing different and often mutually-inconsistent beliefs, nevertheless sometimes manage to act on their beliefs such that social order, rather than disorder, emerges from their activities? Hayek did more to answer this question, specifically as it relates to order and disorder in the economy, than any other thinker before or after his time. The price system, Hayek argued, functions to coordinate possibly divergent plans (based on individuals' possibly divergent beliefs) by informing individuals "what to do" in response to ever-changing data, changes about which, in the absence of the price system, they might otherwise be completely ignorant. However, though Hayek's work has improved our understanding of the epistemic function of prices, he did not live long enough to extend his thory of social order to many other social phenomena.

In developing a more general theory of spontaneous order, Butos and McQuade build upon recent work in biology and the theory of complex adaptive systems. *Hayekian Systems* analyzes the features of such systems that facilitate learning about the environment, and anticipation of and adaptation to environmental changes. In the process, Butos and McQuade incorporate many novel results of Austrian economics into a general theory of social order, and apply this theory to various social arrangments, perhaps most significantly, to the interactions between government and science.

The contributors to the current collection of essays criticize, clarify, and extend various aspects of the book's central theme. Elisabeth Krecke considers Butos and McQuade's analysis in the light of the economic disorder created by the activities of European (central) bankers during and after the 2009-2010 sovereign-debt crisis. James Wible explores similarities among the works of Hayek, his

friend Karl Popper, and Charles Sanders Peirce, father of American pragmatism, whose work Hayek occasionally cited. Randy Holcombe aims to extend Butos and McQuade's analysis to encompass the part played by conscious political choice in the deliberate (i.e. non-spontaneous) design of some social institutions. Robert Mulligan develops Butos and McQuade's analysis by addressing the problem of the evolution of knowledge. Roger Koppl focuses on the system-dependent nature of knowledge, suggesting the extension of Butos and McQuade's work to other complex social systems not explicitly discussed in the book. Sandy Ikeda applies Butos and McQuade's concept of a Hayekian system to the emergence, growth, and success (and failure) of cities.

Taken together, *Hayekian Systems* and the contributions to the current symposium present a challenge to contemporary Austrian economists to do more than merely clarify the meaning and usefulness to other economists of Hayek's ideas. Butos and McQuade, and their admirers and critics in the present volume, encourage today's Austrian economists to treat Hayek's work as a still-living—indeed, perhaps merely nascent—research program that can, and should, continue to be developed. Here's hoping these Austrians take up the gauntlet thrown down by Bill Butos and Thomas McQuade.

The urge to fix, and its effects on banking systems

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1. INSPIRATION FROM *HAYEKIAN SYSTEMS*

In this important book, the two authors, William Butos and Thomas McQuade, conduct an investigation into "the structure of social interaction", which has the potential to open promising new paths, not only for Austrian economics, but for contemporary economic methodology in general. They explore social arrangements as diverse as markets, firms, money and banking systems, science communities, legislatures, and bureaucracies. These are described as "complex systems of human interaction", capable of learning and adapting to their environments, and even potentially exhibiting a form of anticipation. Each of them is, to the extent outside forces allow them to be seen as a "complete self-maintaining whole" in which stability, adaptability, and growth are a consequence of the organization of their internal processes, and are not dependent on intervention by those outside forces.

One major focus of the book, as I see it, is on how such systems can react to outside forces' intent on changing their behaviors and interfering with their constitutive processes. Although *Hayekian Systems* is firstly concerned with what is going on within systems to provide them with adaptive ability, it uses those insights to deal with what is going on between systems, specifically when one system is in the mode of attempting to influence or control the operation of another.

In this context, two statements in *Hayekian Systems* struck me as particularly pertinent in setting the stage for any proper positive investigation into government regulation of social arrangements. First (Butos and McQuade 2023, p. 3):

> If social science is going to progress in understanding the various social arrangements that pervade modern societies, then a first step is to include in the analysis that government itself is indeed a complex system with its own characteristic structure, internal transaction types, and emergent effects. It is not good enough to point to possible defects in one system and assume that another system can be deployed at will to fix that defect—with government in the fixing role this is just the implicit invocation of the benevolent dictator model.

And second (Ibid., p. 69):

> But while it is perhaps inevitable that economists will tend, like the man with a hammer who sees every problem as a nail, to take every social arrangement they contemplate to be a market of some sort, this is not necessarily the most helpful approach.

While variants of these sentiments have been said before, what is notable about their appearance in *Hayekian Systems* is that they are not mere assertions—their content is based in and derives from a consistent theory of social structures. Government systems are complex systems, and as such the effort to model them as an idealized individual is profoundly off the mark. And while many social arrangements have things in common with market systems, the commonality is at a very high level of abstraction, and so, for any practical purpose, ignoring the significant lower-level differences is a mistake, although it is one that has been made many times. Even money and banking systems, which are embedded in markets, have characteristic processes and emergent effects unique to them on which their stability, adaptability, and growth depends.

These statements inspired me to look with fresh eyes at the evolution of the European banking system within a context of permanent crisis—a topic that I have been exploring over the past decade in my mainly scenario-based work. Looking through the lens of *Hayekian Systems,* what I saw was the story of one system relentlessly trying to 'fix' another. From a longer-term or historical perspective, which I am going to adopt in this article, this ongoing fixing process appears to have profoundly altered the very essence of banking.

2. THE FIXER SYNDROME

Butos and McQuade make clear from the beginning that *Hayekian Systems* is not a normative research program (Ibid., p. 3). It is not about making recommendations to change the current status or improve the state of things. In this regard, the system thinking advocated by them is diametrically opposed to recent approaches to economic policy such as the one advanced, for example, by the researchers of the *Organization for Economic Cooperation and Development* (OECD).

The purpose of OECD, in partnership with the *International Institute for Applied Systems Analysis* (IIASA), is indeed to elaborate "a methodology to achieve a better understanding of the nonlinear behaviour of complex systems" in order to improve the quality of policymaking. These experts speak optimistically about the usefulness of their "next-generation systems analysis models" as a "sense-making tool" for designing "better policies" (OECD/IIASA 2020):

> This can enable us to understand better the behaviour of complex, dynamic systems so as to anticipate their evolution, assess and manage risks, and decide how and where to intervene through targeted policies. Systems thinking also helps us to identify and understand critical linkages, synergies and trade-offs between issues generally treated separately, and thus to reduce unintended consequences of policies. Systemic thinking also helps decision makers to spend public money more wisely because integrated solutions tend to be cheaper than sectoral ones due to the synergies created.

This assertion reveals not only how deeply the urge to fix everything is ingrained in technocrats' thought patterns, but also their unwavering confidence that, with the right tools, they will have the knowledge and expertise to successfully do the fixing. Yet, the only theoretical concepts at their disposal are the modern macroeconomic models which, as Butos and McQuade (op. cit, p. 1) point out, "represent the market economy as a mathematical machine"—an inappropriate and misleading representation for a complex adaptive system.

Nonetheless, policymakers with fixer mentality believe or, rather, want to make us believe that they have the capacity to make the world better. As social planners, they embrace the management of complexity from the top down, and this is ultimately what the OECD's famous paternalistic slogan 'better policies for better lives' really is all about. But the complexity of their self-imposed task to fix what they perceive as flaws inherent in markets and money and banking systems grows exponentially as each presumably well-intentioned fix sprouts, like a chain reaction, unintended and unforeseeable situations in which several new fixes are needed. The pervasive need for control and interference ends up, fix by fix, creating systems which are malformed and dysfunctional even by the fixers' own criteria, as the following case study illustrates.

3. SYSTEMIC CRISES

The banking system is a central pillar of the modern market economy—a channel for innovation, prosperity, and growth. It has always played a crucial role in managing, lending, and preserving the wealth of individuals, businesses, and governments. Perhaps even more importantly, commercial banks are at the heart of the monetary system. When they use their clients' deposits to grant new loans, they de facto create money. Money is, to a large extent, debt—be it private, corporate or government debt. In the modern world, currency (banknotes and coins) represents only a small fraction of the money circulating in society. As Benoît Coeuré, a well-known former European central banker, rightly notes, "debt-as-money" and its counterpart, credit, are what makes our economies work and grow over time (Coeuré 2016).

Butos and McQuade (op.cit., pp. 59-62) describe the structure of a money and banking system as a self-stabilizing adaptive arrangement not dependent on regulation and control (save for an underlying legal and institutional system that guarantees fundamental rule of law principles such as the respect of property rights, the security of contracts, and the fairness of the judicial process). However, the advantages of centralized control over money and banking have been too attractive for governments and social planners not to get involved, and the establishment of central banks has been the linchpin of the resulting top-down arrangements. For the feedback-based control over the activities of commercial banks has been substituted, in increasing measure, by regulatory control and faith that the central bankers have the tools, expertise, and good intentions necessary for the protection of the value of money and of depositors' savings. With respect to the commercial banks, they can be trusted, according to Mr. Coeuré, only if it is ensured that governments effectively hold them to a "social contract" through a high degree of supervision and regulation.

Not surprisingly, the history of central banking has not been a story of smooth going—rather, it has been a rocky road of inflation, booms, busts, and banking crises interspersed with short intervals of apparent stability. And in recent years, the global banking system has undergone a series of systemic crises. Its image was seriously tarnished after the sector almost fell apart in 2008, when a cascade of bank failures was set off, apparently out of the blue, or so it seemed to central bankers and other regulators. The crisis was followed by years of economic stagnation. It was a slow-moving debacle whose effects are felt up to the present day, and it laid bare deep-running fractures within the international banking system. Analysis revealed that banks, reacting in unexpected ways to regulatory mandates, had engaged in reckless and even fraudulent practices that eventually became widespread in the banking industry.

Caught in the eye of the storm, American authorities decided to do what they thought best to minimize the potentially colossal damage to society. They bailed out, with taxpayer money, hundreds of the large banks, deemed 'too big to fail', that had contributed to the disaster. Europe took a slightly different path. Ailing systemic banks received unprecedented government support too, but the rescue came with stringent obligations. The main fix was that they had to clean up their balance sheets and get rid of their nonperforming loans. The presumption was that, if they did that, the sector would be healthy again.

However, a new and unexpected disaster struck Europe. Between 2009 and 2012, the euro area experienced a full-blown sovereign debt crisis that threatened to destroy no less than its common currency. This happened in a way no one thought was possible. In the immediate aftermath of the 2008 debacle, European banks had been encouraged by policymakers to massively pile up debt issued by their crisis-hit home gov-

ernments. This was especially true for banks residing in southern European nation states. Because of a fatal codependency between domestic banking systems and their governments (which would later be known as the 'sovereign-bank nexus' or the 'doom-loop'), weaker banks and indebted governments ended up tearing each other down. The detrimental intersystem dynamics was something that nobody, at least not the policy makers and regulators, had seen coming.

This episode showed that it may take very little to trigger highly adverse interactions in the regulated and supposedly stable money and banking system. In the case at hand, investors' fear that the Greek debt might be too risky to hold was enough to ignite large-scale fire sales in bond markets. When market participants began to dump their bonds en masse, the spreads on the Greek debt shot up so high that rating agencies all raised red flags, thereby making investors' worries self-fulfilling. Default of a euro area government, unthinkable so far, was now looming. And another unexpected reaction conspired to make matters worse. After getting rid of Greek and other junk bonds, investors then preferentially turned to AAA-rated sovereign debt—notably, the German Bunds, which had always been considered as the ultimate benchmark for safety in the euro area's financial markets. This flight to safety became yet another factor destabilizing European sovereign bond markets. The reaction of regulators, accusing Germany of contributing to financial instability because its finances were 'too well managed', was the height of absurdity.

Yet, at the time, that argument was on many EU policymakers' lips. Years later, it would even inspire an ambitious project of financial engineering—the creation of a Single Safe Asset for the eurozone. However, this technocratic initiative, which was built on the idea that it was possible to make markets forget about the inherent economic, institutional, and political discrepancies between 'risky' and 'safe' eurozone countries, disappeared quickly in the sand. Markets simply did not believe in it. They still preferred the German bonds.

4. CRISES BEGET FIXES; FIXES BEGET CRISES

When confronted with such systemic crises, policymakers' and regulators' instinctive response is to regulate and control more, introducing new initiatives which reshape the regulated systems further. In some cases, these fixes have short-term success.

Until 2012, it looked as though policymakers were desperately overtaken by the events occurring in European bond markets. But Mario Draghi, then-president of the European Central Bank (ECB), had more insight than most. Above all, he understood the risks for the common currency. On July 26, 2012, in a remarkable speech he gave in front of investors at a London conference, he pledged to do "whatever it takes" to stabilize markets in turmoil. These three words sufficed to put an end to the sovereign debt cataclysm. Three words that saved the euro, it is often said. But there were, of course, more than words behind Mr. Draghi's promise. Under a newly created emergency program called Outright Monetary Transactions (OMT), the ECB had committed to act as a risk-taker of last resort by buying the debt of countries facing exorbitant servicing costs. In the end, OMT did not even need to be implemented. Markets' trust in the capacity and willingness of the ECB to preserve the value and safety of the euro was still strong enough to resolve the situation.

In the face of existential threats to the euro in the early 2010s, the ECB began to considerably expand its role in crisis management, even if this meant stretching beyond limits the narrowly defined price stability mandate the EU Treaties had initially assigned it. For example, it formed—together with the European Commission and the International Monetary Fund, and assisted by the European Stability Mechanism—a powerful ad hoc authority called the European Troika. This controversial consortium was mandated to manage the bailouts of Greece, Cyprus, Ireland, and Portugal, as well as a special credit line granted to Spain, to which the European heads of government had agreed in a long and torturous negotiation process. In return, the beneficiary governments had to carry out hardline austerity policies at the expense of their already crisis-hit populations. The experts hoped that the painful efforts and sacrifices would attract foreign investors and bring back growth in those countries. Eventually, the plan backfired badly. Greece was

plunged into severe poverty. The other countries too struggled for years to recover from what, in hindsight, is seen as a policy error of historic proportions—one for which none of the Troika members was ever held accountable, by the way.

The response of policymakers and regulators was to posit that the ECB operated within an incomplete and flawed institutional framework. According to that perspective, what needed fixing was not the ECB but the European Monetary Union (EMU). In principle, because of the no-bailout clause, whose corollary is the prohibition of monetary financing, the ECB was not allowed to purchase sovereign debt. Thus, during the 2010-2012 sovereign debt crisis, the EMU's rules deprived the ECB from the tools ordinary central banks have at their disposal for warding off speculative attacks in bond markets. Policymakers pushed for a drastic extension of the central bank's role and power, even if this would entail sacrificing the ECB's status as a highly trusted and independent institution.

Once the acute crisis phase was over, EU leaders wanted the ECB's involvement to go further. They wanted it to take on new responsibilities, including within the European banking system. So, the ECB was assigned a leading role within a supranational system of banking supervision called the Single Supervisory Mechanism (SSM). In 2014, Mario Draghi recruited two seasoned central bankers, Daniele Nouy and Sabine Lautenschläger, to build the SSM from the ground up. Reportedly, the Franco-German duo started its mission on an empty floor of the ECB's Frankfurt headquarters with only a handful of collaborators. But they were working hard and fast. Already by the end of 2014, they had hired another 1,000 employees to help them in their assignment: to fix the distressed European banking system.

The SSM, which profoundly changed the ECB's original institutional structure, rapidly became a vast bureaucracy. Today, it employs around 1,600 staff. In addition, several thousand of functionaries are provided by national central banks to assist the SSM in its daily tasks. Meanwhile, the ECB's supervisory unit directly oversees the 113 systemically important euro area banks (which, taken together, hold almost 82 percent of banking assets), and indirectly all the others. Within this sophisticated and intrusive system of banking supervision, the ECB was granted unprecedented powers, allowing it to rule over the European banking sector with an iron fist. Conducting onsite investigations to detect undue risk taking and misconduct, cleaning up banks' balance sheets by helping them shed unprofitable loans, setting higher capital and liquidity requirements ('buffers'), accelerating insolvency and enforcement proceedings, and strengthening bank corporate governance—these are just a few of the ECB's supervisory arm's self-assigned tasks. Moreover, it has authority to grant or withdraw banking licenses. In extreme cases, it can even trigger bank failures.

The intense desire to fix the banking system pushed the SSM technocrats to go as far as deciding to reshape banks' business models and, ultimately, to determine the European banking market structure. The experts claimed that Europe was 'overbanked' compared for instance with the United States, and that a certain degree of 'consolidation' was needed. To reduce the number of banks in the market, mergers and acquisitions were (and still are) actively encouraged all over the European continent. Supervisors' call for the creation of megabanks is somewhat surprising given that for years the same financial regulators had promoted exactly the opposite goal: ending 'too-big-to-fail'.

More generally, there is something almost schizophrenic about the ECB's role as overseer of the eurozone's banking industry and its job as manager of monetary policy. The SSM's objectives may indeed clash with those of monetary policy. During the post-crisis years, the ECB's monetary policy unit had sought to stimulate the economy by boosting lending through low or even negative interest rates and other 'quantitative easing' (i.e., bond-buying) policies. At the same time, the ECB's supervisory unit worked to enhance the safeness of the banking system by imposing draconian rules on its actors. This in turn undermined the latter's willingness and capacity to lend to the real economy—and, ultimately, to finance innovation, investment, and growth. To arbitrate such conflicting goals, the ECB came up with a practical solution: paying banks to lend. Under the so-called Targeted Longer-Term Refinancing Operations (TLTROs) program, banks could borrow from the Eurosystem at a rate as low as -1%, conditional on their lending to the real economy.

Between 2015 and 2022, first under the presidency of Mario Draghi and later under the one of Christine Lagarde, quantitative easing became the ECB's wonder weapon. Especially during the Covid crisis, the institution embarked on asset purchases of unparalleled scale. It not only significantly increased its preexisting Asset Purchase Program (APP), but launched a new one, the Pandemic Emergency Purchase Program (PEPP), whose envelope reached 1.8 trillion euros. As a result of these unconventional monetary policy measures, the ECB's balance sheet grew to almost 9 trillion euros, the equivalent of 70 percent of euro area GDP. By mid-2022, the ECB had become by far the biggest sovereign bond buyer in Europe. It now unapologetically financed nearly all the debt of the eurozone's most spendthrift nations. Europe's monetary system was being misused in a way never seen before in the Union.

During the three pandemic years, banks were nudged to substantially lower their credit standards. TLTROs became ever more favorable to encourage them to lend as much as possible to households and firms. So-called zombie companies, viable only under ultra-low rates and with the help of government grants, continued to proliferate, contributing to malinvestment and misallocation of resources all over Europe. Bubbles built up in property and financial markets, fueled by years of ultra-accommodative monetary policy.

On the microeconomic level, the ECB's ultra-loose monetary policy paradoxically (or perhaps not) appears to have helped rich Europeans get richer, and the poor poorer. This was admitted by ECB Executive Board member Isabel Schnabel, in charge of the implementation of the PEPP, who worried, that the "use of asset purchases, in particular, has triggered concerns that monetary policy may raise economic inequality by favouring those who own financial assets", and who urged her institution to fix the situation by privileging "a set of policy instruments" that ensures its "mandate is fulfilled while minimising the potential distributional effects of monetary policy" (Schnabel 2021). Does she mean the ECB should step into the arena of fiscal policy?

With the latest generation of European central bankers (to which Mrs. Schnabel belongs), the ECB increasingly takes into consideration issues that go far beyond the realm of monetary policy, such as social exclusion, social injustice, and income and gender inequality. In the same vein, French President Macron recently urged European leaders to consider tasking the ECB with an explicit role in tackling climate change. The SSM too requires climate-related efforts from banks and threatens with punitive measures those that fail to meet expectations. Today's ECB is miles away from the somewhat boring but highly independent institution it was in its beginnings.

Policymakers claimed they wanted to fix the economy by correcting the logic of markets and market-based banking. Their fixes have come closer to abolishing them.

5. THE NEW ABNORMAL

One thing that adaptive systems do is adapt. They do this even (or especially) in the face of continuous attempts to control, regulate, and fix them.

Banks—now called 'supervised' or 'obliged entities' in regulatory jargon—managed to make some adjustments to the completely abnormal circumstances induced by the attempts of over-confident 'Big Players' (term borrowed from Koppl 2002) to repair broken economies. But this has been far from easy. Ever since the ECB set its interest rates to zero, most credit institutions struggled to rebuild their business models. Low-for-long interest rates weighed heavily on bank profitability. When inflation rates tripled in 2022, the ECB's Governing Council proceeded to impose 10 interest rate hikes and, in order to shrink the ECB's colossal balance sheet, quantitative easing programs were shut down. Once again, European banks saw their world turned upside down. On one hand, quantitative tightening was good news for them. Their loan income improved as the central bank lifted its policy rates. But, on the other hand, higher rates pushed up banks' cost of liabilities and reduced the value of their balance sheets. Moreover, they now had to face reduced lending activity and higher credit risks. They had to cope with an increasing number of borrowers that encountered difficulties in repaying their debts. Among those were households struggling with a cost-

of-living crisis and a sharp correction in real-estate markets, as well as corporates unable to find affordable refinance options and, last but not least, heavily indebted governments. And even though banks' exposures to sovereign debt have overall declined in the past years, the dreaded bank-sovereign doom-loop is not out of the picture, far from it. In particular in Europe's south, the balance sheets of many banks continue to be entangled with those of their national governments.

However, banks have taken advantage of a silent but important priority switch among the objectives underlying bank regulation. For years, the stated purpose of regulation was to ensure the stability of the financial system and, ultimately, to protect customers. Now, it appears that the prevention of financial crime (such as money laundering, terrorist financing, tax evasion, corruption, etc.) has captured the top step on the podium of regulatory goals. Regulators have progressively expanded their focus to the control not only of bank behavior but of customer behavior as well. More precisely, banks have been assigned the task of policing their clients, on behalf and under the strict control of their banking supervisors. The argument is that financial institutions are best-placed to detect suspect practices early on. Regulators count on them as a main vehicle for implementing anti-money-laundering (AML) laws, regulations, and policies. Over the past few years, mandatory know-your-customer (KYC) checks, through which banks verify clients' identity, have become increasingly demanding. Banks are moreover required to immediately signal to law enforcement authorities any suspicious individual, organization or company, as well as any doubtful activity or transaction.

Bankers are often complaining that AML-related reporting requirements have contributed to an escalation of their already unbearable compliance costs. To play by the rules, they have had to recruit droves of compliance officers and build up large in-house compliance departments. More and more, they turn to so-called 'RegTech' companies that offer them technological solutions to automate and streamline the increasingly complex compliance processes. Compliance continues to weigh on bank profitability. Furthermore, sanctions for noncompliance are becoming increasingly severe. For example, some banks have been fined up to several hundred million dollars for insufficient AML controls. This occurred even in cases when no financial crime had been committed under their watch. As a trio of American lawyers argued, "regulators have been punishing the banks not because of any actual money laundering, but rather because the banks did not meet the regulators' own subjective vision of the ideal anti-money laundering or counter-terrorist financing program" (Saperstein, Sant and Ng 2015).

As a result of the growing regulatory pressure, and with the help of powerful artificial intelligence (AI) tools, banks have come to know their clients inside out. They invest heavily in new generations of ever more sophisticated (adaptive, predictive, and generative) AI tools and models, whose scope of application is unprecedented, above all when it comes to fraud detection. And after years of intense data collection on clients, banks are able to work with ever larger data sets. They no longer content themselves with the already extensive financial, personal, and professional data customers provide them under standard KYC requirements—they have their bots crawl through the internet in search of all publicly available information on customers, which will serve them for the purposes of profiling and prediction. Customers' social media activities, opinions they share in posts, as well as photos, audio, videos, travel, work and life patterns, health information, connections and relationships, and any other digital footprints they may leave behind—all of it is of value to banks. Needless to say, such spying and tracking may violate clients' privacy rights—without the latter even knowing it.

Banks are inevitably realizing that the massive store of data they were forced to gather on behalf of their regulators is in fact an invaluable treasure trove that is just waiting to be exploited. Why not do like Big Tech and sell client data on advertising markets? For now, any banker would say this is never going to happen. And yet, why should we believe that such a business opportunity will not be taken by the actors of a sector that has been struggling for years to stay profitable? Of course, seeking to become actors in the highly lucrative data economy would be a big step for banks. Anticipating that their customers might disapprove of such intrusive practices, those who take that road will probably do like Big Tech companies did in their beginnings, and hide their new business models from clients as long as possible.

So far, regulators and policymakers do not seem to be alarmed about this latest potential coup within the banking system. Maybe it's because they are in on the deal. It obviously suits them that banks have become such outstanding data collection specialists.

Markets also adjust. A new competitive dynamic is rapidly and radically transforming the financial services industry. New entrants are intruding on banks' core business areas and gaining market shares. They bring in new approaches, competences, and technologies, but actually their best trump card is that they are far less regulated than ordinary banks. For example, so-called 'non-banks', also known as 'shadow banks', such as insurance companies, pension funds, investment funds, hedge funds, money market funds, and a range of other intermediaries, offer customers the full panoply of banking services, from payments to deposits to wealth management, investment, and lending, but they do not need a banking license.

The same applies to FinTech start-ups as well as to large technology firms (TechFins or BigTechs). Among the latter, there are powerful global social networks that can count on billions of active users worldwide. Many of them have already undertaken significant steps to enter the financial services industry, including in Europe. Noteworthy is also the nascent sector of 'decentralized finance' (DeFi), which proposes peer-to-peer financial services based on secure distributed ledgers (blockchains) and privately issued digital currencies. The industry is still small and risky, but its potential impact on banking and finance is huge.

Small or large, all these entities have so far greatly benefited from the regulatory discrepancies that especially the European regulators had unwittingly introduced during the post-crisis years. Regulators were so focused on getting traditional banks under their yoke that somehow they forgot, and hence spared, banks' fiercest rivals. As a result, non-banks have been prospering. By the end of 2020, they already held about half of all financial assets worldwide. In the meantime, regulators have opened their eyes on the situation, and their fix is more extensive regulation. They now try to get non-banks under control as well. They currently plan to subject all of them, including FinTech, TechFin, and DeFi, to the same kind of strict regulatory framework as the one they imposed on the traditional banking system.

6. CONCLUSION

In this paper, I chose to focus only on one aspect of the wide-ranging study by Butos and McQuade: the interactions between systems. I have given particular attention to the interplay between the systems of banking, central banking, as well as banking regulation and supervision.

So far, this topic has attracted surprisingly little interest among economists. Yet in recent years, as a result of the efforts of policymakers and regulators to fix banking systems to their liking, and to fix the unanticipated and unwelcome side effects of these fixes, all these systems have undergone such profound, irreversible, and mutually impacting, structural changes that they can no longer be adequately understood by treating them as separate or unrelated entities. Undermining the nature of banks as independent (or 'free') firms, the whole process has ended up radically changing the functioning of the monetary system as we knew it, and even challenging its underlying—including democratic—values. Strangely enough, nobody talks about this consequential coup.

The urge to fix—the phenomenon of interventionism—and its consequences have, however, been described before, most extensively by another contributor to this symposium, Sanford Ikeda, in his 1997 book, *Dynamics of the Mixed Economy*. In a way that is very compatible with the work of Butos and McQuade, Ikeda clearly links the issue to Hayek's famous "knowledge problem", thereby distinguishing his approach from that of public choice theorists and from more mainstream models of intervention and government growth (Ikeda 1997). More recently, Scott Scheall, philosopher of the Austrian School of economics and editor of this symposium, provided a thorough theoretical reflection on the nature and extent of "policymaker ignorance" and, most notably, its potential effects on the efficiency of political action (Scheall 2020). What Butos and McQuade add to the works of Ikeda and Scheall is to situate their thinking in the context of a general theory of adaptive systems and their interactions in which the organization of the internal processes of both government and market systems is comprehensively described.

I understand that the systems approach developed by William Butos and Thomas McQuade is essentially a theoretical one. A high degree of abstraction is "our best hope for coping with the complexity of the social world", the authors write (Butos and McQuade, op.cit., p. 3). But I remain convinced that the conceptual framework they propose opens unseen possibilities for understanding real-world dynamics such as those that led up to the Great Financial Crisis as well as those that reshaped the banking system and financial markets after that disruptive series of events.[1]

NOTES

1 I would like to say that it is a pleasure and an honor for me to participate in this symposium on William Butos' and Thomas McQuade's brilliant and challenging book. I welcome the free rein given to me by the editors of *Cosmos + Taxis*, and in particular Scott Scheall, to write in an unconstrained way about a topic that interests me greatly. The fact that Bill and Thomas are dear friends of mine is another reason why I am happy to be part of this project. I first met them in spring 2003 while attending the Colloquium on Market Institutions and Economic Processes at New York University. At the time, they both belonged to the core group of this highly reputed weekly Austrian economics seminar, organized for years by Mario Rizzo. I was there as a visiting scholar. Near the end of my stay, I was invited to dinner at Maria and Roger Koppl's house in Maplewood, New Jersey. At that occasion, I was introduced also to Donna McQuade and Cynthia Butos. It was the beginning of long and lasting friendships to which neither borders nor oceans have been obstacles. Lastly, I would like to thank Thomas McQuade for his extremely constructive feedback and insightful comments on a first draft of this paper. I am grateful also for the valuable suggestions and helpful feedback I received from a reviewer appointed by the editor.

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Hayekian Systems, the Economy, and Complex Phenomena

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Abstract: In an interesting and thoughtful monograph, Butos and McQuade aim to extend Hayek's theories of spontaneous market and complex cognitive orders to institutions and organizations with adaptive arrangements bearing the same name as the title of the book, *Hayekian Systems*. Even though analogies with markets have long appeared in the history of economics, the processes of science and government function quite differently than markets. Hayek had extended the theory of complex phenomena to the human mind in *The Sensory Order*. But Hayek apparently was less than successful in extending his theory to processes of government. This becomes the main thesis of *Hayekian Systems*, to extend the theory of spontaneous order from markets and the cognitive orders of the human brain to government, to science, and to the epistemological problems of central banking.

But questions can be raised about classifying the various conceptions of order found in this work. Are the various orders capable of being nested within one another, or existing in parallel, or perhaps both; and are they capable of infinite variation at least in principle? Moreover, do they make sense from an indeterministic view of natural, social, and economic phenomena. Hayek had extensive contact with Popper and both Hayek and Popper admired C. S. Peirce's contributions. Since Popper and Peirce were indeterminists, it is worthwhile to consider conceptions of spontaneous and cognitive orders from a context of indeterminism. Also, Hayek and Peirce thought that topology was the mathematics most relevant for representing and classifying entities in economic and scientific processes. Additionally, Peirce was a founder of semiotics, and he created a semiotic interpretation of mathematics and topology. The key theoretical metaphors of map and model from *The Sensory Order* and the array of theoretical diagrams portraying the key contributions in *Hayekian Systems* are both essentially semiotic in character and thus make sense from a Peircean perspective.

There seem to be social patterns in the economy and society which are not the intended result of any particular human mind in isolation or of multiple human minds aligned in concert in some collective deliberative process. Such patterns have become known as spontaneous orders. A corollary seems to be that knowledge of a spontaneous order precludes any individual or organization from altering those patterns in a predictable and predetermined way for unambiguous social or individual benefit. Attempts to do so inevitably imply unintended consequences. Although there is more to the history of the idea, the notion of a market economy as a spontaneous order is now associated with the ideas of Friedrich Hayek. Hayek also interpreted cognitive processes of the human mind as a complex order, one which is coordinated by a central nervous system.[1] These theories are elaborated in William Butos' and Thomas McQuade's *Hayekian Systems: Research into the Structure of Social Interaction* (2023). They aim to extend the theory of spontaneous and complex cognitive orders beyond market systems to institutions and organizations with adaptive arrangements which they call Hayekian Systems.

While there could be extensions of Hayekian systems to other patterns of social organization, Butos and McQuade turn most of their attention to science and government and to their epistemological constraints. Science and government are two of the more important institutions in society and their processes function quite differently than markets even though analogies with markets have appeared. In economics more broadly, science is often described as a marketplace of ideas and some larger corporations as having internal markets. These analogies with markets for science and for some internal processes of large organizations are most often quite misleading, directing attention away from the more important differences between markets and government or markets and science that are required to understand them as social processes. An important question is whether science and government exhibit important properties of spontaneous, complex orders or not. Science and government may provide venues for understanding how nonmarket processes function adaptively and solve problems in different ways than the price system.[2] Markets may be in the background of science and government but essential for providing the resources that both sectors employ. But their adaptive responses may be located in processes other than price or resource adjustment in markets. Scientists usually modify their theories and experiments using the scientific method and evidence with little active attention to economic constraints and input prices. Government officials fashion their administrative proposals by facing elections, legislative processes, and judicial review and leave the economic arrangements to their assistants and Treasury officials.

In their preface, Butos and McQuade describe how their work *Hayekian Systems* came to be. McQuade studied Hayekian and Austrian theories at Auburn University under several prominent Hayekian scholars such as Roger Garrison, Leland Yeager, and Mark Thornton likely in the 1990s. Butos participated in several graduate seminars organized by Walter Weimer at Penn State University in the 1970s. Weimer was a member of the faculty in the psychology department. Most important for *Hayekian Systems* is that in May of 1977 Weimer hosted the second Penn State conference on "Cognition and the Symbolic Processes," which brought Hayek to campus to highlight his then largely ignored work, *The Sensory Order* (1952). Hayek (1982) gave a short overview and Weimer (1982) presented a long paper titled "Hayek's Approach to the Problems of Complex Phenomena: An Introduction to the Theoretical Psychology of *The Sensory Order*." The next day there was considerable discussion of all of the presentations at the conference including those of Weimer and Hayek.[3] Not only did Butos attend the sessions of the conference, but so did this author. Weimer was on Butos' dissertation committee as well as mine. Butos wrote on Hayek's monetary theory while I authored a critique of the then very new idea of rational expectations from the perspective of cognitive psychology and philosophy of science. Weimer taught several graduate seminars. He offered Penn State's graduate course in the philosophy of science which was cross listed with both psychology and philosophy for students from both departments. In psychology, he offered a two-term sequence on the history of psychology and a third graduate class on cognitive psychology. I had the good fortune of taking each of these seminars, enrolling five times in graduate courses offered by Weimer.[4]

The thesis of a market system as a spontaneous order would be difficult to refute. As trade and commerce evolved several centuries ago, no less a figure than Adam Smith called attention to markets function-

ing with the metaphor of an invisible hand. Producers fabricate and create goods and services even though they do not yet know the identity of those who will actually come to purchase what they display for sale or trade. Similarly, households plan to purchase entities from the market when they do not often have specific prior information about what, how, and when products will be produced and distributed to the marketplace. Market processes appear to be coordinated but in fact no human or human organization organizes everything. Individual habits, behaviors, contracts, perceptions, and interpretations of market exchange lead to reliance on those processes as long as past contingencies behind both sides of market patterns adjust adaptively. Price is an important indicator, but product attributes are relevant as well. One hopes to acquire fresh vegetables at the market price. Nearly spoiled produce at the same price in the same market situation would be a bad transaction. Thus, quality and reputation matter as well. Individuals in market situations develop a sharp but fallible capability of distinguishing good from bad transactions.

A market system leads to thousands if not millions of transactors responding to price-quality signals within distinct markets. If one ignores most of the distinctive circumstantial differences of individual markets, then one can present the simple logic of market supply and demand with price adjusting in positive or negative directions as needed to move toward an equilibrium outcome as displayed on the classroom board. Now many students do not have an organized notion of market processes, so this is an essential starting point. The logic of equilibrium in one market can be extended to others. Many of these markets may be in equilibrium simultaneously. If all markets are hypothesized to be in simultaneous equilibria at a single intersection point for each market, then we have the simplest notion of general equilibrium. Pedagogical experience reveals that students have a difficult time imagining an economy where every market is at a single-point equilibrium simultaneously. Economists are a different matter. Walras inspired by Cournot seems to have been the first to raise such an idea in the 19th century and to imagine that counterfactually an auctioneer would call out prices for every market until the general equilibrium array of prices was found. Then exchange was permitted after all excess demands and supplies had been eliminated. Joseph Schumpeter (1954, p. 1026) recognized general equilibrium as the "basis of practically all the best work of our own time." As Butos and McQuade (p.1 and note 2, p. 4) point out, general equilibrium is the theoretical concept behind the latest version of macro known as dynamic stochastic general equilibrium (DSGE) macroeconomics. Hayek (1967b, pp. 35-36) made use of a conception of general equilibrium in his economic work as a pattern that could be best represented mathematically but not quantified since it was the outcome of an ongoing evolutionary spontaneous order.[5]

The application of the theory of spontaneous order to markets seems intrinsically appealing. Prices in concert with other economic variables such as income, wealth, and resource stocks and flows help largely anonymous participants coordinate their consumption and production activities without the intervention of any planner. Patterns of market activity emerge which were never planned by any individual. Market processes incorporate the particular and limited knowledge of each participant which in total represents more information than a single individual could have, interpret, or calculate. But markets are not the only institutions of human society and the question becomes whether the theory of spontaneous order can be adapted to other institutions. As mentioned, Hayek had extended the theory of complex phenomena to the human mind in *The Sensory Order*. But Hayek was apparently less than successful in extending his theory to processes of government. This becomes the main thesis of *Hayekian Systems* (chapter 3, p. 23). to extend the theory of spontaneous order from markets and the cognitive orders of the human brain to government, to science, and to the epistemological problems of central banking. After providing the background and introduction to Hayek's work, chapters three and four look to *The Sensory Order* and to biological systems theory for inspiration in how to extend the Hayekian framework. Then chapters five and six deal with the adaptive systems in market economies and science. Chapters seven, eight, and nine are concerned with the systems of government, with systems of interaction between government and central banking, and with the problems stemming from state-sponsored science.

At this point, consider some of the finer points from *The Sensory Order* as presented in chapter four.[6] There Hayek presents a theory of how the human mind functions in its environment. The mind receives

external inputs through the senses and internally from neural connections to other processes in the body. Similarly, other more complex external events are sources of neural impulses that are transmitted to the brain. The brain is a complicated and distributed network of neurons and neural connections that transmit impulses electrically from their source to the brain. Information, whatever its source, becomes embedded in extraordinarily complex multi-dimensional, distributed, patterned, and networked brain-wave firings. The brain has both short and long-term, networked and distributed representations of neural activities. The long-term representations, if often repeated, effectively function as a "map" of the external environment according to Hayek. Shorter term variations of stimuli stemming from current events and sources function as a "model" of the present environment and are generated within the map.[7] The neural model is also forward looking and provides the basis for an expectation of what might happen in the immediate future. Maps and models have classificatory functions. Stimuli are recognized as similar or dissimilar and classified as such by the brain. Basic stimuli can be recognized as parts of patterns leading to higher levels of classification. The map is a vehicle of long-term memory while the model is a more recent classification pattern. Since there is no single locus of control, the classificatory activities of a human brain function something like a spontaneous order and eventually the characteristics of a particular complex cognitive order emerge.

The next step towards a Hayekian systems theory is to extend the theory of the brain as a spontaneous order to social systems. Butos and McQuade note that social systems have many of the same but not all of the pattern features of the human brain:

> We are proposing that these basic processes of classification described by Hayek as operating in the brain, including particularly the formation of a mutable map of the brain's environment as experienced in the past and the ability of that map to support a model driven by current experience, have their counterparts in adaptive social orders, implemented differently, of course, but very similarly in principle. We are certainly not proposing that social orders are brains but that they are brain-like in certain very specific and circumscribed respects (p. 33).

Butos and McQuade then go on to identify eight brain-like aspects of social systems such as structural persistence and complexity, an increase in social system pathways, mutability of social systems, some anticipatory features, inertially lagged adjustment effects, primacy of relational connections, bounded responses within the social system, and the dependence of the reaction of the system on the stimuli and current state of the system.

A second source of inspiration for *Hayekian Systems* theory is biological systems theory as found in chapter five. The idea that biological entities and processes have orders beyond their physical and chemical processes can be traced as far back as Aristotle and especially to Kant. Among the contributions from Kant were the ideas that biological organisms are purposeful and have a unity of the whole, that they are self-organizing and self-maintaining, and that parts of biological systems are formed and maintained by those systems. Also noted are the contributions of Bertalanffy on biological systems and Piaget on the concept of closure as an operation of the system. The main biological systems theorist of interest to Butos and McQuade is mathematical biologist Rosen (p. 39). Rosen provided a systematic treatment of anticipatory behavior observed in many ways in biological systems. He reformulated the phenomena of thermodynamic openness and process closure in terms of the Aristotelian notions of material and efficient causality. He pointed to the adaptive response capabilities of biological systems, and he seems to have connected anticipatory behaviors with adaptability.

The core features of Hayekian systems for the remaining chapters (5-9) are organized around a series of adaptive systems diagrams. They provide a theoretical picture of the key features of an adaptive anticipatory system. The first diagram provides a simple but effective representation of Rosen's adaptive, anticipatory biological systems theory (Figure 5.1, p. 41). The boundary between the system and its environment is represented with a rectangular figure. Inside the figure are the processes of learning, anticipation, and action interacting with a model of the biological system itself and its environment. Inputs that cross the boundary

from the outside are resources and reactions represented by arrows pointing inward. The biological system produces output which is represented by an arrow pointing outward. The processes and model inside the boundary form a closed loop. The anticipatory biological systems diagram is sparse and paired down to the essentials relevant for anticipatory performance.

The authors recognize that the processes, inputs and outputs of social systems would be very different for other systems. The next step is to modify the theory of biological systems as represented in that first figure with the most important contributions from Hayek's *The Sensory Order*. A second diagram (Figure 5.2, p. 42) illustrating the key relational features of the process structure of anticipatory social systems is nearly twice as complex as the first one. Instead of four key features inside of the boundary rectangle there are eight. Interpreted for social systems, the process structure of an anticipatory social system can be characterized as an epistemic system and more specifically as a Popperian learning and knowing system (p. 42). The system can create conjectures and eliminate mistakes so that what is considered as being known can be updated. Biological analogies in social theory have been created previously. Rosen apparently recognizes that his biological theory could be applied to social systems. Economists such as Marshall, Boulding, and Alchian have employed biological analogies for economic activity and the firm as well.

In chapter six, attention is directed to the economy. Three versions of the Popperian anticipatory adaptive systems theory are developed for economic systems. Anticipatory social systems diagrams are constructed one each for the market, the firm, and a free banking system (Figures 6.1, 6.2, and 6.3; pp. 52, 55, 61). The anticipatory diagram and theory of a market system shows the importance of economic processes usually ignored in mainstream economics such as: the entrepreneur, dramatically rising standards of living over the past 200 years, the role of prices in enabling economic calculations essential for production, and Hayek's knowledge problem which is how to best use resources when only individuals in special decentralized circumstances of time and place have such knowledge in limited form. The last anticipatory diagram is for a free banking system where the four processes are judgment, banking, clearing, and anticipation. Its purpose is to provide a benchmark for discussing the epistemological problems of central banks later in the book.

In chapter seven, the authors turn from the economy to science. The authors note some similarities and analogies between markets and science. The greatest similarity is that science is often described as a marketplace of ideas. Other similarities are that scientists and individuals in the economy are both self-interested, both face scarce resources, they both face limits and constraints of different varieties, and communication is often with others who are hardly known. Also, specialization, competition, entrepreneurial innovativeness, and risk-taking activities are common to scientific and economic processes. However, there are sharp differences between the economy and science. As most widely understood, the interactions and processes within science are not primarily economic. Scientific theories and hypotheses are not evaluated by relative prices. Scientific entities such as research attributes and results are not bought and sold on markets. Property arrangements are sharply limited in science. The unknown properties and enduring features of natural patterns or social arrangements which are the subject of scientific investigation and experimentation are not private property since they could never be owned privately. Once some discovery is made about those natural or social patterns and that outcome is conveyed publicly, the result is available to everyone who thinks it is important at a low or zero cost. Also, competition within science is very different than the Cournot-like textbook perfect competition of many identical or similar firms driving price down to cost in the marketplace. In science, usually there are one to a few scientists or research teams. The competition is rivalrous more like what occurs in sports as Hayek (1968b) held in his, "Competition as a Discovery Procedure." In such processes the emphasis is more on producing knowledge rather than efficiently and perfectly competitively produced goods and services. Epistemic scarcity is as prevalent as material and chronological scarcity.

Chapter seven is the second longest chapter in *Hayekian Systems*. A science sector version of the anticipatory process diagram is created (Figure 7.1, p. 77). Near the end of the chapter, the authors take up analyzing science as a Hayekian process. The distinguishing feature is that knowledge generation can be char-

acterized with "reputation-driven arrangements" (p. 82). After discussing various contributions and issues in recent philosophy of science which are too extensive to include here, they summarize their analysis of science as a Hayekian anticipatory system:

> Scientific knowledge is not just a selection from the best offerings of individual scientists.; it is the outcome of an extended, institutionalized, social process of publication, criticism, interpretation, citation, argumentation, promotion, rejection, reinterpretation, assimilation, and even (from some participants' points of view) misinterpretation of individual contributions. It is not inherently propositional ……Knowledge generation cannot be separated from the procedures through which scientists interact and through which individual efforts are transmitted to become accepted as scientific knowledge.… (Butos and McQuade, 2022, p. 88).

The last three chapters of *Hayekian Systems* present a theory of government as a multiplicity of anticipatory social systems which interact with other social systems. In chapter eight on government systems, separate attention is given to legislatures and bureaucratic agencies. Government in general is one of the most successful institutions in human history in terms of influence and growth but is constantly prone to failure. This presents something of a paradox. Legislators and other government actors promise many things that they cannot deliver and some that are quite harmful. How is that government as an institution persists? Butos and McQuade point to the arguments of several prominent economists that there must be some net benefit from government, or it would cease to exist. Alternatively, they point to the adaptive nature of government so that changes are made which effectively prevent a general rebellion.

Analysis of legislative processes comes with an anticipatory systems diagram that is visually similar to those from previous chapters (Figure 8.1, p. 100). Legislatures have significant epistemological problems compared to other anticipatory systems. Mainstream economists have extended the rational choice approach to legislatures and other political processes. This approach is characterized as naïve. Instead, the Hayekian anticipatory systems approach is developed as a superior conception of what legislatures do and why they grow and persist. A legislative system contains a working model of its environment, and that system reacts with its environment and the working ideologies of the electorate. Legislatures are most successful when they are responding to a crisis of survival such as war, depression, or a pandemic. But the epistemological problems of legislatures are profound as noted by Scheall. Policymakers are relatively ignorant of society, and they do not know which legislation might solve real problems. Thus, many varieties of government failure persist. How then does the government survive? The inference seems to be that legislatures must have some adaptive capabilities relative to the external pressures of ideologies which allow them to grow, adapt, and survive.

From legislatures, Butos and McQuade turn to bureaucracies. Bureaucracies implement legislation that will be created and tested by the political system. Legislatures create the legislation, but an executive branch housing bureaucracies implements new laws, and the judiciary may review and modify those new laws. Another Hayekian anticipatory system is constructed for a government agency, but this one comes with a major change (Figure 8.2, p. 105). The lower two-thirds of the diagram is an anticipatory systems diagram for an agency. Its four main processes are learning, innovation, judgment, and action and these processes are connected by consequences, knowledge, initiatives, and plans. The major change is that above the Hayekian anticipatory systems process appear three agency clients of government bureaucracies: the executive, the legislature, and the judiciary. Also, bureaucracies face constraints which are different than the discipline of markets and profit in the private sector; their internal operations are subject to more invasive influences than firms; and those influences may be more unpredictable than those faced in the private sector. They conclude: "Given such differences, any exhortation that agencies would be more efficient if run like a business are naïve" (p. 107).

In chapter nine, interactions between government and the market and between government and science are developed. The diagram of process organization from chapter five is provided again in revised

form as background for an analysis of how government interacts with science and markets (Figure 9.1). There are three major effects of governmental processes: they may alter the flow of resources to other social actors; they may destabilize those actors; and they may distort the adaptive processes of markets and science. The authors briefly point to the fact that the private sector will develop work around procedures which lead to cycles of increasing intervention by government. Some of the government interventions create large bureaucracies which take on the role of a "Big Player" relative to the entities in the private sector. One of the best examples of a Big Player is the central bank (p. 119). Butos and McQuade argue that the information available to the central bank is flawed and too aggregated or centralized and it is unable to respond accurately to micro level imbalances between various financial markets and financial institutions. They argue that a free banking system or a monetary system without a central bank is better able to respond to the knowledge problems of banking and financial markets (pp. 119-124).

A similar analysis is made for government and science. Government creates funding agencies which function like "Big Players" (p. 151). The science funding agencies are too centralized relative to the domains of actual scientific research which leads to excess funding in some areas of scientific research. This excess funding distorts the direction of research creating a boom in favored areas of funding. When scientists encounter experimental failures, funding may eventually be diminished or ended completely. This creates a "boom and bust" cycle in scientific activity and it may also distort the path of future research. Chapter ten provides a history of government science funding, a summary of rationales for government funding of scientific research, and examples of destabilizing and distorting effects of such spending. The authors argue that central planning in science is not possible, and they illustrate with two examples, nutrition science and climate research.

So, what can be said of the contributions of *Hayekian Systems*? Overall, the effort to extend the mindset of Hayek's works to science and government is truly interesting, perhaps even pathbreaking. Consider the conceptualization of government as a governance process. Even while in graduate school taking mainstream economics courses and then Weimer's classes, this author had the sense that the Austrian economics of spontaneous orders was incomplete. Now the obvious thought which arises is that *Hayekian Systems,* as developed in that work, could fill some of the larger holes in the theoretical landscape of Austrian and perhaps even mainstream economics. Decades ago, I came to believe that science and even government could have aspects of spontaneous orders or complex phenomena since society and nature separately appear to exhibit phenomena with properties indicative of spontaneous orders. Also, a deeper understanding of government and especially science might provide nonmarket models of social-institutional adjustment processes with the primacy of adjustment located in something other than changing relative prices. *Hayekian Systems* clearly aims to take us beyond the limits of Hayek's works creating a theoretical path for extending the idea of spontaneous orders or subsystems of such orders to government and science.[8]

There are issues which lurk behind spontaneous orders and Hayekian systems. In attempting to understand the main claims of Butos and McQuade, one issue which led to a detailed search throughout their work is the definition of a system and to what extent it is co-extensive with the conception of spontaneous order. The authors are careful to define and elaborate what is meant by a spontaneous order. Then there is almost an imperceptible shift to the term "system" and there is no specific definition of a system or systems. The term "market system" seems at times to be used as an equivalent substitute for the market as a spontaneous order. Also, the aim of the work is to extend Hayek's theory of spontaneous order to the social orders of complex societies and those extensions are "Hayekian systems." So are Hayekian systems spontaneous orders within the overall spontaneous order of society or are they organizations with prominent features patterned mostly by human design but nested within or between various other spontaneous orders or complex phenomena? Hayek (1967b, p. 76) at one-point talks of simpler complex phenomena within the broader pattern of the spontaneous order or society. Another question is whether the order of Hayekian systems may be more highly ordered than the broader order of the spontaneous order within which they operate. But this is never clearly discussed, and the term spontaneous order seems to fall into the background as the theory of *Hayekian Systems* is further developed. Also, there are criticisms of mainstream economics as be-

ing too mechanistic. Mechanical processes are extremely rigid, and this rigidity lends itself to data collection, mathematical theories, and predictive ability. So, an indirect implication is that mechanically ordered processes are not spontaneous orders, but they do exhibit the properties of tightly ordered systems up to a certain limit.

Another question is whether any organization or process of human design can be completely determined by such design. If not, this suggests that some limitations of human organizations could be understood as stemming from the properties of a spontaneous order or a complex phenomenon in which it is nested. If mechanical ordering is incomplete at the physical level which is recognized in the philosophical theory of indeterminism, then human organizations would appear to be less powerful in bringing order to the human domain than the laws of nature are to the physical domain. Indeterminism is consistent with an evolutionary perspective and spontaneous orders and especially at the social level. The leads to the obvious question of whether there are different genres of systems and spontaneous orders.

Yet another question or concern is that there appears to be no sharp distinction between the individual and social processes in which individual humans function. The anticipatory systems diagram portrayed for *The Sensory Order* (Figure 5.2) represents cognitive processes that clearly function at the level of a single human individual according to Hayek. Then the authors discuss biological analogies in social theory and how biological systems are different than social systems. Perhaps for the purposes of this work the anticipatory processes of individuals and social organizations are quite similar. But that does not mean that they are similar in every respect. There is a recognition that human individuals have brains and social organizations do not, but their differences are left underdeveloped. Some of the features in the Hayekian anticipatory systems diagrams could clearly be fulfilled by individuals and others by some organization, committee, or group. One wonders whether these differences are significant or not. Actually, Butos and McQuade do have a very nice descriptive table of levels and types of order including those at the level of individuals which would have been quite useful to include in this work. That table is in one of their articles on *The Sensory Order*. Readers would be well-served to consult McQuade and Butos (2005, pp. 353-354).

To address important aspects of the preceding questions, here the focus will shift to another intellectual figure of great prominence lurking in the background of both Hayek's and Popper's works. Here I have in mind the ideas of C. S. Peirce and some of his contributions which have received little attention from economists or Austrians. Besides his place in the history of American pragmatism, Peirce was also considered a founder of a rather new field of inquiry now within linguistics—semiotics. Hayek's use of concepts like map and model in the *Sensory Order* and his understanding of prices as symbols are clearly semiotic in character. Both Hayek and Popper knew of Peirce. Hayek quotes one of Peirce's most famous passages about not blocking the path to inquiry and Popper considers Peirce to be the first modern indeterminist.

Consider what Hayek had to say about Peirce. On a separate page at the beginning of Part Two of his *Studies in Philosophy Politics and Economics* (p. 134) Hayek quotes without further comment a very well-known rule of conduct for learning processes from Peirce's writings. Given the prominence of its placement in the work, Hayek seems to imply that he thinks highly of the position Peirce offers:[9] In 1898, Peirce was presenting a set of lectures in Cambridge, Massachusetts in close proximity to Harvard's campus. Earlier in one of his lectures, Peirce spoke of the need of a "Will to Learn" which would have been seen as a reply to James' well known conception of the "Will to Believe." Then later, Peirce qualified his conception of the "Will to Learn" with remarks that often have been widely cited by many interpreters of Peirce:

> Upon this first, and in one sense this sole, rule of reason, that in order to learn, and in so desiring not to be satisfied with what you already incline to think, there follows one corollary which deserves to be inscribed upon every wall of the city of philosophy:
>
> Do not block the way of inquiry.
>
> — C. S. Peirce as quoted by Hayek (1967, p. 134).[10]

One would imagine that what Hayek had in mind was not blocking learning about spontaneous and cognitive orders of the economy, the principles of a liberal society, and perhaps Hayekian systems.

Turning to Popper, Popper offered high praise recognizing Peirce's indeterminism. Popper's (1973a) laudatory comments come from one of his most interesting essays, "Of Clouds and Clocks: An Approach to the Problem of Rationality and the Freedom of Man." Clouds are meant quite generally to represent physical systems like gasses which are highly irregular, disorderly, and mostly unpredictable. In contrast physical systems which are quite regular, orderly, and highly predictable are termed clocks. The phenomena of our world exhibiting mixes of order and disorder could be placed on a line between clouds and clocks with clouds on the far left and clocks on the far right. Determinism would be the idea that all cloud-like systems are clocks where we should be able to find models, principles, and forces which would explain cloud-like phenomena as resulting from clock-like processes. For Popper this is Newtonian determinism. The alternative is that all phenomena are clouds—even the most clockwork like of phenomena. This brings us to Popper's comments about Peirce:

> Among the few dissenters [to physical determinism] was Charles Sanders Peirce, the great American mathematician and physicist and, I believe, one of the greatest philosophers of all time (Popper, 1973a, p. 212).

Popper goes on to quote one of Peirce's more interesting comments about indeterminism. From his considerable experience as an experimental physicist, Peirce held that the most accurate measurements of the physical sciences "fall behind the accuracy of bank accounts" and "are about on par with an upholsterer's measurements of carpets and curtains" (Peirce 1892, CP 6.44, p. 35). That would include pendulum clocks since Peirce was one of the world's leading gravity researchers which required swinging a pendulum instrument in intervals for hours over several days. No one tried to measure a deterministic physical property more minutely and with mechanical precision than Peirce. Popper even claims that the pendulum clock is the most exemplary example of clockwork-like phenomena (Popper 1973a, p. 207). For Peirce, observations which are interpreted as favoring determinism and mechanism "simply prove that there is an element of regularity in nature, and have no bearing whatever upon the question of whether such regularity is exact and universal or not" (Peirce 1892, CP 6.46, p. 36). Popper's analysis of indeterminism goes on to present four functions of language where higher levels of language control lower levels. His theory is especially sharp at the individual level: "Each organism can be regarded as a hierarchical system of *plastic controls*—as a system of clouds controlled by clouds." The controlled subsystems make trial-and-error movements which are partly suppressed and partly restrained by the controlling systems" (Popper 1973a, p. 245). Popper does not mention Hayek's theories of complex phenomena, spontaneous orders, and the cognitive orders of *The Sensory Order* even though Popper's analysis of indeterminism would seem to encompass such phenomena. One can only wonder why not.

Indeterminism is especially relevant to conceiving of spontaneous orders and systems within those orders. Butos and McQuade recognize that Hayek took an evolutionary view of natural and biological processes which would lead to an evolutionary epistemology for human beings as individuals and how they function within whatever social processes they may create. The clear implication is that economic processes are knowledge creating processes which actually function in an evolutionary way. Individuals and social organizations have a mix of narrower to broader knowledge creating processes depending on the scope of their streams of information and the processes and abilities which they bring to understanding their situations. Those knowing processes which economic agents have in the course of conventional economic activities are termed "epistemic" processes and the term "epistemology" is reserved for the more formal knowledge creating processes of the sciences and philosophy. In either case, those in the economy and scientists of all varieties find ways to navigate the indeterminism of the subject matter of complex economic or scientific phenomenal processes.

All of this is relevant to a consideration of what could be meant by the term "spontaneous order." In Hayek's writings, a term is encountered which seems to be absent from Butos and McQuade's treatment of spontaneous orders. Hayek (1967b, p. 74) repeatedly speaks of "regularities" that result from natural or social interactions that are not the product of human design. At one point, he likens studying economic activity to investigating the patterns of galaxies and solar systems (Hayek 1967b, p. 76). An implication not directly stated is that galaxies and solar systems are examples of spontaneous orders in the natural world. If so, this would seem to require a conception of indeterminism. Popper is much more directly in favor of indeterminism. In the "Clouds and Clocks" essay where he notes Peirce's views on indeterminism, he clearly declares that he is for indeterminism with Peirce and others, and he rejects Einstein's effort to retain some form of determinism (Popper 1973a, p. 213).

Indeterminism is helpful because it provides a useful starting point for thinking about patterns of regularities in nature and society. The very term spontaneous order suggests a pattern of order which has emerged from a more encompassing background of disorder or unordered phenomena. This is the simplest conception of indeterminism. Disorderliness or randomness comes first and recognizable patterns later. It is possible that one could try and define a spontaneous order as embodying a weak form of determinism or as being toward the clock end of Poppers clouds-and-clocks spectrum line. Determinism asserts the reverse of indeterminism, that order is primary, and disorder is secondary in the background and is due to the incompleteness or imperfection of whatever order exists. Decades ago, economist Arthur Okun (1981) described this view as a sand-in-the-machinery view of economic proesses. Hayek seems to recognize somewhat indirectly what Popper, Peirce, and modern cosmologists assert, that indeterminism is prior to and logically a stronger and more fundamental position than determinism. Such an indeterminism would take the contributions across the sciences, like modern physics, astronomy, and the life and social sciences, into account. Indeterminism seems to be the stronger position for interpreting our world than determinism.

If indeterminism is the stronger position for interpreting the events and phenomena of our world and universe, then that conception needs to be adopted explicitly for spontaneous orders. Spontaneous orders are patterns of regularities which emerge in nature, life, and society and are not the direct result of human cognition or activities. Such orders are incomplete and imply a remaining background of disorder as a first approximation. As time passes, a multiplicity of other spontaneous orders might emerge. Some of those orders might be replications leading to ordering processes in parallel. Or the scale of a spontaneous order may allow for smaller scale orderings within the larger pattern. So, we could have spontaneous orders within spontaneous orders and those orders may further evolve in parallel, by replication, within other spontaneous orders, or allow another layer of orders within those which have emerged. Within all of these possible layers and orderings of spontaneous orders, very rigid orderings of phenomena may result as well. One can use the term mechanical to refer to such rigid orderings.

The extraordinarily rigid orderings of planets circling a star for billions of years constitute some of the most rigid repetitions imaginable to humans. Even so, for any stellar system, a stage of disorder apparently preceded the highly rigid but later stage of that star system. At another level, once humans have discovered rigid natural properties and the enduring qualities of the natural elements, then that knowledge can be used to create clocks. Clocks are machines of extraordinary rigidity that have been constructed to indicate the tightly ordered passage of time. As noted previously and as Popper argued in his essay, "Of Clouds and Clocks," pendulum clocks have been the most iconic example of mechanical processes in our world (Popper 1973a, p. 207). There are others such as well-engineered buildings, bridges, and cars. The most important idea for machines in light of spontaneous orders and indeterminism is that the highly rigid order of machines is both constructed and limited, and it exists against and within a background of disorder and an array of a complex spontaneous orders. What emerges from the preceding considerations is the idea that there may be multiple types or kinds of spontaneous orders and complex phenomena and that a nomenclature of types and a system of classification might be helpful. Such sentiments could be extended to include the cognitive orders of individuals functioning within spontaneous orders and Hayekian systems. Butos

and McQuade provide comments in some of their chapter notes heading in this direction and they also describe knowledge as a process of classification.

At this point, it is time to turn to another conception of an abstract pattern which at first might seem to be unrelated to spontaneous orders and complex phenomena. However, that concept might provide parallels to some problems stemming from conceptions of spontaneous orders and complex phenomena. Here a concept will be raised which might strike some as odd. The concept which might be helpful in thinking about spontaneous orders is the concept of infinity. Infinity is an unobservable but logical property of an extremely large quantity of entities and a process of classification seems to have led to some progress in reasoning about infinity. Also, the concept of infinity could be relevant to some of the aspects of a conception of spontaneous order. For instance, is any particular spontaneous order a singularity only or could it stem from generating processes that could yield an infinite number of different spontaneous orders not just one? Does this matter? For centuries before the late 19th century, mathematicians and philosophers did not know what sense could be made of the concept of infinity. Infinity was imagined as a quantity that goes on indefinitely and is larger than any large but finite quantity. However, infinity seemingly defied a logic of rationalizing with simple rules such as addition, subtraction, multiplication, and division. For example, before newer thinking about orders of infinity, not much could be said about infinity and reasoning seemed to be somewhat circular as exemplified by the following rules: infinity plus infinity equals infinity, infinity times infinity is still infinity, and any number divided by zero equals infinity. Beyond mathematics and number theory, philosophers wondered if there was such an entity as an infinite being and scientists whether space was finite or infinite. It took a mathematician such as Cantor to theorize that there could be orders of infinity.

A theory of orders of infinity provides a process of classification. For example, to any non-negative integer *n*, plus one could be added to form *n+1* and this could continue indefinitely towards infinity.[11] Thus, the non-negative integers most familiar to every rational human being and child can be meaningfully classified as being infinite. This is often recognized as the lowest order or zeroth level of infinity. To this lowest order of infinity, one could form the next order simply by adding one-tenth or 0.1 to every non-negative integer. This series would have the non-negative integers *n* of the first infinite series interspersed in sequence with another series of numbers taking the form of *n.1*. Then they could be placed in sequential order of magnitude from smallest to largest: 0, 0.1, 1, 1.1, 2, 2.1, …., *n+1, n+1.1*. This is an example based on the mathematical writings of Peirce.[12] Such a series of numbers would have twice as many numbers as the non-negative integers, both series would be infinite, but the second series would have twice as many members as the first. The process could continue to yet a another or third order of infinity. One could add .01 to every second member of the immediately preceding second series to form a third term so that now there are an infinity times three of terms in the third series: *n, n.1, and n.11* or using specific integers and starting with zero we have: *0, 0.1, 0.11; 1, 1.1, 1.11; 2, 2.1, 2.11,* etc.

Peirce's examples of infinities take the mathematics towards the issue of continuity. The non-negative integer line has gaps that need to be filled. In fact the integer line has an infinite number of gaps and each gap can be filled with an infinite number of decimals, some which repeat without end. One can imagine filling the gaps as Peirce's example suggests with the logic of infinitesimals or with a theory of limits. The point is that we do not want a number line with holes or gaps as a matter of the fundamentals of mathematical logic. Numbering is actually a process of classification. Think of the various applications in everyday life, science, and the economy. The number line combined with various units of measure can yield scales of measure for many basic magnitudes in human activity and of course for science and commerce. Such scales need to be free from gaps and without limit otherwise the numbers used in science and in economic processes such as basic accounting, national income accounting, index numbers, interest rates, etc. could have gaps, discontinuities, and perhaps finite limitations. It also needs to be noted that the basic concepts of calculus used in economic theory and probability theory require or incorporate the concepts of continuity and infinity.

If there are broader patterns of spontaneous orders containing other spontaneous orders with some in parallel or nested arrangements and others containing pockets of more rigidly ordered phenomena, then Hayek's (1955, 1964) theory of complex phenomena comes to mind. Complex phenomena are those with abstract and perhaps potentially unlimited patterns or features of order, or levels of order within other patterns of order, and of orders in parallel with other orders which might be nested within larger scale orders. A human being is a complex phenomenon even though each one of us is limited and finite. But our capacities are capable of infinite variation. Think of a human being as nested arrays of orders with some orders within other orders and with others in parallel. All of the orders present within a human being are connected by a central nervous system including the brain. Humans in society essentially function arranged as arrays of parallel orders within other orders which are all contained in the overall structures and orders constraining and governing individual activity and social interaction. If Hayek is right, then the central nervous system is a spontaneous or complex cognitive order housed within the various nested, parallel, and replicating orders that structure the physical, biological, and neurological systems characteristic of an individual. In turn, after the number of individuals has multiplied greatly, patterns among and across individuals result in large populations of human beings living in civilized arrangements conducted in isolation and/or with moral principles and laws and within organizations and institutions. If Peirce is right, then a central nervous system equipped with the simplest logic of mathematics could symbolize and imagine the various orders of infinity. A human mind which has the capacity to understand infinity and its logical orders likely could understand and classify the most important abstract features of spontaneous orders, cognitive orders, and Hayekian systems operating within the institutions and social processes of society, government, and science.

Perhaps there is a hierarchy of spontaneous orders like that in the mathematics of infinities or in Popper's hierarchy of plastic controls. If one reads *Hayekian Systems* closely, Butos and McQuade seem to recognize that the phenomena of spontaneous orders may also exhibit order and pattern.[13] In the economy, human minds would seem to be functioning within the spontaneous order of market processes, the evolutionary knowledge orders of Hayekian systems, and the orders of other social processes. It seems logical that human minds functioning as individual level cognitive orders as Hayek portrays them in *The Sensory Order* would function in parallel first within small groups such as families and then is in some hierarchical way in larger social processes and organizations including Hayekian systems. Above the level of human individuals and specific social organizations with each level having properties of spontaneous orders, individuals and social organizations may be part of larger patterns of spontaneous orders and complex phenomena.

Similar considerations could be made for science. It seems logical that scientists would function in parallel as a first approximation and then in hierarchical order if one or several scientists are rank-ordered relative to others taking roles such as principal investigators, research scientists, post docs, lab assistants and so on. If science is a spontaneous social order containing many cognitively capable scientists, then we have another spontaneous order of the overall process containing human individuals who also function in parallel with each other and within the overall order of their research niches. In those niches, scientists are also organized into one, two, or perhaps several research teams in each field of research often with low numbers of participants compared to the large numbers involved with commercial markets. In an economic sense, science is a densely concentrated and concatenated succession of activities which make them susceptible to the problems and inefficiencies of monopoly-like power.[14] Likewise, the outcomes of the research processes in science would seem to be at the low end of numerical possibilities. Scientific research which does not narrow the range of hypotheses is not very valuable to science.

Next consider the discipline of economics. If Hayek, other Austrian economists, and Butos and McQuade are right, then the subject matter studied by economists, economic activity itself, takes the form of arrays of patterned, nested, and replicating spontaneous orders, complex phenomena, and the organizational orders and mechanical processes within those orders including Hayekian systems. If economists study all of these differing orders of complexity and if science is another process of complex spontane-

ous orders, then economic science itself must be a complex phenomenon. If so, the orders of various complex economic processes are quite extensive and capable of generating an infinite variety of outcomes, then some type of specialization might occur in the economics profession according to the type of ordering processes. In simpler terms, if economics is about complex economic phenomena, then the discipline itself must be a complex phenomenon addressing different aspects of the complex phenomena in the economy.

The various layers and arrays of complex economic orderings suggest the possibility of pluralistic economic profession where different approaches or schools of scientific thought and practice specialize in types of economic phenomena within a limited range of complexity. What is being suggested is that if the economy is a complex array of spontaneous orders and Hayekian systems, then different approaches to economics could take up specific ranges or types of phenomenal order abstracting from others. Thus, various approaches to economics, to the extent they confront a real domain of ordered economic processes, encounter something fundamental in the economy. Mainstream economists seem to prefer instruments, tools, and economic phenomena that are highly rigid and that give rise to large data sets. They seem to think of the economy as a grand machine containing a multiplicity of mechanical economic sub-processes which are generated by human beings with the humans themselves conceived as optimizers acting and behaving in the most logically consistent and rigidly patterned economic activities in machine-like ways. The rigid order and pattern of economic processes, which is the subject matter of mainstream economics, is a constructed order and how that order came to be is mostly left unexplained.

Non-mainstream economists like Austrians alternatively focus on the non-mechanical aspects of individual and social processes which in turn might be interpreted as enabling the mechanically repetitive social and economic processes that are the subject matter of mainstream economics. Non-mainstream economists focus on the broader social processes in which the more rigid processes are conceived and constructed. In a very real sense, mainstream economists ignore what could be categorized as background orders and processes which are so much the focus of Hayek, Austrian economics, and other social science disciplines. If the patterns of spontaneous orders persist for a time, then they may not be readily apparent or essentially function in a constant way relative to the dynamic patterns of economic phenomena which mainstream empirical researchers take as their subject matter and for which they collect data. One can ask how the patterns embedded in economic equations came to be and how is it possible that the patterns identified in such equations could endure for a time. But those questions are not of great importance in mainstream applied economic research. The theory of *Hayekian Systems* attempts to explain the evolving qualitative orders of institutional processes in which market systems function. These sentiments take us toward an intellectual position that Hayekian systems and mainstream economics could be intellectual complements to some degree even if economists of each approach tend to be dismissive of the methods and scientific practice of the other. It is unfortunate that the enduring evolutionary orderliness of economic and governance processes is essentially relegated to the error terms of the many stochastic equations of mainstream economic analysis.

Besides spontaneous orders and complex phenomena including those of the human brain, Hayek also had some interesting things to say about the uses of mathematics in economics. Anyone who is aware of the impact of modern macroeconomics on policy analysis at central banks is aware of how highly mathematical some models of economic activity have become. Nearly every national or central bank in most nations of the world construct and interpret economic activity with DSGE macro models. Unfortunately, very little is said about mathematics in *Hayekian Systems* although it is implied that DSGE models are misdirected.[15] However, Hayek does give us some significant remarks on mathematics that could be redirected towards DSGE macroeconomics. At the Penn State Conference on Cognition and the Symbolic Process in 1977, Hayek was asked what he thought about increased mathematization of economics:

> This is a rather complex issue. Mathematical economists do not understand that the great advantage of mathematics is that it permits us to describe patterns without requiring that we know their quantitative mechanisms. But most economists are bad mathematicians who imagine that mathe-

> matics consists of quantitative or numerical statements like statistics. Instead of statistics, we need powerful and abstract mathematics, because that is still the only method for describing complex patterns. But that is not a numerical or quantitative mathematics. The most accurate illustration is topology (Hayek in Weimer-Hayek Discussion, 1982, p. 326).

Similarly, in *The Sensory Order* itself, Hayek claims that the patterns within the brain need to be understood with topology. The resemblance between the elements of sensation and external physical elements is relational and not to be borrowed from gestalt psychology. The sensory qualities that we experience in our mental experience need to be "topologically equivalent" to the order of physical elements in the external world (1952, pp. 37-39). The relational resemblance between sensory and physical elements can be stretched, twisted, or crumbled using topological operations as metaphors as long as these operations do not change the isomorphism between sensations and physical elements stimulating those sensations.

Hayek's remarks on mathematical topology as being appropriate occur again in "The Theory of Complex Phenomena" (1964, pp. 23-25). There Hayek maintains that pattern prediction is possible even if the prediction of a detailed instance within the pattern is not predictable. Until DSGE models, general equilibrium models were mathematical pattern models illustrating in principle how many markets interacting together might come to an overall general equilibrium. But no one had figured out a method for infusing empirical content into the theory except with analogical anecdotes. Indeed, one of the criticisms of general equilibrium theory before the 1990s was that it was a mathematical model that could not find an applied form and thus was not testable. Similarly, Weintraub's (1975, 1984, 1991) work on general equilibrium theory informed by Lakatos' (1976) *Proofs and Refutations*, suggested that general equilibrium theory should not be rejected merely because, to that point in time, there was no empirical version of the model. Instead, the appropriate standard for mathematical progress is proof and other forms of mathematical demonstration, not falsification or some form of empirical or econometric validation. Peirce did take up many of the same issues as Lakatos essentially holding that mathematical discovery could be understood as a semiotic and reasoned process of diagrams and demonstrations.[16] However, DSGE methodology and practice have changed the landscape of general equilibrium theory and macroeconomics.

DSGE theorists have asserted a strong form of general equilibrium with an elaborate multiple equation system which can be solved yielding a dynamic intertemporal solution. Then they created a sophisticated simulation method for conducting empirical research which became known as calibrating the model. Calibration involves taking given empirical values for some accepted macro parameters and then running the model forward to estimate other macro variables such as GDP, interest rates, unemployment, etc. The method uses most of the data to determine how closely the model tracks the more recent quarters of economic activity for the most important macro variables. DSGE models have become one of the more important versions of macro models used by central banks.[17] Every central bank seems to have one. The New Keynesian DSGE models typically contain an equation for monetary policy known as the Taylor rule. The simplest versions of the Taylor rule can be described as a Fisher equation plus additional mathematical terms reflecting U.S. federal way which mandates something like equal attention to inflation and unemployment.

While an argument cannot be developed in detail here, no DSGE theorist has provided a deep argument that the actual data streams used in macro modeling must come from equilibrium processes. In reality, the data is a consequence of whatever natural, social, and economic processes that actually generate the numbers. Spontaneous orders endure and have complex patterns and suborders and patterns within which market processes and individual level economic decisions take place. All equilibria, including economic ones, occur with spontaneous orders in the background. One might argue that macroeconomic data are as much a product of evolutionary complex phenomena as they are of equilibrium phenomena. Institutions and Hayekian systems may stabilize economic activity enough so that the indeterminacy of spontaneous orders and Hayekian systems falls into the background. But that does not last forever as the system changes in evolutionary fashion, sometimes at slower rates and other times at faster ones. If this is so, then there

are obvious implications for monetary policy. Fine-tuning short-term nominal interest rates to nudge the economy to counter inflation or recession with six, eight, or ten successive policy steps in a row is likely mistaken except in times of systemic crisis. Similarly holding and compressing nominal interest rates near zero like what happened for more than a decade from 2009 to 2020 is extremely distorting both for risk appraisal and household net worth and the epistemological processes embedded in private sector decisions relying on accurate absolute and relative interest rates and accurate estimates of household the worth, financial assets, and capital valuations.

The idea that mathematics could be used to model the complexity of the patterns of phenomena in the natural and social worlds and that it has a topological character can be found in the writings of C. S. Peirce. Also, mathematical abstractions and methods for their discovery and demonstration form a large part of Peirce's theory of cognition.[18] Instead of focusing on science or entrepreneurship as types of complex cognitive activity, Peirce chose two closely related domains, mathematics and semiotics. Mathematics is the most abstract of all human abstractions for Peirce, then logic, followed by philosophy, theoretical science, applied science, and eventually common-sense knowing processes. In taking these positions, William James and his contributions are almost always directly or indirectly in the background of Peirce's mind. Peirce did not follow the positivists of his time into behaviorism, and he turned away from James' somewhat anthropological research methods for observing human cognitive activity. As noted, James did write some very interesting articles on higher mental processes. However, after leaving his psychological laboratory and moving to philosophy from psychology, James pioneered a process of solicited personal accounts to illustrate how humans changed their minds. His *Varieties of Religious Experience* (1902) may be the best illustration of James' survey method. Instead of behaviorism and personal accounts, Peirce thought that attention to mathematics and mathematical properties related to phenomena could reveal how complex human minds could innovate and discover new mathematics, novel applications, and how they could convey those innovations with other minds through diagrams and demonstrations. This led Peirce to create a new way for conceiving how humans with complex evolutionary cognition might communicate with signs or symbols—the theory of semiotics.[19] Peirce, like Hayek, was deeply influenced by Kant. Peirce took the important idea from Kant that all thought is in signs and developed it to such an extent that he is now recognized as a founder of this relatively new field. Mathematics and science were two of Peirce's most important domains for illustrating the possibilities of semiotics and the nature of human understandings and meaning.

Providing even a simple elaboration of Peirce's semiotics and how he illustrated cognitive complexity and the ability to perceive and reinterpret the orders of signs, symbols, and systems of representation available to particular individuals in specific forms of human inquiry and science would be beyond the scope of this essay. What we can recognize is that Hayek, Popper, and even Weimer have taken positions that are essentially semiotic or have significant semiotic features. As already noted, Hayek's *Sensory Order*, which asserts ideas of cognition occurring with neural maps and models that are understood topologically are inherently semiotic and can be further elaborated in semiotic terms. Hayek (1952, p. 181) also diagrammatically displayed an example of the logic of a classifying order that might occur internally in a human mind. That diagram is semiotic as well. Also, Popper offers theories of mind, scientific inference, and the functions of language with significant semiotic aspects. Popper asserts that humans function within three domains or worlds of phenomena: matter, mind, and a third world of logical entities resulting from mental activity (Popper 1973b, pp. 153-162). Popper's third world can be manifest in the first world of physical existence when it is manifest in semiotically facilitated material entities such as books, libraries, mathematics, science, designed physical structures, machines, schedules, plans, and written or spoken accounts of events, interpretations and criticisms of interpretations. The partitioning of what we experience into three worlds is semiotic in character as well. What Popper does not do is explicitly extend his discussion of the entities of his three worlds to semiotics. However, this is what Peirce has done.[20]

Peirce's most general term for indicating the nature of a sign as employed in mathematics and science was "diagram." A diagram could serve as a model of major relational arrangements of the patterns of any

phenomena.[21] Across human inquiry diagrams could take a multitude of forms. Anything which stands in place or represents another thing, entity, or process is a sign and the special symbols and representations of mathematics are all considered diagrams in Peirce's thought. Sketches on the wall of caves and geometric figures clearly could be recognized as diagrams and so were dots, lines, letters, numbers, variables, equations, musical notes and scores, artistic creations, words written and spoken, articles, books, sounds, utterances, etc.

Moving these comments toward a close, a final comment or two is in order. There is a perspective from which *Hayekian Systems* has a significant Peircean quality. For Peirce the relational fundamentals embedded in any particular type of mathematics or science or in any type of intersubjective human understanding can be illustrated with a diagram. For Peirce, such diagrams are both mathematical and semiotic in character. They indicate the relational patterns that may be the most important and they should be constructed as thought experiments when inaugurating a new line of research or inquiry. Essentially diagrams constitute a preliminary stage of conceptualization and facilitate theorizing about the nature of natural, social, or economic phenomena. Such diagrams should be developed before any specific mathematical or scientific research is conducted. Thus, the diagrams representing core aspects of Butos and McQuade's *Hayekian Systems* convey the key theoretical ideas and relational patterns elaborated in that work and they facilitate focusing on fundamental patterns of economic, governance, and scientific processes. Thus, in an important way, the analytical diagrams of *Hayekian Systems* are very Peircean. The Rosen biological systems diagram does have equation-like process designations for symbolism. Also, the system diagrams for the *Sensory Order* and for the Hayekian systems of government, science, and central banks indicate the main relational patterns essential for the successful theorizing of those processes. One can even imagine combining the diagrams of *Hayekian Systems* and *The Sensory Order* with a modified general equilibrium pattern diagram. There processes of individual optimization would be nested within processes of semiotically facilitated inquiry, discovery, and entrepreneurship which would be further nested within spontaneous orders, arrays of Hayekian systems, and other complex phenomena. Thus, Butos and McQuade's *Hayekian Systems* points toward many new understandings of economic and institutional processes, and they should be commended for the accomplishments found in their work.

NOTES

1 In rereading Hayek's (1955, 1964, 1969, 1976, p. 76) essays and other writings on these matters, I am continually asking the question whether the cognitive orders emerging in any particular individual and human brain could also be called a spontaneous order. Hayek does not seem to have as sharp a theory of the individual as Popper in my view.

2 This was a point made about science in my *Economics of Science* and a passage titled, "Hayek's Theory of Science as a Noncommercial, Rule-Governed Order," (Wible 1998, pp. 144-150).

3 Details for the conference volume can be found in Weimer (1982).

4 Weimer (2022a, 2022b) has authored a two-volume account of his work on science and cognitive psychology as it relates to the classical liberalism of the Hayekian variety. Those volumes are worthy of consideration in their own right.

5 For an analysis of Hayek and general equilibrium see Butos (1985).

6 For an introduction, see Hayek (1953, chapters 1 and 2).

7 See Hayek (1952, pp. 107-118) for his discussion of map and model relating to mental order.

8 Government and many of its processes and organizations may function as Hayekian systems. If government agencies function in proximity to spontaneous order, any government economic agency concerned with an advanced, market economy such as the continental-scale American economy would encounter significant limitations from the patterns and processes of various arrays of spontaneous orders of such a large-scale democracy and society. Yet another implication would be that a government regime of central planning for a spontaneous

social order would be particularly ill-conceived. Central planning would inhibit decentralized arrangements essential for a dynamic economy in the short run and would curtail economic growth especially in the long run. From those implications it is quite obvious to infer that economic freedom and economic growth are essential for political freedom and vice versa.

9 Hayek lauded Peirce's view of cognitive processes: "From H. von Helmholz's still insufficiently appreciated conception of 'unconscious inference' and the similar ideas of C. S. Peirce ..... they all stress in one way or another that our perception of the world is made possible by the mind possessing an organizing capacity; and that what used to be called elementary qualities are its product rather than its material." (F. A. Hayek, "Primacy of the Abstract," 1978/1969, p. 38).

10 Hayek likely read this passage from a fragment of a lecture published as a note in Peirce's *Collected Papers* (1898a, CP 1, par. 135, p. 56) since the first six volumes appeared in the 1930s. A complete version of the 1898 lectures was published in 1992. The "Will to Learn" and its corollary can be found in that 1992 publication or Peirce (1898b, pp. 170-171, 178).

11 Peirce ([1976a], NEM IV, and [1976b], NEM IV) calls this sequence Fermat's inference. There are many mentions in Peirce's *Collected Papers*.

12 Peirce (1895, NEM III/1, pp. 53-58; 1897, NEM III/1pp. 87ff; 1903, NEM III/1, p. 341 ff.).

13 See Butos and McQuade (2023, pp. 24-25, notes 2, 3, 8, 12).

14 No one has discussed monopoly power in science as much as Bartley (1990).

15 Butos and McQuade 2023, p. 1 assert that modern macro models "represent the market economy as a mathematical machine." Also see notes 2, 3, 4 on p. 4.

16 Peirce's (1976) mathematical contributions were belatedly published in a massive collection of mathematical textbooks, mathematical notes, writings on the philosophy of mathematics, and correspondence titled *New Elements of Mathematics*.

17 The chairman of the Federal Reserve, Powell (2023) seems to criticize DSGE models as interpreted by Torres (2023).

18 For an overview of Peirce's views on mathematics and cognition, see Pietarinen (2022).

19 For a more detailed discussion of Peirce's semiotics see Everett (2024) and Pelkey (2019) and for semiotics and economics, see Wible (2022).

20 Similarly, especially in his latest two-volume work, Weimer (2022a, b) has one of the richest discussions and treatments of human cognition that one can encounter, and it extends to Hayek, Popper, market and other human activities. But Weimer does not take up Peirce's work on semiotics and mathematics as an important domain for studying the complexities of human cognition at their highest levels of abstraction. Weimer often recognized that Peirce anticipated some of Popper's most important ideas, but not the semiotic, mathematical, and cognitive side of Peirce's views.

21 Marshall (1879, p. 5), the great British economist, takes a similar view of diagrams and mathematics: "Diagrams present simultaneously to the eye the chief forces which are at work, laid out, as it were, in a map; and thereby suggest results to which attention has not been directed by the use of the methods of mathematical analysis. The method of diagrams can be freely used by every one who is capable of exact reasoning, even though he have no knowledge of Mathematics."

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Social Interaction Through Conscious Choice

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Abstract: Butos and McQuade build on the ideas of Hayek (1952) to relate the sensory order of individuals to social orders, including markets, science, and government. Hayek's conception of the sensory order is consistent with a sprawling research program on the nature of consciousness. The nature of conscious choice has significant implications for the organization of social institutions. While institutions are emergent orders, they emerge within a superstructure of institutional constraints that are imposed from the top down. The recognition that they are imposed by the conscious choices of self-aware individuals has substantial implications for the nature of social interaction.

One of the most important insights that economics has to offer is that orderly social systems can emerge spontaneously, without anyone planning them out. Individuals make their own plans, and institutional structures emerge that enable individuals to interact with others for their mutual benefit. Hayek (1948; 2014, ch. 11) has discussed extensively the way that orderly social interaction emerges spontaneously, as the result of human action but not of human design. This spontaneous order is generated by the conscious choices made by individuals at two levels. At one level, individuals make choices and make decisions subject to the constraints they face. The market order provides an example. Second, many of the constraints people face are the result of human design, also created through the conscious choices of individuals. This paper focuses on the implications of conscious choice within that second level of choice—the conscious choices that shape institutional constraints.

North (1991, p. 97) defines institutions as "the humanly devised constraints that structure political, economic, and social interaction." A complete understanding of the social order requires not only an understanding of the choices people make subject to the constraints they face but also the way that those constraints emerge as a result of the conscious choices of those who design them. Buchanan (1990) notes that economics typically studies the way that people make choices subject to constraints, and labels as constitutional economics the study of the process by which people choose institutional constraints.

Much of Hayek's work on spontaneous order has focused on the way that order emerges as people interact within the constraints they face. This paper focuses on the implications of conscious choice on the design of institutional constraints by drawing on a multidisciplinary literature on consciousness in philosophy, biology, and psycholo-

gy, to identify what it means to be conscious. That literature, even within specific disciplines, has drawn few definitive conclusions. Incorporating economic insights may offer additional insights to the more general study of consciousness, while research on conscious behavior has the potential to offer insights on the evolution of social order.

One common element in both an emergent social order and the sensory order is that they are decentralized. As McFadden (2006, p. 390) observes, "There is of course no center of the brain where all this information is put together, but it is well established that there are a number of *correlates of consciousness*—dynamic activity that is usually associated with attention and awareness." Self-awareness is a key component of conscious behavior that influences the development of social orders.

The spontaneous order of social institutions, including market institutions, evolves in much the same way as biological organisms and ecosystems evolve. As Alchian (1950) explains, those that are most fit for the economic environment survive and multiply; those that are the least fit die off. Butos and McQuade (2023, p. 43) quote Penrose (1952) who criticizes this evolutionary approach to economics by saying that this "variant of the growth approach leaves no room for human motivation and conscious human decision."

Penrose identifies a major difference between biological evolution and the evolution of spontaneous social orders. In biology, differentiation occurs through genetic mutations that just happen with nobody choosing them. In social orders, differentiation occurs as a result of the conscious choices of individuals. As Butos and McQuade (2023, p. 43) state, "In social systems, the efficient causes all have as their basis the purposeful action of the participants in the system."

A: INDIVIDUAL CHOICE

Robbins (1935, p. 16) defines economics as "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses." Human behavior, in this setting, consists of the choices people make regarding how to employ means to attain the ends they desire. Economists have depicted the process by which people make these choices in various ways. The neoclassical framework typically assumes that individuals act to maximize their incomes or wealth, and adds assumptions about the structure of utility functions, which leads to testable hypotheses. Mises (1998), in contrast, says "Human action is necessarily always rational. … When applied to the ultimate ends of action, the terms rational and irrational are meaningless. The ultimate end of action is always the satisfaction of some desires of the acting man."

Ferguson (1966, p. 11), the prototypical neoclassical economist, describes the theory of consumer behavior as beginning with the assumption of perfect information on the part of those who choose. "First, we assume each consumer or family unit has complete information on all matters pertaining to its consumption decisions." Individuals have utility functions that exhibit diminishing marginal rates of substitution and indifference curves that cannot intersect (Ferguson 1966; ch. 1). Rationality is then taken to mean that people's choices are consistent with the assumptions of neoclassical utility theory

One argument in favor of neoclassical utility theory is that it would be possible for people to make choices that violate its assumptions, so the theory produces testable implications. Friedman (1953, pp. 11-12) defends this approach to describing economic behavior, saying "But economic theory must be more than a structure of tautologies if it is to be able to predict and not merely describe the consequences of action…" Friedman's depiction of economic theory implies a behavioral model of stimulus and response to represent the way that people choose. People are faced with choices, and refer to their utility functions to find the appropriate predictable response.

Among the many assumptions underlying neoclassical utility functions, perhaps most significant for present purposes is that they are stable, both across time and across individuals. This allows for comparative static models to give testable predictions. By assuming that utility functions are stable over time and among individuals, Stigler and Becker (1977) explain that the theory is able to predict changes in behavior

over time, or differences in behavior among individuals, as a result of differences in relative prices and/or incomes.

Buchanan (1964, p. 217) makes a case against this approach to economics. "If the utility function of the choosing agent is fully defined in advance, choice becomes purely mechanical. No 'decision,' as such, is required; there is no weighing of alternatives. On the other hand, if the utility function is not wholly defined, choice becomes real, and decisions become unpredictable mental events. If I know what I want, a computer can make all of my choices for me. If I do not know what I want, no possible computer can derive my utility function since it does not really exist." Penrose's critique of evolutionary theory applies to neoclassical utility theory as well: it "leaves no room for human motivation and conscious human decision."

Referring to Hayek's ideas on complex social phenomena, Marsh (2010, p. 119) says that the "mind is itself constitutionally (and terminally) constrained in fully understanding its own (complex) mechanics…" If people simply made choices by referring to their utility functions, this would not be the case. Indeed, neoclassical utility theory offers a complete description of the actions people would take given the alternatives they face. That is what gives neoclassical utility theory the ability to predict that Friedman (1953) celebrates.

B. CONSCIOUS CHOICE

The paper has made frequent reference to conscious choice without defining what it means to be conscious. Chalmers (1995, p. 200) says "Consciousness poses the most baffling problems in the science of the mind. There is nothing that we know more intimately than conscious experience, but there is nothing that is harder to explain." Following Chalmers, the discipline of philosophy has labeled attempts to understand consciousness as the hard problem.[1]

Hayek (1952, p. 133) says "It may be impossible to give a satisfactory definition of what consciousness 'is', or rather that this is a phantom-problem of the same kind as the 'problem' of the 'absolute' character of the sensory qualities. We shall endeavor to avoid this difficulty by not asking what consciousness 'is' but by merely inquiring what consciousness does." Marsh (2010, p. 120) notes, "the hard problem, for Hayek, is forever intractable." Marsh (2010, p. 127) goes on to say "Hayek takes the view that a unified theory of consciousness (i.e., the hard *and* easy problems) is forever beyond our grasp." But as Rey (1997, p. 461, italics in original) observes, "Among ordinary beliefs about consciousness, none seems more powerful or more certain that that we each know immediately in our own case, in a special way that is immune to any serious doubt, that we *are* conscious."

Hodgson (1991, p. 40) notes the difference between experiencing pain and the physical manifestations of pain, such as grimacing, withdrawing, crying and so forth, "which may be observed by others. The distinction between conscious mental events and physical events is probably clearer in the case of pain than most other examples…" Hodgson (1991, p. 41) says the same applies to emotions such as fear, anger, and elation. We imagine those emotions in others because we experience them ourselves. Our own consciousness is both what allows us to perceive it in others, and what differentiates us from others. There is you, and then there is everyone else.

Another point of view on consciousness, offered by Dennet (1991), Crick (1994), Edelman (1989), and others is that consciousness is nothing more than a set of biological processes. It is an illusion. Ginsburg and Jablonka (2019, p. 96) say that neurobiologists "regard consciousness as the outcome of the self-organizing dynamic interactions between the low-level parts of a hierarchically structured neural system, which are constrained by the higher levels of organization and give rise to global, novel, and coherent patterns of precepts or actions." Dawkins (1976) characterizes living things merely as survival machines for genes. Acts of perception are neuronal events, Crick and Koch (1990) explain. Introspection would seem to call into question this line of reasoning, because everyone experiences consciousness—the self-awareness that goes beyond just acting in response to a stimulus.

Johnjoe McFadden (2020) has developed a conscious electromagnetic field (CEMI) theory of consciousness, in which he depicts consciousness as the perception of perturbations in the brain's electromagnetic (EM) field. Describing the evolving CEMI theory of consciousness, he says "Consciousness is what algorithms that exist simultaneously in the space of the brain's EM field *feel like*." McFadden (2006, p. 397) says "The only place in the known universe where electromagnetic fields occur that are capable of communicating self-generated irreducibly complex concepts like 'self' (and thereby persuading an observer that they are indeed conscious) is in the human brain."

Hayek (1952, p. 142) says, "If sensory perception must be regarded as an act of classification, what we perceive can never be unique properties of individual objects but always only properties which the objects have in common with other objects. Perception is thus always an interpretation…" Chalmers (1995, p. 203) offers an example. "Why is it that when electromagnetic waveforms impinge on a retina and are discriminated and categorized by a visual system, this discrimination and categorization is experienced as a sensation of vivid red? We know that conscious experience *does* arise when these functions are performed, but the very fact that it arises is the central mystery."

The phenomenon of consciousness is embodied in self-awareness, although Chalmers never uses that exact term.[2] Chalmers (1995, p. 214) says "a mechanism of awareness will itself be a correlate of conscious experience." Jeannerod (2007, p. 548) says "The ability to recognize oneself as the agent of a behavior or a thought—the sense of agency—is the way by which the self builds as an entity independent from the external world. By way of consequence, self-recognition is a prerequisite for attributing a behavior to its proper agent, be it oneself or another person."

Bermudez (2007, p. 457) says, "Without the capacity to be aware of our own thoughts, beliefs, and other mental states we would be unable to engage in many of the intellectual activities that are frequently thought to be characteristically human. Only self-conscious creatures are able to reflect upon their own mental lives or to develop strategies for the future, for example." This observation has obvious implications for people's economic behavior.

Hayek (1952, pp. 135-136) observes "that conscious experiences can be remembered and will be recognized as already experienced before when they occur again. 'Memory' or 'recognition' here means no more than the reappearance in consciousness, in combination with circumstances with which it has become associated, of what has been consciously experienced before." Hayek (1952, p. 193) goes on to say "It may be noted in passing that these considerations also have some bearing on the age-old controversy about 'freedom of will.' Even though we may know the general principle by which all human action is causally determined by physical processes, this would not mean that to us a particular human action can ever be recognizable as the necessary result of a particular set of physical circumstances."

McFadden (2006, p. 396) connects the concept of free will with his CEMI theory saying "We experience the influence of the CEMI field as *free will*. This is why our willed actions feel so different from automatic actions: they are the effects of the CEMI field as the cause. … In CEMI field theory, we are not simply automatons that happen to be aware of our actions. Our awareness (the global CEMI field) plays a causal role in determining our conscious actions."

Hodgson (1991, p. 157) conjectures that "evolution has apparently favoured consciousness, not merely by giving rise to organisms with consciousness, but also by equipping them with mechanisms to ensure that in times of danger or crisis, or otherwise requiring important decisions to be made, full conscious attention is brought to bear on the problem." When the appropriate action is clear, one can make decisions with relatively little conscious effort. When ambiguity presents itself, conscious choice is more likely to result in a better outcome.

For the purpose of understanding social order, perhaps the most important characteristic of consciousness is self-awareness. People recognize themselves as distinct individuals who have the ability to decide for themselves what choices they will make.

C. SELF AWARENESS AND CONSCIOUS CHOICE

Imagine, as economists often do, an omniscient benevolent social planner who designs an institutional structure to maximize social welfare. Individuals behind a Rawlsian (1971) veil of ignorance, in which they know nothing about their own personal characteristics, would readily agree to this institutional structure, following Rawls's thought experiment. In the real world, many might disagree, because they are self-aware and make conscious choices to further their own interests. Indeed, the whole purpose of the Rawlsian veil is to eliminate people's self-awareness.

Butos and McQuade (2023, p. 11) remark that Hayek "despaired of the ability of traditional democratic liberal constitutionalism to secure liberty given the widespread lack of appreciation of the superior epistemic properties of a spontaneous order." But self-aware individuals make conscious choices, thinking about things from their own perspectives. Conscious individuals could be aware of and appreciate "the superior epistemic properties of a spontaneous order," and yet still desire to construct an order more favorable to themselves. Self-aware individuals may even perceive their own interests as closely allied with the public interest.

Consider a famous example. In 1953, Charles Wilson, CEO of General Motors who was nominated to be Secretary of Defense, was asked in his confirmation hearing before the United States Senate, whether he saw any conflict of interest that might arise because of his association with General Motors. He responded, "for years I thought what was good for our country was good for General Motors, and vice versa." More recently, Henry Paulson, Secretary of the Treasury from 2006 to 2009 and former CEO of Goldman Sachs, bailed out a failing Goldman Sachs in 2008, claiming it was in the nation's interest to do so. That same year, Goldman Sachs competitor Lehman Brothers was denied similar government support and went bankrupt. We can speculate on how that series of events might have been different had the Treasury Secretary been a former Lehman Brothers CEO rather than the former CEO of Goldman Sachs. Self-aware individuals tend to see social interests through the lens of their own personal interests.

Consider another example, somewhat far afield from politics and government: sports fans. People might be interested in the outcomes of sporting events for their entertainment value, but sports fans are emotionally involved with their teams' performances. They are happy when their teams win and depressed when they lose. Behaviorally, a hometown victory will lead to more spending in local shops and restaurants, indicating a behavioral change that would not seem to be predicted by neoclassical utility theory. Why should people's consumption choices be affected by the outcomes of sporting events?

People might have a financial stake in an outcome if they bet on their team, but even here, fans will bet on their own teams, and refuse to bet on rivals, because of their self-awareness as fans of a particular team. They may make the conscious choice to make a bet they think is likely to lose, because they are emotionally invested. This type of behavior has not made its way into the academic analysis in economics and political science, but it is consistent with Hayek's (1952) description of the sensory order.

Butos and McQuade (2023, p. 31) summarize Hayek's theory of the sensory order, saying "Hayek describes the basic structure of the brain as a network of components, physically connected, that interact via the transmission of electrical impulses. … Each neuron is connected to many others… and new connections can be established or existing ones eliminated." Butos and McQuade (2023, p. 32) continue: "The physical changes in neurons and their connections implement a form of learning in which the system adapts to its environment." This restructuring of thought patterns forms the basis for individuals to make conscious choices, and the incorporation of past experiences in the remapping of neural connections opens the opportunity for self-awareness.

Marsh (2010, p. 126) says "Hayek's conception is … a model that allows us to go beyond our immediate environments to a past through memory, habit and tradition and forward through planning and imagination, neither requiring the direction from paradigmatic cognitive states such as beliefs and desires." For present purposes, an emphasis on planning and imagination contrasts conscious choice with a mechanical cause and effect depiction of human action. Marsh (2010, p. 126) notes that the concept of tacit knowledge,

which can be used only by the people who possess it, arises because of the ability of individuals to make conscious choices.

McFadden (2006) notes that much human activity—even complex activity—is undertaken without self-awareness. The complex actions of one's immune system, for example, occur unconsciously, and even a complex activity like driving a car might be done unconsciously as the driver's conscious thoughts drift elsewhere. But, McFadden (2006, p. 387) notes, we observe "the strictly human activities, like use of language—to be accompanied by awareness." Self-awareness is a key characteristic of consciousness.

As earlier noted, Hayek (1952, p. 193) observes that "It may be noted in passing that these considerations also have some bearing on the age-old controversy about 'freedom of will.'" The discussion in this section suggests the connection between consciousness and the ability of individuals to make creative choices when opportunities arise, rather than referring to stable utility functions that embody their preferences. The evolving nature of thought processes within the brain makes every person a unique individual. Hayek's (1952) theory of the mind is consistent with self-aware individuals making conscious choices.

D. THEORIES OF BEHAVIOR AND SOCIAL EVOLUTION

One alternative to depicting individuals as conscious entities who act creatively and have the capacity to make different decisions when confronted with the same circumstances—to "think outside the box," to make use of an overused phrase—is neoclassical utility theory. People have stable well-defined utility functions that meet the neoclassical assumptions, which yields predictable behavior. Neoclassical utility maximizers do not think outside the box.

To gain some insight into the way that conscious choice shapes institutional constraints, consider the cooperative societies of ants and bees, whose members work together for their mutual benefit. Their actions appear to conform with neoclassical utility theory, as Tullock (1971, 1994) observes, but few would classify them as making conscious choices.[3] One difference between these insect societies and human societies is that within human societies there is a constant competition among individuals to alter institutional constraints to gain power over one another. This is a manifestation of self-aware behavior and conscious choice.

Another difference between human societies and insect societies is that human societies exhibit progress. Progress generated through the spontaneous order of the market has been especially evident since the beginning of the Industrial Revolution, and a comparison of conditions in ancient Rome compared to hunter-gatherer societies shows that progress has been occurring for thousands of years. Meanwhile, insect societies evolve only through biological evolution.[4] This difference between the societies of ants and humans is due to human self-awareness and the ability to make conscious choices. They are entrepreneurial in the Kirznerian (1973) sense that they can recognize and act on opportunities that have previously gone unnoticed. When societies are composed of conscious and self-aware individuals, social evolution can occur without biological evolution. Ant societies have functioned the same way for thousands of years. Human societies are constantly evolving.

McFadden (2006) notes that while there are evolutionary advantages to developing conscious choice for some activities, that is not true of all activities (such as regulating one's heartbeat, or immune responses to diseases). So, natural selection would amplify the development consciousness for some purposes but suppress it for others. When trying to evade predators or searching for food, one does better by not making conscious choices for some things—for example, one's heart rate—to devote full conscious attention to others.

One evolutionary advantage of consciousness is that it enables individuals to engage in creative and entrepreneurial behavior, which drives economic and social progress. It allows social evolution to occur more rapidly than biological evolution. But this same self-awareness drives individuals to seek power over others for their own benefit. Faced with a prisoners' dilemma situation, people may place their interests above the

cooperative interest of all, and even tend to see their personal interests as corresponding with the public interest.

E. THE INSTITUTIONAL DILEMMA

For centuries, the focus of social science on the design of institutions has been on the prisoners' dilemma nature of social interaction. In many cases, individuals following their own narrow interests end up producing a social outcome that is worse for everyone. This idea goes back at least to Hobbes (1651), who argued that there is a social contract which obligates everyone to abide by the government's rules to create an orderly society. Otherwise, the result is anarchy, which produces a war of all against all. The idea here is that rather than following their narrow self-interests, people could agree to be bound by such a social contract, which would improve everyone's well-being.

Twentieth century social contractarians such as Rawls (1971) and Buchanan (1975) build on those ideas to discuss what type of institutional arrangements people would hypothetically agree with to create an orderly society. This idea leans heavily on the concept of agreement: that everyone would agree to rules that would allow them to escape the prisoners' dilemma situation and produce an orderly society. One difficult question in this framework is discovering what would be the terms of this social contract. What constraints would everyone find in their own interests to abide by, assuming that all others faced the same constraints? This question will be set aside to focus on the next question: Even if a set of institutions could be developed that would allow people to escape that prisoners' dilemma, would people actually agree to it?

This question is reasonable precisely because institutions of governance are designed to overcome a prisoners' dilemma situation. In a prisoners' dilemma, everyone has an individual incentive to decline to agree regardless of the choices of others. The authoritarian response is to force everyone to abide by a certain set of institutional constraints for the good of everyone. By forcing people to act cooperatively, they escape the prisoners' dilemma situation.

The problem with this authoritarian solution is that someone must have the authority to actually enforce it. The enforcer has the same incentive as everyone else: to opt out even when enforcing those institutional constraints on others. As Holcombe (2021) has explained, the requirement of enforcement divides a society into an elite group of enforcers, and the masses upon whom the rules are being enforced. The elite do not face the same constraints as the masses.

This distinction between elites and masses has a long history in the social sciences. To note one example which is particularly relevant to the design of institutional constraints, Mills (1956, p. 3) observes that "The powers of ordinary men are circumscribed by the everyday worlds in which they live … But not all men are in this sense ordinary. As the means of information and of power are centralized, some men come to occupy positions in American society from which they can look down upon, so to speak, and by their decisions mightily affect, the everyday worlds of ordinary men and women." Members of the elite benefit from being able to make the rules to which the masses must conform. They do not want to be bound by that social contract; they want to design it and enforce its terms on others.[5]

This observation applies to more than just the elite. The prisoners' dilemma framework shows why even if it is in everyone's interest to agree to a cooperative solution, everyone has an incentive not to agree. The reason is that there are many possible institutional structures that could produce an orderly society, and everyone wants the one that is best for them. Consider a contract curve within an Edgeworth box diagram. Efficiency means being on that contract curve, but there are an infinite number of different outcomes on that curve. This is one area in which insect societies appear to have an advantage over human societies. Individual insects are not self-aware, and each acts according to the cooperative solution in a prisoners' dilemma setting. They act as if they were behind a Rawlsian veil of ignorance.

"Rational" individuals in insect societies "agree" to act cooperatively, "maximizing their utility," whereas in human societies, self-aware individuals can consciously choose to defect from the cooperative option, which appears to be the better choice for themselves, although suboptimal for the greater society.

One difference between ants and humans is that humans are self-aware and make conscious choices. This thought experiment—the differences between insect and human societies—helps demonstrate the difference between standard economic assumptions about human behavior and the implications of recognizing that humans make conscious choices.

F. CONSCIOUS CHOICE AND SPONTANEOUS ORDER

Hayek (1952) draws a parallel between the way the mind evolves to organize thoughts to understand the environment it senses and the way societies spontaneously evolve to create an order that is the result of the individual plans of members of society, but without any overall plan for its organization. Butos and McQuade (2023, p. 8) say that "Hayek's cognitive theory as set out in *The Sensory Order* provides an explanation for the relationship between two distinct orders—the subjective order produced by the mind of the individual and the objective order external to, but sensed by, the individual."

Butos and McQuade extend Hayek's ideas and apply them to a wide range of social organizations. This idea of unplanned order has obvious application to markets, as Hayek (1945) described. Butos and McQuade apply this idea to the evolution of scientific ideas and government structures. If markets can be viewed as discovery procedures, as Hayek (2002) does, it is a small step to view scientific inquiry the same way, as a mechanism for advancing knowledge. Butos and McQuade (2023, p. 107) also see the emergent order in government, noting that "among government bureaucracies there is exhibited a wide range of adaptive responses to their environment and the constraints it imposes on them."[6]

The Austrian school's analysis of emergent order has tended to take constraints on individual behavior—both physical constraints and institutional constraints—as given and has analyzed the way individuals have interacted within those constraints to produce an orderly outcome. Even with regard to collective action, Butos and McQuade (2023, p. 98) say "The problem then becomes to examine how groups of individuals faced with making a 'group choice' will tend to react under different institutional arrangements." Because institutions are humanly devised, rather than assuming, or even observing, institutional arrangements, an analysis of social order should extend to explaining how institutional arrangements are designed.

G. CONSCIOUS CHOICE AND INSTITUTIONAL CONSTRAINTS

A Hayekian approach to analyzing the social order focuses on how spontaneous orders can emerge without any overall plan, as a result of the interactions of individuals who make their own plans. People act within the constraints they face to accomplish the ends they seek. But institutional constraints are humanly devised, so a complete understanding of a social order requires understanding of how human interaction shapes those institutional constraints. Hayek recognized the importance of these institutional constraints. Butos and McQuade (2023, p. 19) say "Hayek argued that achieving the benefits of spontaneous order required rules of conduct regarding social interactions (e.g., rules of property and contract) and rules governing the relationship between individuals and government." How are those rules of conduct devised?

Butos and McQuade (2023, p. 19) go on to report Hayek's optimism on these rules, saying "Hayek (1960, p. 63) claimed that 'better rules of conduct' will prevail by displacing inferior sets of rules and by sustaining larger populations." There are reasons to question this optimism. One is the simple observation that oppressive and unproductive institutional structures seem to constantly arise all over the globe. Relatively productive institutions in twentieth century Venezuela have given way to oppressive institutions in the twenty-first. Meanwhile, the institutional oppression of North Korea exists beside the free and productive institutional structure in South Korea. The Soviet Union, created in 1917, broke up in 1991, and despite the optimistic predictions in the 1990s became Putin's Russia in the twenty-first century.

While examples could continue, some insight into why Hayek's optimism is open to question goes back to the fact that institutions are designed through the conscious choices of self-aware individuals who tend to see the collective interest as congruent with their own. Indeed, Hayek (1944, ch. 10) explained why

political institutions tend to enable the worst to get on top. The political institutions Hayek saw as necessary for a liberal order—protection of property rights and enforcement of contracts—require an enforcement mechanism, and those who have the power of enforcement are in a position to use that power to dictate an institutional structure advantageous to themselves.

Unlike citizens behind a Rawlsian veil of ignorance, self-aware individuals commonly make conscious choices with the goal of gaining power over others. Galbraith (1983, p. 10) says, "In all societies, from the most primitive to the ostensibly most civilized, the exercise of power is profoundly enjoyed. … power is pursued not only for the service it renders to personal interests, values, or social perceptions, but also for its own sake, for the emotional and material rewards inherent in its possession and exercise." Bertrand Russell, in his Nobel lecture (1950) compares the acquisitiveness of neoclassical utility theory with the aspirations of self-aware individuals, saying "The world would be a happier place than it is if acquisitiveness were always stronger than rivalry. But in fact, a great many men will cheerfully face impoverishment if they can thereby secure complete ruin for their rivals."

Butos and McQuade (2023, p. 99) incorporate this idea, conjecturing that "government is successful because, first, it provides clear and viable opportunities for the pursuit of happiness of internal participants (whether that be power, prestige, or wealth, or the promotion of social ends thought worthwhile); second, it is an arrangement which is capable of sensing (and even anticipating) and reacting adaptively to certain features of its environment; and third, its product is such that, over time, it at least partially conditions the feedback from the environment toward favoring the system's sustainability and growth of effective authority." Governmental institutions are designed through the conscious choices of self-aware individuals who have the power to impose those institutions on the masses.

Butos and McQuade (2023, ch. 8) go on to discuss the way governmental institutions evolve as a result of the decentralized actions of those involved: legislators, bureaucrats, interest groups, and others. There is, in this sense, an emergent order in governmental institutions, as Wagner (2007) has noted, but that order emerges within a planned order that is designed by those who have the power to impose their rules on the masses. Butos and McQuade (2023, p. 102) note that when social problems surface, government's "disposition to deal with the crisis not only by expanding its scale but also by widening the scope of its activities is enhanced, and legislation enacted following such a disposition results in increasing legislative authority over aspects of society not previously subject to it." They are observing the effects of the conscious choices of self-aware individuals who have both the desire and the ability to gain more power over others.

Institutional constraints are not designed by the cooperative behavior of individuals who are seeking ways of escaping a prisoners' dilemma situation. Some individuals have the power to design those institutions that impose constraints on the masses. While there are elements of spontaneous development in all institutions, their general framework is imposed from the top down, by force. Those institutions are the product of the conscious choices of self-aware individuals.

This paper has laid out a framework for analysis that can be used to understand why particular institutional constraints exist to shape social orders. Why did some societies impose class systems such as slavery, castes, and royalty, while others are more egalitarian? Why do the political elite impose institutional constraints that are obviously socially suboptimal? Surely Nicolas Maduro recognizes that the institutional changes implemented from the top down in Venezuela since the beginning of the twenty-first century have been counterproductive. They are the result of the conscious choices he and others in the Venezuelan power elite have made. The recognition that these institutional structures are the result of the conscious choices of self-aware individuals lays a foundation for better understanding the nature of social orders.

H. CONCLUSION

This paper has attempted to draw a connection between Hayek's ideas on social organization, as described by Butos and McQuade (2023) and theories of conscious behavior. One challenge is that consciousness has been the subject of inquiry in multiple disciplines—primarily philosophy, biology, and psychology—and there has been no consensus on what consciousness is, even within those individual disciplines. The hope is that economics can lend some insight into the nature of consciousness, and that the concept of conscious choice can offer a more complete depiction of social behavior.

The understanding of emergent social orders—the idea that orderly and productive institutions can arise as the result of human action but not of human design—has been one of the preeminent accomplishments of social science. Hayek has been a leading figure in this area of inquiry. His contributions, and those of Austrian school scholars more generally, have analyzed the way that individuals, faced with institutional and other constraints, develop ways of interacting for their mutual benefit. This paper steps back to look at how those institutional constraints—largely the result of human design—have evolved, and the role that people's conscious choices play in their design.

The role of conscious choice in social evolution draws a connection between the very open-ended study of consciousness and economic analysis of individual behavior. The emergence of consciousness has evolutionary advantages to those who have it. Economic progress is the result of the conscious choices of self-aware individuals. More generally, the institutional structure that governs the way individuals interact with each other has largely been constructed by self-aware individuals who negotiate with others, creatively looking for ways to tilt the rules in their favor. The entrepreneurship that has driven economic progress is possible only because people are self-aware and make conscious choices. That is the difference between the static social orders of ants and the continually evolving social orders in human societies.

The self-awareness that leads individuals to cooperative and mutually advantageous interactions when they act within institutional constraints has the potential to work against cooperative behavior when people design those institutional constraints. Institutions, as constraints on people's behavior, must be enforced to be effective. Some individuals impose those institutional constraints by force on others, and those self-aware individuals who have the ability to marshal that force to design and impose institutional constraints on others have an incentive to do so in ways that benefit themselves.

Commenting on the idea of emergent social orders, Butos and McQuade (2023, p. 170) say "One major lacuna seems to be the lack of a treatment of government and political systems as adaptive systems, and even authors such as Beinhocker (2006), who promote the wide applicability of a complex systems approach, tend to treat government simply as a device for making and applying (hopefully enlightened) rules." Governments do have that characteristic—they have processes that emerge without anyone planning them out—but within an overall planned superstructure that is imposed from the top down. The characteristics of that superstructure are the result of the conscious choices of self-aware individuals.

Incorporation of a theory of conscious choice into the understanding of political, social, and economic institutions can lead to a better understanding of how socially suboptimal institutions can emerge and persist. Consciousness is worth studying because, as McFadden (2006, p. 388) says, "Consciousness generates phenomena in the world. It is a cause of effects." Butos and McQuade (2023) build on Hayek's ideas to offer substantial insight into the development of social systems. The social order is an emergent order, but within a planned order of humanly devised institutional constraints. Some but not all institutional constraints are emergent; others are consciously designed. An extension of their work can incorporate the recognition of conscious choice to analyze the way that institutional constraints are designed by self-aware individuals.[7]

NOTES

1 Chalmers (1996) elaborates on the ideas in his article in the book he published the next year.

2 Chalmers does discuss the relationship between awareness and consciousness, noting that consciousness incorporates people being aware of their surroundings—things they see, hear, and feel, for example. Self-awareness is the recognition of a boundary between the self-aware individual and everything and everyone else. Hayek (1952, p. 133) equates consciousness and awareness, saying "Consciousness, in the sense in which this term is synonymous with awareness, is an attribute which attaches only to some but not all mental events."

3 In the very unsettled investigations of consciousness, panpsychism is the idea that all matter is conscious to some degree. Bruntrup and Jaskolla (2017) offer some ideas on this subject. See also Goff (2017) who defends the idea of panpsychism.

4 Hodgson (2015, ch 13) notes ambiguities in the way evolution is viewed, noting that it can refer to changes that occur from one generation to the next, or changes individuals within a generation make. Ant societies can evolve as biological evolution occurs over generations. Human societies can evolve as individuals make conscious choices to do things differently from those who came before.

5 Note that Hobbes (1651) explicitly recognized that those who enforced the social contract were in an elite category separate from those upon whom it was being enforced, in contrast to twentieth century contractarians like Rawls (1971) and Buchanan (1975).

6 Wagner (2007, 2016) has considered this idea in detail.

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Hayekian Systems: Scientific Inquiry as a Spontaneous Order

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Abstract: Scientific theories evolve in response to anomalous empirical observations, but also to integrate new experience, analogous to the way individuals develop new concepts when established ones have difficulty addressing some newly recognized aspect of reality. Hayek's construction of the sensory order explained how individuals construct subjective internal classifications to navigate external reality. Social interaction normalizes individuals' subjective concepts which are further filtered by their survival and efficiency benefits. Similarly scientific dialog, review, and experimental reproduction drive evolving scientific inquiry. Scientific theories are preferred for their simplicity and power—Ockham's razor—but also for consistency with other accepted theories—at one time consistency with religious dogma was paramount. Normally science modifies established theories to accommodate new results and progresses as basic theories are extended incrementally, increasing a theory's sophistication and complexity. However, eventually an accretion of problematic observations creates sufficient cognitive dissonance, at which point continuing to introduce further modifications becomes too cumbersome. Following Ockham's razor, scientific orthodoxy resists alternative theories unless they are simpler but offer at least the same explanatory power. Writ small at the individual level of the sensory order, we experience a conceptual epiphany when we consciously adopt more efficacious concepts. Writ large in scientific inquiry, this is a paradigm shift or scientific revolution. A new theory may be originated or proposed by an individual, but its ability to supplant a prevailing orthodoxy can only be a corporate undertaking.

1. INTRODUCTION

This paper approaches scientific inquiry from a Hayekian perspective following Butos and McQuade (2023). It considers the collective progress of scientific inquiry through the interaction of individual scientists employing their own subjective models of experience. Hayek's (1952) sensory order is an adaptive classificatory apparatus that maps internal, subjective, and revisable models of empirical reality onto the complexes of undifferentiated sensory impulses we experience directly, relating current experience to the remembered past. Similarly, scientific theories map abstract models onto the external reality they purport to describe (Campbell 1974a, p. 442; Feist 2005, p. 128).[1] Theories are evaluated, adopted, and superseded according to how well they describe and predict experimental observations and the comprehensiveness of the explanations they offer. Progress in the natural sciences suggests new experiments and generates a growing stock of observations for our theories to explain. Science filters out mistaken, disconfirmed, and less useful theories but reinforces those with the greatest predictive power and consistency.[2] Over time repeated confirmation, disconfirmation, or cognitive dissonance help refine established theories or eventually lead to their abandonment. Hayek's theory of cultural group selection (Hayek 1960, 1967, 1973) will be applied to the scientific evaluation of alternative physical theories, though the group this acts through is less the totality of society than an elite scientific priesthood.[3]

The paper is organized as follows: following this introduction, part 2 defines and discusses Hayek's distinction between intelligently designed orders (*taxes*) and spontaneously emergent, undesigned orders (*cosmi*), particularly emphasizing Hayek's construction of the spontaneously emergent sensory order (1952); then part 3 contrasts the sensory order of individual cognition with the collective enterprise of scientific inquiry considered as a spontaneous order; part 4 discusses the development of epistemology in the context of human evolution, particularly brain evolution; part 5 illustrates the theory through the evolution of scientific concepts with atomic theory presented as an example, and finally part 6 presents concluding comments.

2. *COSMOS* AND *TAXIS:* SPONTANEOUS VERSUS DESIGNED ORDER

Spontaneous order (*cosmos*) encompasses the sensory order constructed by each individual to order our experience of intrinsic reality (Hayek 1952), as well as other spontaneously-emergent, undesigned orders. Hayek's construction of the sensory order and his theory of cultural group selection consciously built on the intellectual traditions of the Scottish enlightenment (Ratnapala 2001), whose philosophers and nascent social scientists focused their inquiry on the dynamics of undesigned orders defined in the process of their emergence (Buchanan 1982). These spontaneous orders include organically evolved social institutions such as customary law (Hale 1713), government (Ferguson 1767), market organization (Smith 1776), language (Smith 1767), religion (Smith 1759; Hume 1779), and behavioral and ethical norms (Smith 1759; 1776; Hume 1777; Mandeville 1729). Spontaneous orders are not consciously designed but are selected by improving an organism's, institution's, population's, or society's contextual adaptation. Contrasting with design orders (*taxes*), spontaneous orders accommodate individual autonomy, diverse subjective experience, preferences, values, expectations, awareness, intentions, and planning.

At roughly the same time as the Scottish enlightenment was founding the social sciences, French natural historians were also applying evolutionary principles in biology, particularly Maupertuis (1745; 1751; Glass 1947; 1959), de Maillet (1748), Buffon (1749-1778), and Lamarck (1801; 1802; 1809; 1815-1822). Erasmus Darwin (1792-1796) joined Lamarck in proposing an evolutionary theory based on inheritance of acquired characteristics (Eiseley 1958, pp. 48-52). All were important precursors of modern evolutionary theory developed by Charles Darwin (1859; 1871) and Alfred Russell Wallace (1864). Although Lamarck and Erasmus Darwin mistakenly attempted to apply inheritance of acquired characteristics to biology, this form of transmission can easily describe the emergence of social phenomena (Morgan 1877, p. 390; Tylor 1881, p. 19; Opler 1965, pp. 79, 91; Bickhard & Campbell 2003), particularly Darwin's theory of social evolu-

tion presented in the *Descent of Man* (Darwin 1871) and Hayek's (1960; 1967; 1973) theory of cultural group selection. It is somewhat puzzling that Hayek failed to draw more explicitly on these evolutionary and proto-evolutionary theorists.

To accommodate the staggering diversity of empirical experience, we map categories and concepts onto external reality. Our conceptual mappings are subjective, hierarchical, overlapping, and redundant, forming a classificatory apparatus to focus awareness, memory, and sensitivity to new impressions (Campbell 1974a, pp. 422, 442). To Hayek empirical reality is primary and given rather than shaped by our perception or beliefs. The sensory order has no existence outside the mind, and remains autonomous for each individual, regardless of the extent we evaluate our concepts and expectations intersubjectively against those of others. The varieties of subjective experience naturally generate a range of alternative mappings and conceptual models (Feist 2005, p. 128). The most explanatory and adaptive of these are ultimately selected (Campbell 1974a, p. 434; 1990). Social intercourse normalizes the concepts of the sensory order, filtering alternative mappings by the extent they improve survival and reproductive opportunities (Campbell 1965, p. 30).

Like Immanuel Kant, Hayek is a representationalist, and his theory of cognition also shares notable similarities with Wittgenstein's (1921 [3.32-3.325]) theory of signs in the *Tractatus*.[4] However Hayek's account of perception is more operational and less formal than Kant's or Wittgenstein's. For example, Kant held that we perceive phenomenal reality collectively because we share common criteria of rationality as well as inhabit a common empirical reality (Kant 1781/1787, pp. A820-821/B848-849) at least one step removed from an underlying noumenal reality we cannot access or understand.[5] Kant's intersubjectivity is the same as what Hayek calls intrinsic or empirical reality. Hayek uses intersubjectivity to refer to subjective perceptions compared and validated through social norming. Neither Kant nor Hayek consider social norming as any guarantee of objective truth. In Hayek's view intersubjectivity can be mistaken because each participant remains fallible. Even the cooperative scientific enterprise is not infallible and cannot claim ontologic finality. In contrast Kant's view is that concepts are universal and objective, since given the same information, any rational person would reach the same conclusions and arrive at the same concepts:

> truth depends upon agreement with the object, and in respect of it the judgments of each and every understanding must therefore be in agreement with each other (*consentientia uni tertio, consentiunt inter se*[6]). The criterion whereby we decide whether our holding a thing to be true is conviction or mere persuasion is therefore external, namely, the possibility of communicating it and of finding it to be valid for all human reason. For there is then at least a presumption that the ground of the agreement of all judgments with each other, notwithstanding the differing characters of individuals, rests upon the common ground, namely, upon the object, and that it is for this reason that they are all in agreement with the object the truth of the judgment being thereby proved (Kant 1781/1787, pp. A820-821/B848-849).

Because Kant sees cognition as a collective process applying universal rules to common subjects, Kant's theory of concept formation applies to scientific theories. These also apply universally and are invariant across individuals because they reflect the common intrinsic (phenomenal) reality:

> The *possibility of experience* is, then, what gives objective reality to all our *a priori* modes of knowledge. Experience, however, rests on the synthetic unity of appearances, that is, on a synthesis according to concepts of an object of appearances in general. Apart from such synthesis it would not be knowledge, but a rhapsody of perceptions that would not fit into any context according to rules of a completely interconnected (possible) consciousness, and so would not conform to the transcendental and necessary unity of apperception. Experience depends, therefore, upon *a priori* principles of its form, that is, upon universal rules of unity in the synthesis of appearances (Kant 1781/1787, pp. A156-157/B195-196).

Only after we amass sufficient experience can we conceptualize abstract properties common to these sets of percepts. Human epistemology advances from the initial stage of basic phenomenal experience where we are unable to hypothesize similarities among individual percepts to advanced stages of testing abstract categories against the percepts they classify and differentiate. We impose this subjective structure on phenomenal experience prior to developing any understanding of what we are perceiving (Campbell 1974a, p. 442), a property Hayek (1969) calls *the primacy of the abstract*.

Experience and memory require us to construct *tentative* concepts to map onto reality (Campbell 1974a, pp. 420, 442). We construct these mappings by isolating observed properties (e.g., large/small, near/far, hard/soft, warm/cold, etc.) and identifying similarities (Feist 2005, p. 128). Sensory impulses become meaningful only after we categorize them with abstract concepts. Concepts thus constitute tentative hypotheses about reality which we continuously revise to accommodate subsequent experience, which may confirm or disconfirm our tentative working concepts. The meaning of concepts is inherently subjective because everyone's experience and the concepts we adopt are at least potentially unique, with a meaning that evolves as we gain experience:

> Every sensory experience of an event in the external world is therefore likely to possess 'attributes' (or to be in a manner distinguished from other sensory events) to which no similar attributes of the external events correspond. These 'attributes' are the significance which the organism has learnt to assign to a class of events on the basis of the past associations of events of this class with certain other classes of events. It is only in so far as the nervous system has learnt thus to treat a particular stimulus as a member of a certain class of events, determined by the connexions which all the corresponding impulses possess with the same impulses representing other classes of events, that an event can be perceived at all, i.e., that it can obtain a distinct position in the system of sensory qualities (Hayek 1952, p. 166 [8.6]).

Scientific concepts differ only in that they result from a cooperative enterprise which relies on colleagues to define problems, propose theories and experiments, reproduce and extend experiments and observations, etc. Scientific theories are always constructed in the context of an accepted scientific orthodoxy:

> Sense experience therefore presupposes the existence of a sort of accumulated 'knowledge,' of an acquired order of the sensory impulses based on their past co-occurrence; and this knowledge, although based on (pre-sensory) experience, can never be contradicted by sense experiences and will determine the forms of such experiences which are possible (Hayek 1952, pp. 166-167 [8.7-8.8]).

Hayek holds that we organize sensory data through summaries of selected memories before we can understand subsequent experience as it unfolds (Hayek 1952, pp. 165-167 [8.3-8.8]). Scientific theories are constructed to provide this context for subsequent experimental results and empirical observations:

> According to our theory, the characteristic attributes of the sensory qualities, or the classes into which different events are placed in the process of perception, are not attributes which are possessed by these events and which are in some manner 'communicated' to the mind; they are regarded as consisting entirely in the 'differentiating' responses of the organism by which the qualitative classification or order of these events is created; and it is contended that this classification is based on the connexions created in the nervous system by past linkages. Every sensation, even the 'purest', must therefore be regarded as an interpretation of an event in the light of the past experience of the individual or the species.

> The process of experience thus does not begin with sensations or perceptions, but necessarily precedes them: it operates on physiological events and arranges them into a structure or order which becomes the basis of their 'mental' significance; and the distinction between the sensory qualities, in terms of which alone the conscious mind can learn about anything in the external world, is the result of such pre-sensory experience. We may express this also by stating that experience is not a function of mind or consciousness, but that mind and consciousness are rather products of experience (Hayek 1952, p. 166 [8.4-8.5]).

Tentative relationships hypothesized among simple sensory data and complex aggregates are tested against experience (Hayek 1952, p. 143 [6.38]; Campbell 1974a, p. 420). When we encounter something incompatible with previously adopted concepts, we often preserve the outmoded concepts by nesting them in more sophisticated ones that accommodate new experience (Hayek 1952, p. 145 [6.45]). This behavioral sequence of building revised concepts on a foundation of inadequate, abandoned concepts and categories imposes path dependence (Campbell 1974a, p. 434). Even in the social sciences where researchers stubbornly cleave to established orthodoxies in the face of repeated disconfirmation (Yeager 1997), repeated failures of explanatory and predictive power of must prove fatal. This seems to be a particular weakness of economics because in practice its subject matter can be somewhat removed from either sensory experience or intrinsic reality and can devolve into an exercise in justifying policy maker preferences. Lakatos (1978) notes that when empirical tests fail to confirm established theory, often the first response is to question the data rather than the theory. This tendency to save appearances at all costs seems especially strong in economics (Kohn 2004). Similarly, what Kuhn (1962) calls normal science progresses through incremental changes made in response to disconfirming results which cannot be accommodated well by the original theories. Over time cognitive dissonance accumulates and when the theory eventually becomes so overcomplicated with ad hoc adjustments and quirky auxiliary hypotheses, the scientific establishment will eventually prefer a simpler alternative as long as explanatory power is not sacrificed.

Meaning resides in individuals, though it evolves intersubjectively. We validate subjective concepts and understanding against empirical reality, but also through social intercourse (Campbell 1965, p. 30; Scheall 2024). This is particularly true for scientific concepts and theories claiming universal applicability. The modern peer review process attempts to formalize intersubjective normalization for scientific research, however imperfectly (Butos and McQuade 2023, pp. 74-78). Kant viewed concept formation as an inherently deterministic process that was naturally normed by the intrinsic properties of underlying phenomenal percepts (Kant 1781/1787, pp. A156-157/B195-196, A707/B735). Kant's model of routine human concept formation is more prescriptive and superficially "scientific" than Hayek's operational, descriptive approach. Because Kant's *categories of the understanding*—space, time, and causality—are the same for everyone, in his view there can be no subjective perceptions. Kant holds that concepts are universal without regard to differences in individual experience, and this applies to concepts in general, rather than exclusively to scientific concepts.

Scientific theories are selected and refined first by comparing their predictions with the intrinsic reality we construct them to map onto, and second by the intersubjective social norming of dialog and peer review with other scientists (Campbell 1974a, pp. 434, 442; 1990). Both are at least analogous to natural selection, though unlike natural selection, this process may transmit acquired characteristics as originally proposed by Erasmus Darwin (1792-1796) and Lamarck (1802, 1809, 1815-1822). In contrast with Kant, Hayek accepts that concepts can and do differ across individuals, though like Kant he holds that we do not perceive reality directly, but only through the ordered mappings we construct. In further contrast with Hayek, Kant rejects what he calls transcendental realism, holding instead that space and time have no reality apart from our perceiving them (Kant 1781/1787, pp. A369, 491/B519). Hayek also rejects Kant's doctrine of noumenal reality.

However, Hayek's distinction between intrinsic reality and our subjective sensory order becomes very much like Kant's distinction between the phenomenal and noumenal realms. To Hayek, everyday perception relates exclusively to the phenomenal world, which consists of experimental mappings onto the underlying reality. The richer and more diverse our phenomenal experience, the better, but the resulting conceptual mappings are essentially subjective and unique (Feist 2005, p. 128). Experience enables us to construct concepts which enable us to interpret and navigate it. Memory determines how we interpret subsequent experience as it unfolds, Hayek's (1969) primacy of the abstract[7]. Scientific knowledge evolves spontaneously, even when this evolution proceeds through the paradigm shift of a scientific revolution. The "truths" of any scientific discipline are never final but always tentative and contextual (Hayek 1945), thus being subjective in precisely the same way as an individual's concepts (Campbell 1974a, p. 420).

3. SCIENTIFIC INQUIRY COMPARED WITH THE SENSORY ORDER

Concepts are embedded in a constellation of auxiliary hypotheses which we can never articulate explicitly (Duhem 1906; Quine 1951).[8] Disconfirmation can demonstrate that a previously accepted theory was wrong in some particular but cannot definitively tell us which part has failed. In revising disconfirmed beliefs, we must be guided by the interpretive apparatus of the sensory order. Ockham's razor selects the simplest theory with a given explanatory power. According to Popper, every extension of scientific knowledge starts with a provisional attempt to frame a problem for solution (Frederick 2019). Scientific problems should be rigorously defined in terms of current understanding, though often the way problems are defined is contextual, changes as science advances, and will exhibit the entrepreneurial awareness of the theorist (Bickhard and Campbell 2003, p. 226). Scientific problems can be contradictions in an accepted orthodoxy, divergent predictions from two competing or overlapping theories, empirical observations which disconfirm a theory, etc. New theories attempt to reconcile empirical observations by modifying established theories. Scientific knowledge also advances by applying Ockham's razor by supplanting theories requiring greater detail to explain less of experienced reality, in favor of less detailed theories that explain more with less (Popper 1983, p. 8).

Popper views scientific progress as a process of constructing new concepts that better describe an emerging empirical reality. Scientific explanations should solve the problems they are designed to address and may solve additional ones (Popper 1957, pp. 132-134). Simpler scientific theories are preferred, but so are those that have more implications (1963, pp. 217, 219-20, 241-42) and are sufficiently interesting (Popper 1963, p. 222). A scientific theory is preferred if it is simpler than alternatives with the same explanatory power (Popper 1957, p. 139; 1963, p. 241), or if it corrects empirical deficiencies or revealed inconsistencies in accepted theories (Popper 1957, pp. 139-145). Scientific theories should be tested, verified, and when disconfirmed, modified or abandoned (Popper 1935; 1959, p. 108; Campbell 1973). Popper (1934) aimed at constructing a unified theory of knowledge (Wächtershäuser 1987, p. 121) where scientific meaning evolves through falsification. Verification, i.e. failed falsification, passively confirms the sensory order at any point in time; successful falsification calls for the more exceptional act of revising the sensory order by recognizing when particular hypothesized mappings are wrong or unhelpful. This informs the construction of alternative hypotheses that accommodate all known data.

Falsification neither selects precisely which beliefs must be revised, nor the manner of their revision. New theories may add supplementary hypotheses to explain falsifying data, and will be preferred if they are simpler, accord better with observed experience, or explain more observed phenomena (Popper 1994, pp. 40-43). Scientific theories and concepts should seek to introduce or reframe problems by extending the application/implications of accepted theories and concepts and suggest solutions for testing (Popper 1958, pp. 184, 190), in what Campbell (1973, pp. 58-59) calls mnemonically supported thought. Scientific theories and concepts can be invalidated by demonstrating that they fail to address a real problem (Popper 1958, pp. 190-92, 199-200). Theories that do not interface with intrinsic reality in the sense that they cannot potentially be falsified are metaphysical rather than scientific (Frederick 2019, pp. 49-50).

In preserving appearances in the face of problematic new experience, as an efficiency measure we seek to retain as much as possible of our existing conceptual framework according to the Duhem-Quine principle (Blachowicz 1971, p. 180; Campbell 1974b, p. 151). Only when an accretion of ad hoc revisions become sufficiently complicated and unworkable will the old framework be superseded through a scientific revolution or paradigm shift (Kuhn 1962). This occurs when the efficiency considerations of Ockham's razor override the mundane efficiency of preserving as much of the pre-existing sensory order as possible through further minor revisions that save appearances (Blachowicz 1971, p. 180; Campbell 1973):

> [I]t is always possible to find some way of evading falsification, for example, by introducing ad hoc an auxiliary hypothesis, or by changing ad hoc a definition (Popper 1934, sect. 6, Falsifiability as a Criterion of Demarcation).

Researchers evaluate experimental results in terms of prevailing scientific understanding. Just as we apply the sensory order to navigate individual experience, scientific consensus determines how we interpret empirical reality. In both situations we modify scientific theories and the sensory order to accommodate disconfirming results. When too many disconfirming results accumulate and are too dramatically at a variance with prevailing orthodoxy, a paradigm shift becomes the only way to resolve the contradiction. A simpler theory that explains more will nearly always find acceptance when it resolves a battery of problematic experimental observations (Popper 1934, sect. 19). Scientific research and engineering design applications are necessarily informed by prevailing theory. As far as possible, we accommodate disconfirming experimental results or empirical observations with ad hoc modifications to established theory. Only when a theory is sufficiently overburdened with ad hoc complications does that introduce the opportunity for a paradigm shift. This often results from the proposal and acceptance of a new theory which is ultimately judged superior due to its greater economy and greater explanatory power.

Researchers who propose a paradigm shift have to overcome an orthodoxy which has emerged over time to explain past disconfirming observations (Popper 1934, sect. 19). Accepted theory generally constitutes a path-dependent accretion of auxiliary hypotheses that accommodate the succession of disconfirming or problematic observations (Campbell 1974a, p. 434). The more complicated a scientific theory, the more burdensome its theoretic infrastructure, the less likely it can successfully address new problematic observations, and the greater the opportunity for Ockham's razor to privilege simpler theories with greater explanatory power. There will generally not be much opportunity for this kind of advance against a new theory which is still relatively simple.

> No conclusive disproof of a theory can ever be produced; for it is always possible to say that the experimental results are not reliable, or that the discrepancies which are asserted to exist between the experimental results and the theory are only apparent and that they will disappear in the advance of our understanding … If you insist on strict proof (or strict disproof) in the empirical sciences, you will never benefit from experience, and never learn from it how wrong you are (Popper 1934, sect. 9, Why Methodological Decisions Are Indispensable).

However, as will be discussed below in connection with the experimental evidence which led to modern atomic theory, Popper's view is diametrically opposed to the consensus in modern physics. Science cannot aspire to ontologic finality; scientific truths are inherently tentative and revisable (Campbell 1974a, p. 420). We can never know whether a given theory will subsequently require revision because the future observations and measurements that may compel theory revision or a scientific revolution are never knowable in advance and can only be uncovered in the fullness of time. We cannot know what empirical reality will disclose until the observations occur and become a matter of unalterable historic fact. On the level of the individual sensory order, there seems to be a systematic bias in favor of path dependency which avoids revolutionary overturning of accepted concepts, theories, and mappings (Campbell 1974a, p. 434), but when

specific individuals adopt more efficient theories and concepts, adaptive advantage follows constellations of abstractions that are less cognitively burdensome and can be better managed by the brain's actual cortices and connectivity (Blachowicz 1971, p. 180).

4. EPISTEMOLOGY IN EVOLUTION

Simple categorical groupings are based on contrasts and similarities, near v. far, hot v. cold, small v. large, wet v. dry, etc. We learn these distinctions in early childhood and apply them to address new environmental contexts with increasing sophistication as we gain experience. Experience expands our conceptual vocabularies, but most of our concepts are received as a learned cultural inheritance. Cultural group selection allows behavioral traits to be transmitted faster than biological evolution (Campbell 1975, p. 1115; Wächtershäuser 1987, p. 121). Scientific inquiry and philosophical reasoning also evolve in sophistication through memory, literature, and cultural institutions (Campbell 1965, p. 44-45; Popper 1987, pp. 151-152). Formal logic should be contrasted strongly with the operational epistemology of less formal heuristics. Concepts must have cognitive efficacy for the individuals who adopt them (Chomsky 1957, 1964, 1965) but they can only be adopted by others to the extent they offer communicative efficacy. Concepts migrate when groups interact and adopt the concepts they find useful even though they originated in other societies. English is particularly acquisitive in this regard.

Darwin's description of natural selection can be applied directly to the variations among each individuals' spontaneous order (James 1880, p. 457; Campbell 1974b; 1990), which provide a range of survival and reproductive benefits, as well as to the competitive environment which selects some concepts, institutions, behavioral rules, etc., while disadvantaging others:

> It may metaphorically be said that natural selection is daily and hourly scrutinizing, throughout the world, the slightest variations; rejecting those that are bad, preserving and adding up all that are good; silently and insensibly working, *whenever and wherever opportunity offers*, at the improvement of each organic being in relation to its organic and inorganic conditions of life. We see nothing of these slow changes in progress, until the hand of time has marked the lapse of ages, and then so imperfect is our view into long past geological ages, that we see only that the forms of life are now different from what they formerly were (Darwin 1871, p. 63).

Darwin's position here applies equally well to the evolution of concepts comprising an individual's sensory order as to species brain evolution. Innovations are always experimental, and many must fail, though their even their failure always generates useful knowledge[9]. Spontaneous evolution also proceeds gradually:

> As natural selection acts solely by accumulating slight, successive, favourable variations, it can produce no great or sudden modifications; it can act only by short and slow steps. Hence, the canon of "Natura non facit saltum," ("Nature makes no abrupt changes,") which every fresh addition to our knowledge tends to confirm, is on this theory intelligible. We can see why throughout nature the same general end is gained by an almost infinite diversity of means, for every peculiarity when once acquired is long inherited, and structures already modified in many different ways have to be adapted for the same general purpose. We can, in short, see why nature is prodigal in variety, though niggard in innovation (Darwin 1871, p. 429).

The sensory order evolves to a grosser extent over the life of the individual, though this change is only the cumulative effect of day-to-day classificatory adaptations necessitated by and responding to experience as it unfolds.

Natural selection requires genetic variation (Campbell 1974), but cultural group selection can act in the absence of genetic transmission—it is the selection of behavior and institutions which are socially adaptive,

provide survival and reproductive benefits that perpetuate the societies which manifest them. These cultural factors need not be passed on through exclusively family relationships but can be passed on through imitation or emulation within a given society, and can be imitated or emulated by other social groups, again without genetic transmission (Campbell 1965, p. 41; Wächtershäuser 1987, p. 137). Darwin devotes chapter seven of the *Origin of the Species* (chapter eight in later editions) to instinctual behavior:

> It will be universally admitted that instincts are as important as corporeal structure for the welfare of each species, under its present conditions of life. Under changed conditions of life, it is at least possible that slight modifications of instinct might be profitable to a species; and if it can be shown that instincts do vary ever so little, then I can see no difficulty in natural selection preserving and continually accumulating variations of instinct to any extent that may be profitable. It is thus, as I believe, that all the most complex and wonderful instincts have originated. As modifications of corporeal structure arise from, and are increased by, use or habit, and are diminished or lost by disuse, so I do not doubt it has been with instincts. But I believe that the effects of habit are of quite subordinate importance to the effects of the natural selection of what may be called accidental variations of instincts;—that is of variations produced by the same unknown causes which produce slight deviations of bodily structure (Darwin 1859, p. 209).

Though Darwin notes that "no complex instinct can possibly be produced through natural selection, except by the slow and gradual accumulation of numerous, slight, yet profitable, variations" (Darwin 1859, pp. 209-210), this does not apply to cultural group selection, which may effect dramatic change much faster (Wächtershäuser 1987, p. 137). Darwin observed that natural selection drove very gradual evolution which allowed new species to emerge gradually and differentiate themselves from their ancestors and parallel lineages one generation at a time. Given enough time the diversity this process would offer would be staggering. Poorly adapted and less flexible lineages would be bred out and go extinct, but the better adapted, more adaptable strains would persist and be strengthened in their surviving descendants.

Natural selection is driven primarily by long-term environmental factors, but nearer-term evolution occurs through adaptive sensory cognition (Wächtershäuser 1987, p. 137; Popper 1979, pp. 19-32). Darwin's study of instinctual behavior noted that domestic features emerged under the protection of human husbandry where humanity moderates natural selection. "Domestic instincts, as they may be called, are certainly far less fixed or invariable than natural instincts; but they have been acted on by far less rigorous selection, and have been transmitted for an incomparably shorter period, under less fixed conditions of life" (Darwin 1859, p. 213). This can result in the traits and adaptations achieved through natural selection to be dissipated or lost entirely: "Natural instincts are lost under domestication" (Darwin 1859, p. 215).

Darwin's analysis of the emergence and transmission of instinctual behavior prefigures Hayek's theory of cultural group selection:

> …the fact that instincts are not always absolutely perfect and are liable to mistakes;—that no instinct has been produced for the exclusive good of other animals, but that each animal takes advantage of the instincts of others;—that the canon in natural history, of "natura non facit saltum" is applicable to instincts as well as to corporeal structure, and is plainly explicable on the foregoing views, but is otherwise inexplicable,—all tend to corroborate the theory of natural selection (Darwin 1859, p. 243).

Genetic assimilation, the Baldwin effect, describes how acquired behavior is transmitted (Baldwin 1896; 1897; described by Costa in Darwin 1859, p. 209, note 1). Individuals whose learned behavior enables them to successfully adapt to rapid environmental instability survive and transmit their adaptive characteristics, instincts, and behavioral aptitudes, along with any associated genetic predispositions. These socially well-adapted exemplars display their beneficial behavior and teach it to their offspring and others. Moroni (2014,

p. 10) sees Hayek's (1988) theory of cultural group selection as resulting from two complementary arguments. Social institutions result from human action, but not human design. These are the emergent institutions (*cosmi*) Hayek contrasts with design or command orders (*taxes*). Spontaneously ordered institutions emerge from the experience of diverse individuals interacting over a long time period (Scheall 2024), contrasting with a command order which may be designed instantaneously by a single charismatic lawgiver.

The diversification of competing rules, customs, and practices results in a range of group adaptations. Competing adaptations are filtered by conditions that privilege those that enhance survival in the environments that persist or subsequently emerge, including adaptations in brain anatomy, conceptual mappings, scientific theories, institutions, behavioral norms, etc. (Campbell 1974a, p. 415). More adaptive institutions outcompete alternatives and privilege the societies that adopt them (Bickhard and Campbell 2003, p. 229). At one extreme competition may include merger and assimilation but at the other conquest and genocide. More peaceful and humane outcomes offer the benefit of preserving greater genetic diversity, automatically adapting the merged population to better resist biological stressors, pandemics, and other external challenges. Evolved tradition and institutions embody the experience and accumulated wisdom of generations of predecessors who may not be genetically related to their cultural successors (Campbell 1975, p. 1115). In Hayek's words, "most knowledge … is obtained not from immediate experience or observation, but in the continuous process of sifting a learnt tradition, which requires individual recognition and following of … traditions." Thus, "[t]radition is in some respects superior to, or 'wiser' than, human reason" (Hayek 1988, p. 75).

5. EPISTEMOLOGY AND THE EVOLUTION OF SCIENTIFIC CONCEPTS

Scientific concepts contrast with concepts individuals form drawing on direct and subjective sensory experience (Feist 2005, p. 131), even though beyond the confines of a desert island, social norming supplements our personal experience and can dominate individual concept formation (Campbell 1965, p. 30). Scientific concepts are especially general and rely on perceptual experience collected and reported by others over long time periods under controlled conditions (Scheall 2024). Empirical observations are often reported second-hand before theorists use them to alter established theories or propose new ones. Individual concept formation is autonomous but scientific concepts are selected collectively by communities of scholars, just as the underlying observations must be confirmed through reproduction by other researchers. According to Duhem (1906) and Quine (1951), scientific concepts are always embedded in an encompassing context which generally resists modification, but it is important to note that individual understanding of a scientific theory is always autonomous, contextual, and idiosyncratic, constrained by individual experience and mastery of a given paradigm.

5.1 Conceptual evolution of the atom and sub-atomic particles

In ancient times the atomic hypothesis was introduced as a metaphysical speculation of the kind positive science would ultimately exclude. Notably it did not rely on any empirical observation. The four Empedoclean elements of earth, air, fire, and water, combined to account for the observable properties of physical matter. As modern chemistry emerged from alchemy, heat was conceived of as a fluid contained in combustible substances, phlogiston, released as flame when an object burned. It sublimated invisibly out of objects as they cool and had to be added if the object was heated. Since it was observed that many substances gain mass as they burn due to the fact that the fuel is combined with oxygen, Boyle (1673) proposed that phlogiston possessed negative mass to account for this phenomenon. Only after chemists accurately accounted for the weight of the gaseous substances consumed and emitted during combustion, could they conclude that mass was conserved through the process, contributing to founding modern thermodynamics.

In nineteenth-century physics, atoms were understood to be microscopic, electrically-neutral objects composed of smaller charged particles. Kelvin (1867) had proposed that atoms consisted of inertial vortices suspended in aether, and later Thomson (1904) suggested an atomic structure with electrons suspended in a positively-charged atomic body that rotated in a vortex. The Rutherford-Geiger experiment which shot beams of alpha particles (helium nuclei) through gold foil demonstrated that the mass of the gold atoms was concentrated in the center (Geiger 1908; 1910; Geiger and Marsden 1909; 1913). If the gold atoms had the kind of uniform structure Kelvin and Thomson had hypothesized, the alpha particles would have been scattered randomly as they passed through the foil. The Rutherford-Geiger result was entirely unexpected, leading to abandonment of Thomson's plum-pudding model. A small but significant percentage of the alpha particles were reflected back by the gold atoms. The only way this could be explained was if the mass of the gold atoms was concentrated in the nucleus.

Rutherford had essentially tested one concept of the atom, and when confronted with disconfirming results, he was unable to save appearances with additional auxiliary hypotheses. His response was to construct an entirely new concept informed by empirical observation, an atom where the mass was concentrated in a positively charged nucleus, which would repel and deflect the positively charged alpha particles.

Next the Millikan experiment suspended a mist of charged mineral oil droplets in an electrical field. The fact that some droplets could be exactly balanced against gravity demonstrated that the strength of electrical repulsion was exactly balanced by the force of gravity. This enabled Millikan to measure the strength of the basic electrical charge and the mass of the electron which carries it (Millikan 1913). Somewhat surprisingly the experiment showed that positively charged protons and negatively charged electrons have equal but opposite charges, but not equal masses. The proton residing in the nucleus is far more massive than the electrons orbiting it, helping explain the concentration of atomic mass in the nucleus. The surrounding, lower-mass electrons largely account for how atoms interact with each other, e.g., covalent and ionic bonding which allows atoms to form larger molecules (Einstein 1922).

5.2 Quantum mechanics

Quantum mechanics was initially developed to account for the observation that atoms emit discrete energy as their electrons transition to lower energy states closer to the nucleus, and that only specific energy states are permissible. These discrete atomic emissions, energy packets, or quanta, are now recognized as photons, fundamental particles of light and electromagnetic energy. Quantum mechanics is probabilistic but not relativistic. The Einstein-Podolski-Rosen (1935) argument requires that either quantum mechanics is complete with no underlying hidden variables, or it must imply nonlocality, that is, quantum entanglement or what Einstein called spooky action at a distance.

Because electrons orbit around the nucleus, they should lose energy and eventually collapse into the center of the atom, perhaps combining with protons to form neutrons. If this occurred, it would spontaneously change the nucleus from one chemical element to another. Bohr (1913, 1921) proposed that the observed stability of electron orbits was due to the fact that permissible orbits must have an indefinite stability, specifically orbits for which the angular momentum was an integral multiple of Planck's constant h. Bohr suggested that the transition from one energy state to another was restricted to integral multiples of h, emitting or absorbing energy quanta with precisely co-determined wavelengths. Because electrons have to remain in phase over a closed spherical circuit around the nucleus, they remain localized at certain distances and orbital configurations.

Drawing on quantum mechanics and the Heisenberg (1927) uncertainty principle, the neo-indeterminist school proposes that at subatomic scales uncertainty ceases to be merely a consequence of the limitations of human perception but becomes a fundamental aspect of physical reality. The extreme form of this position asserts that if we cannot simultaneously determine the location and momentum of a particle, we cannot rigorously assert that the particle has both definite location and momentum (R. von Mises 1951, pp. 184-185). One way around this difficulty is the appeal to Kant's categories of the understanding—we cannot

conceive of the particle apart from its occupying some location and having some momentum, therefore it must always have definite, though generally unobservable, values of both qualities.

However, the extent the two properties are mutually indeterminate still imposes a constraint on what we can know and observe. Any measurement of a particle's momentum to an arbitrary accuracy must disturb its location, and vice-versa. Heisenberg's uncertainty principle allows us to save appearances by conceptualizing various properties of subatomic particles as being uncertain until direct observation causes a property's probability distribution to collapse, as if observing a particle in a particular location compels it to coalesce from a dispersed field. However fanciful, this interpretation accords with empirical reality.

Richard von Mises discusses the Heisenberg uncertainty principle as analogous to measuring macroscopic lengths. To measure sub-atomic distances, velocities, masses, and momenta, we use beams of very short-wavelength particles, that is, high-frequency, high-energy photons. The shorter the wavelength the more precisely the photons can measure the target particle's location, but the introduction of high-energy photons cannot help but alter the target's momentum, and the disturbance of the targets' properties is greater the lower their mass and momentum. Given the limitations of what we can demonstrate empirically with the smallest measuring sticks we can employ—high-frequency, high-energy photons—we cannot assert rigorous knowledge of both the location and momentum of a sub-atomic particle such as an electron.

The Heisenberg uncertainty principle is expressed as

$$\Delta x \Delta p \geq h/4\pi,$$

where Δx is the variation or uncertainty in location x of a particle, Δp is the uncertainty or variation in observed momentum p of the particle, and h is Planck's constant $h = 6.62607015 \times 10^{-34}$ kgm^2/sec. Popper and von Weizsäcker (1934) presented a critique of the uncertainty principle, further developed by Popper (1982, pp. 53-54). Like Ludwig von Mises, they interpret uncertainty as resulting from knowledge limitations rather than an intrinsic physical property. Ontologically, this assertion cannot be disproven empirically. It is an interpretation rather than a fact. It does not seem to have any implications for the macroscopic world even if it is accepted as governing the sub-atomic realm.

The stability of the nucleus itself was also a puzzle because the positively charged protons would naturally be expected to repel one another. The fact that nuclear protons are bound closely together at very precise lengths required the new hypothesis of an attractive strong nuclear force which operates over shorter, infra-nuclear distances to counteract the protons' electromagnetic repulsion. In fact, we observe protons repelling each other at greater distances outside the nucleus (Coulomb 1785).

As far as we have been able to detect, radioactive decay seems to be non-deterministic at the atomic level, so scientists focus on probabilistic models that describe it to an arbitrary degree of macroscopic accuracy for large numbers of particles. We are unable to predict when an individual particle or nucleus will decay, but we can predict with great precision how rapidly a mass of particles will decay, and how much of the original isotope will remain at each point in time.

To summarize, in each instance a researcher designs an experiment to confirm or explore expectations derived from a *tentatively accepted* scientific theory and constructs a revised theory to accommodate any disconfirmation. This process of scientific inquiry enables scientific orthodoxy to evolve, sometimes through revolutionary change.

6. CONCLUSION

This paper reviewed Hayek's distinction between intelligently designed orders (*taxes*) and spontaneously emergent, undesigned, emergent orders (*cosmi*), particularly distinguishing the sensory order of individual cognition disciplined by social norming from the collective enterprise of scientific inquiry (Scheall 2024). Epistemology developed inextricably with human evolution, particularly brain evolution. Hayek's theory of

cognition illustrates how scientific concepts evolve in response to verification and disconfirmation. The development of atomic theory was presented as an example.

Following Butos and McQuade (2023), scientific inquiry operates through the collective action of individual scientists employing subjective and evolving concepts and models of experience. Hayek's theory of cultural group selection (Hayek 1960; 1967; 1973) was applied to the evaluation of alternative physical theories, particularly noting that cultural group selection in scientific inquiry operates primarily through a specialized elite. Just as the sensory order maps subjective conceptual models of empirical reality onto complexes of undifferentiated sensory impulses, scientific theories map abstract models onto external reality (Campbell 1974a, p. 442; Feist 2005, p. 128). At least in the natural sciences, scientific theories are constructed and selected according to consistency with experimental observations and their explanatory power. Although progress is admittedly messier and less linear in the social sciences that examine phenomenal that are more complex and less clearly defined (Scheall 2015, 2024), in principal the process is the same, if slower and less straightforward. Each stage of scientific investigation suggests new experiments and generates new data requiring further explanations. Scientific progress proceeds by disconfirming mistaken, less useful theories and reinforcing others through verification—theories with the greatest predictive power and consistency. Over time repeated confirmation, disconfirmation, or cognitive dissonance help refine established theories or eventually lead to their abandonment.

Like scientific progress, Hayek's sensory order contributes to evolutionary advantage, and with further development and sophistication, reinforces the path-dependent process of strengthening cortical connectivity and driving brain evolution (Campbell 1974a, p. 434). As our ancestors developed larger brains, they also gained improved survival and reproductive opportunities through socialization in larger groups. Socialization promoted further development of the neocortex. Sufficient socialization leads individuals to categorize interpersonal rewards and punishments through the stylized morality of empathy, reciprocity, social hierarchy, and peacemaking (de Waal 1996; 2006). Peacemaking behavior in particular relies on sophisticated causal models which permit individuals to anticipate negative consequences and plan to overcome them. This behavior could not occur without the sensory order's flexible internal model of external reality. Literature is the most sophisticated and social use of language, engaging our moral imagination in judging fictional individuals and offering a simulated reality which enriches our experience without exposing us to actual risk (Campbell 1965, pp. 44-45; Popper 1987, pp. 151-152; see also Carroll 2004; Gottschall and Carroll 2005).

Similarly, scientific progress relies on researchers translating the implications of scientific theories into experiments to verify or disconfirm them, expanding our knowledge and perception and building on past knowledge to expand our understanding. Butos and McQuade (2017) analyze Polanyi's (1945; 1948; 1962) critique of schemes for government-sponsored central planning for scientific research and development management of science from the 1930s and 1940s. Polanyi conceptualized scientific research as the work of self-governing, spontaneously-evolving communities based on unarticulated liberal traditions which would be frustrated by central planning, however well intended or enlightened.

NOTES

1 I am particularly indebted to Roger Koppl for making me aware of this important literature.

2 This definition of scientific theory applies most directly to the natural sciences, and perhaps less clearly to the social sciences. An extreme interpretation of Yeager's (1997) thesis is that economic consensus follows the whims of policy makers. Accordingly, Kohn (2004) suggested that economic analysis from about 1950 contributed very little to our understanding of the actual economy. Even in the natural sciences, disconfirming or problematic observations generally lead researchers to question their methods of observation, experimentation, or measurement first (Lakatos 1978), and only after that approach proves fruitless, will they incrementally modify accepted theory to save appearances. Actual science will frequently be messier and more nuanced than the stylized version described here.

3 Hayek (1952b) was particularly skeptical about efforts to model the social sciences after the example of the physical sciences. Nevertheless, much of the discussion applying Hayek's construction of the sensory order applies equally well to the exploration of the social sciences' subjective and socially-constructed reality as to the natural sciences' exploration of intrinsic reality. One approach to viewing the distinction between the natural and social sciences is not based so much on approach or methodology, but on the relative complexity of the phenomena being examined, and of the models required to describe them (Scheall 2024). The natural science examples discussed in section 6 are ideally suited for explicating how we revise the sensory order in response to greater experience and disconfirmation. In the social sciences we construct equally tentative subjective models of social interaction, but the problem of the social sciences is further complicated because behavioral analysis is inherently dependent on recursive internal models of themselves. I am particularly indebted to Randall Holcombe for a helpful discussion of this essential and enduring distinction between the natural and social sciences.

4 Hayek was an enthusiastic reader of his cousin Wittgenstein's philosophical works—becoming "probably one of the first readers of *Tractatus* when it appeared in 1922. Since, like most philosophically interested people of our generation I was, like Wittgenstein, much influenced by Ernst Mach, it made a great impression on me" (Lim 2016; see also Hayek 1992/1977). Wittgenstein anticipated and may have influenced Hayek in *The Sensory Order*. Wittgenstein claims the truth of atomic propositions depends on their accurately picturing the atomic fact asserted: "the proposition is a picture of reality (4.01)....it *shows* how things stand *if* it is true (4.022)." Atomic facts purport to be empirical regularities that can only be discerned through sensory cognition, but it would call for a massed phalanx of atomic facts to support concept formation. Because Wittgenstein arrives at a theory of signs which are mapped onto reality, the similarities between the *Tractatus* and *The Sensory Order* are especially interesting. However, Wittgenstein's research programme in the *Tractatus* aims at defining an ontologic absolute rather that an operational description of the mind's inner workings. The *Tractatus*'s approach to epistemology is theoretic, contrasting strongly with Hayek's operational approach informed by contemporary psychology. Since Hayek wrote his initial draft outline of what became *The Sensory Order* in 1919-1920, and did not read the *Tractatus* until 1922, it could not have influenced Hayek's initial theory of perception, and there is no record that he showed his outline to Wittgenstein. However, most of what we now know as *The Sensory Order* was written in the late 1940s, when Hayek could very well have incorporated details of Wittgenstein's theory of signs, though he does not acknowledge Wittgenstein. Wittgenstein abandoned logical atomism after the *Tractatus*, and his later approach to perception in the *Philosophical Investigations* is often less consistently ontologic and frequently more operational (Wittgenstein 1953).

5 According to Kantian philosophy we perceive a common phenomenal reality which depends on an unobservable higher-order noumenal reality we cannot access or understand. Kant's philosophy aims at inferring the nature and properties of this otherwise inaccessible noumenal world to the limited extent possible.

6 "Any two quantities that are equal to a third are equal to each other" (transitivity).

7 Compare Hayek's (1969) primacy of the abstract with Campbell's (1974a, p. 420) discussion of Kant's categories of the understanding.

8 Duhem (1906) and Quine (1951) independently noted the difficulties present in testing a hypothesis which always depends on a battery of auxiliary assumptions or hypotheses. They concluded that unambiguous falsification of

a scientific theory is strictly impossible, in that it would always—in principle—be possible to save appearances by modifying the theory to accommodate problematic observations or experimental results. The Duhem-Quine perspective is called confirmation holism which views scientific theories as complexes of hypotheses, including at least one hypothesis and—at least several but often many—background assumptions or auxiliary hypotheses. Meaningful theories must make testable predictions about reality. Empirical observations can disconfirm a theory as a whole but often cannot pinpoint which component hypothesis or assumption has failed or been strictly disconfirmed.

9 This points to the value of language and particularly of narrative storytelling and literature. Partaking of these sophisticated cultural constructs enables individuals to broaden their experience without significant risk (Carroll 2004; Gottschall and Carroll 2005).

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Comments on Butos and McQuade

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Abstract: *Hayekian Systems: Research into the Structure of Social Interaction* by William Butos and Thomas McQuade is an important and valuable book. It synthesizes a vast and valuable literature while making independent contributions of its own. I discuss the book, given special attention to epistemic issues. I also encourage readers of this article to become readers of the book. I close by encouraging all social scientists to further develop the research program Butos and McQuade have articulated.

Butos and McQuade (2023) have successfully taken on the monumental task of unifying the analysis of social processes, including "markets, firms, money and banking systems, science communities, and governments" (p. 3), by viewing them all as "Hayekian systems." They have produced a pioneering work. Rather than dully repeat Hayekian nostrums, Butos and McQuade advance an innovative Hayekian research program. They build on Hayek to move in new directions. And they *demonstrate* how to do work within their research program. They demonstrate with penetrating analyses of markets, entrepreneurship, money and banking, legislatures, government bureaus, and science. They are showing us how it's done, and their effort should be recognized, studied, and absorbed within the social sciences.

Their look at science may be the most important of their applied studies. "We have paid particular attention to science" they note (p. 174). Their discussion (pp. 148-149) of "central planning in science" is a gem. They say, "Attempts to plan science centrally, whether overtly or indirectly by monopolization of its funding, foster an institutional framework incompatible with science as a self-ordering and self-correcting order." The core function of science is "to generate new knowledge." And, they say, "The circumstances and conditions that induce the creation of knowledge are bound up in the specific institutional arrangements that compose science and govern the sorts of interactions in which scientists engage." Science, in other words, is a social process. But "the structure of government funding of science has adverse implications for long-term stability and adaptability and therefore for the generation and use of scientific knowledge." As the tragi-comic events of the Covid pandemic illustrate all too vividly, science has become unscientific.

Butos and McQuade's startling conclusions on the epistemic efficacy of science today follow from their Hayekian systems framework. We are past due for a revival of the Society for Freedom in Science, which was founded in 1940 (Baker and Tansley 1946). Michael Polanyi, whom

Butos and McQuade cite extensively, was a founding member (McGucken 1978). Among their core principles was "Scientific life should be autonomous and not subject to outside control in the appointment of personnel or in the allocation of the funds assigned by society to science" (Baker and Tansley 1946). The Hayekian systems framework of Butos and McQuade reveals how vital "the allocation of funds" is to the life of science. And yet governmental funding decisions dominate resource allocation in science today. Should we be surprised, then, by expert failure in science?

The Hayekian social systems Butos and McQuade explore are "systems of social interaction" (p. 3) and thus dynamic. They are "adaptive, anticipatory systems with process closure" (p. 3). The two great "inspirations" for their theory are Hayek's *The Sensory Order* (1952a) and Robert Rosen's *Anticipatory Systems* (1985). Hayek's *The Sensory Order* describes a modular, flexible, and coherent system that can adapt to its environment because of its adaptive memory, which produces a continually updated classificatory model of the system's environment. Rosen and Hayek both describe adaptive systems whose responses to stimuli depend on the (ever changing) internal state of the system. This internal state is, in effect, what tells the system how to respond to stimuli. It is an adaptive model of the system's (external and internal) environment that, at least implicitly, *anticipates* the good or bad consequences of alternative behaviors of the system. Rosen helps to clarify this role of anticipation in such systems. And he adds the important notion of "process closure," which Butos and McQuade characterize as a "causal cycle" (p. 2). Cottam et al. (2000, p. 162) say, "The classic form of process closure is that of the hunger–hunt–kill–eat–satisfaction loop associated with carnivores." Certain processes unfold within the system and between the system and its environment. These processes sustain the system. And they form a kind of loop whereby the complete set of processes enables that same set of processes to be repeated so long as the external environment continues to provide a given set of external inputs, such as the animals hunted, killed, and eaten. (The idea of process closure has interesting connections to autocatalytic sets and "constraint closure," which, unfortunately, I cannot pursue here.) "*Process closure*," Collier (2000, p. 286) explains, "concerns the fact that an overall process must achieve self-reinforcement by supporting system viability and, hence, the continuing system capacity to carry out that process. If the system is to achieve overall process closure the elements of the system must interact with each other and with the environment in particular, circumscribed ways."

Butos and McQuade took inspiration from modern biology in conceiving Hayekian systems. And they celebrate "biological analogies in social theory" (p. 42). The sort of view they lay out helps prepare the way for the unification of biology and the social sciences. We are apes who share a long evolutionary history with other social animals, especially other apes. We are unique among primates, but we nevertheless share a long evolutionary history with them. Elsewhere I have said, "Evolution is a palimpsest in which new phenotypes overwrite old phenotypes without fully effacing them" (Koppl forthcoming). Thus, we have an apish disposition toward "linear dominance hierarchies" in which status is forcibly extracted from others in the group through threats and attacks and in which the status hierarchy (at least within a sex) is a strict linear order (Chase et al. 2002, Butovskaya 2020). But, uniquely among primates, we also have a disposition toward reverse dominance hierarchies wherein a coalition of lower status humans acts in a coordinated manner to limit the power of the highest status males (Boehm 1993, 1999, 2020).

Trade is another phenotype unique to our species. *Homo sapiens* engage in *quid pro quo* exchange, which other creatures do not. Other species have a kind of gift exchange wherein the reciprocation is indeterminate at the time of the initial transfer of value (McGrew and Feistner 1992). But, as Adam Smith (WN I.ii.3) observed, "Nobody ever saw one animal by its gestures and natural cries signify to another, this is mine, that yours; I am willing to give this for that." That sort of *quid pro quo* exchange, in which no value is transferred until the reciprocal transfer is agreed upon, is *contractual* exchange. Adam Smith (WN I.ii.3) identified the form of all contractual or quid-pro-quo exchanges. "Give me that which I want, and you shall have this which you want." Long-distance exchange must have been contractual because the opportunities of reciprocation would have been limited and uncertain, thus obliging the trading partners to agree on quid and quo ex ante. Brooks et al. (2018) discuss evidence of long-distance exchange occurring at least 300,000 years ago. Evolutionary time has passed since then, suggesting that contractual exchange may be

in some degree a biological adaptation shaped by natural selection. (See Koppl et al. 2023, pp. 39-40 for a lengthier discussion of the evidence for early contractual exchange.)

Knowledge is the great leitmotif of *Hayekian Systems*. Butos and McQuade tell us that a Hayekian system is "an *epistemic* system, a system capable of building within it some relevant knowledge of its environment, and capable of employing that knowledge within the system . . . to anticipate environmental effects and thereby to successfully adapt to them" (p. 42, emphasis added). They laud "epistemology treated as a natural science" and say that the "Hayekian research program should be viewed as a scientific project about knowledge" (p. 24). The word "knowledge" when used by Hayek and by Butos and McQuade has a nontraditional meaning. It does not mean "justified true belief." Hayek (1945, p. 519) speaks of "contradictory knowledge," which is impossible in standard epistemologies. Butos and McQuade boldly propose that the word "knowledge" be used to "refer to the classification produced as a side-effect of the adaptation to its environment by any adaptive system." If "knowledge" is generated by *any* adaptive system, it applies beyond our species and perhaps even beyond the realm of biological life. It is to this broad notion of knowledge that I now turn.

Hayek said, "The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess" (1945, p. 519). And, "the concrete knowledge which guides the action of any group of people never exists as a consistent and coherent body. It only exists in the dispersed, incomplete, and inconsistent form in which it appears in many individual minds, and this dispersion and imperfection of all knowledge is one of the basic facts from which the social sciences have to start" (1952b, pp. 29-30). Because the "knowledge" of Hayek's "knowledge problem" is "concrete knowledge" it may be "contradictory." What one person "knows" may contradict what another person "knows." The possibility of contradictory knowledge implies that in Hayek's sense of the word "know" you *can* know what ain't so. Scott Scheall (2016) rightly insists that Hayek's conception of "knowledge" is "nonstandard." He cites Hayek's (1969, p. 41) claim that "'knowledge' of the external world . . . consists in the action patterns which the stimuli tend to evoke."[1]

There seems to be no harm in using the word "knowledge" for the sort of concrete knowledge of circumstances that Hayek emphasized. We might wish to speak of "belief" for such cases and preserve the word "knowledge" for something more "scientific," "justified," or otherwise fancy. If we call Hayekian knowledge "belief," however, we may overlook or undervalue the objective grounds for it. This risk is compounded by the sense that there are no limits to what an agent believes, as illustrated by the cliché of the madman who believes himself to be Napoleon. (While beliefs need not be reasonable or self-consistent, Brandenburger and Keisler 2006 cast doubt on whether all possible beliefs can be represented in one's model.) What is called "belief" may easily be dismissed as "mere belief" or "subjective opinion," which may then divert our attention from the concrete knowledge flows of Hayekian systems, which Hayek put at the center of economics and other social sciences.

My preferred sense of "knowledge" is far from the meaning dominant in modern epistemology. One standard philosophical definition of "knowledge" is "justified true belief." This definition has been traced back to the Platonic dialogues *Theatetus* and *Meno* (Gettier 1963, Shaffer 2020), although others have cast doubt on the view that Plato thought knowledge was justified true belief (Moss and Schwab 2019; Parikh and Renero 2021, p. 94). Dutant (2015) and Antognazza (2015) both argue that, as Dutant (2015, p. 112) put it, "the Justified True Belief analysis is a twentieth century invention." The view that "knowledge" is justified true belief has been criticized by Popper (1962), Wittgenstein (1958a, 1958b), Gettier (1963), and many others. Gettier's classic paper (covering less than three pages) is the most salient among these criticisms and deserves a quick review.

Gettier (1963) gives two counter examples to the claim that knowledge is justified true belief. A streamlined version of the first counterexample conveys the argument. Two men, Smith and Jones, are rivals for a job. Smith has seen Jones empty his pocket, count out ten coins, and put them back in. After interviewing

for the job, Smith was told the position will go to Jones. Smith infers that the job will be offered to someone with ten coins in their pocket. Unbeknownst to Smith, Jones was subsequently ruled out for the job and he, Smith, happens to also have ten coins in his pocket. Unexpectedly, Smith is chosen over Jones and gets the job. Gettier claims that Smith has a justified true belief that the job would go to someone with ten coins in their pocket and yet (in Gettier's opinion) "Smith does not *know*" that someone with ten coins in their pocket will get the job. Gettier's brief argument has spawned a large literature on "Gettier problems" and "epistemic luck." Hetherington (2005, p. 1) says, drolly, that this slim and powerful argument initiated "post-Gettier epistemology," which began "with a deafening 'Kapow!'"

Citing Gettier, the prominent epistemologist Alvin Goldman (2010, p. 115) has declared justified true belief "a dead letter." Despite Goldman's negative judgment and others like it, justified true belief continues to be a vital benchmark for many epistemologists. Like Gettier, these theorist view justified true belief as a necessary, but not sufficient condition for "knowledge." Goldman (2010) speaks of "the *justified-true-belief-plus* sense of knowing," where "plus" is "a placeholder for an anti-Gettierization condition" (p. 131). The "plus" in Goldman's case is, roughly, "reliability." He and Beddor say that the "key idea behind" his reliabilism "is that the justifiedness of a belief depends on the mental history of the subject's belief. In particular, it depends on the reliability of the process(es) which cause the belief in question" (Goldman and Beddor 2021). In harmony with Goldman's "plus," Ichikawa and Steup (2018) say, "Most epistemologists have found it overwhelmingly plausible that what is false cannot be known." Moreover, even among epistemologists who recognize as important a "lightweight" sense of "knowledge" that requires truth but not justification, "most typically admit that there is also a stronger sense which does, and that it is this stronger state that is the main target of epistemological theorizing about knowledge."

Thus, the view of knowledge as "justified true belief" may still be the default view, but some "plus" must be added to the formula if we are to move from necessary to sufficient conditions for a proposition to be "known." Hayek's "concrete knowledge" is far from this philosophical view of knowledge.

Timothy Williamson (2000) has repudiated all ideas to the effect that knowledge is justified true belief plus something. He insists that "evidence is what justifies belief" and that evidence must be known if is it to be, indeed, evidence. Thus, "knowledge is what justifies belief" (p. 207). He retains the idea, however, that we can "know" only what is true. And he views knowledge as a "mental state" (pp. 33-41). We are still far from Hayek's view of knowledge and from any concept of knowledge appropriate to the theory of Hayekian systems.

Within philosophy there are epistemological traditions that come closer to Hayek and to Butos and McQuade's "side-effect of the adaptation to its environment by any adaptive system." Important examples include the broad tradition of epistemological naturalism which was initiated by Hume's *Treatise of Human Nature* (1739-1740) and represented more recently by Quine (1969) and Kitcher (1992) among others. Scheall (2020, p. 117) considers the evolutionary epistemology of Campbell (1965) and others to be a part of "the family of naturalistic epistemologies," and he places Hayek in that group. Campbell (1965, p. 380, n.2) says, "any process providing a stored program for organismic adaptation in external environments is included as a knowledge process, and any gain in the adequacy of such a program is regarded as a gain in knowledge." This quote reveals an affinity between Campbell and Hayek. Scheall (2020, pp. 118-119), however, notes distinguishing features of Hayek's epistemology, which was well developed by 1952 (and thus prior to Campbell's essay of 1965) when he published *The Sensory Order*.

Much of social science uses the term "knowledge" in a broader and looser sense than either "justified true belief" or "justified true belief plus." Berger and Luckmann (1966) give us a salient example. Their famous essay on the sociology of knowledge asks us to "put quotation marks around" the terms "knowledge" and "reality" (p. 2). (See Koppl 2010 for an argument that Berger and Luckmann are not "social constructionists" as that term is generally understood.) They explicitly sidestep "such classical concerns of epistemology as truth, justification, and rationality" (p. 2). Everyday actors in society consider themselves to "know" many things that are not true. And their "knowledge" is not justified or rational in any rigorous sense. And yet such "knowledge" guides their actions. Berger and Luckmann explain, "As long as my

knowledge works satisfactorily, I am generally ready to suspend doubts about it" (p. 41). Hayek's "knowledge problem" is about this sort of everyday knowledge. And, more generally, the "knowledge" of Hayekian social systems is of this sort. If we accept Butos and McQuade's analysis of science, then even scientific knowledge does not fully satisfy the requirements of traditional epistemology. It is more like Berger and Luckmann's "everday knowledge" than "justified true belief."

The biologist and complexity theorist Stuart Kauffman provides another example of a nonstandard meaning of "knowledge" arising outside the philosophical literature in epistemology. His view seems close to that of Campbell's (1965) "stored program for organismic adaptation." Kaufmann says, "complex living systems must 'know' their worlds. Whether we consider *E. coli* swimming upstream in a glucose gradient, a tree manufacturing a toxin against a herbivore insect, or a hawk diving to catch a chick, organisms sense, classify, and act upon their worlds. In a phrase, organisms have internal models of their worlds which compress information and allow action" (Kauffman 1993, p. 232).[2] Kauffman's characterization of knowledge does not require knowledge to exist in the form of propositions or even beliefs. *E. coli* cannot affirm or deny any proposition. And it has no beliefs. Its behavioral repertoire is hardly more complicated than swimming sugarward (Beisel and Afroz 2016, Long, Zucker, and Emonet 2017, and Micali et al. 2017).

Kauffman (2000) and Kauffman et al. (2008) use the words "yuck" and "yum" to discuss the simple models an agent such as *E. coli* might have. If such an agent is to respond to "environmental features," Kauffman et al. (2008, p. 39) explain, then it "must also have yuck and yum receptors, capable in the simplest case of 'recognizing' molecules of yuck or yum, and responding appropriately by avoiding yuck and eating yum." In this case, "the agent confronting yuck or yum receives information 'about' yuck or yum." This simple Hayekian system has a form of knowledge. "The cell, we want to say, has embodied knowledge and know-how with respect to the proper responses to yuck and yum, which was assembled for the agent and its descendants by heritable variation and natural selection." The distinction between "knowing how and knowing that" was elaborated in the celebrated essay of Ryle (1945-1946).

In Kauffman's account, the organism's model of its world, its classificatory system, exists primarily in the form of its reactions to events in its environment. *E. coli*'s model of the world puts everything in the external world into one of Kauffman's two great classes: yuck and yum. Yuck is the set of "repellents" such as glycerol, and yum is the set of "attractants" such as D-glucose. And this classification exists in the form of *E. coli*'s tendency to more toward attractants and away from repellents. This tendency to move toward attractants is a disposition, which can be overridden. The probability of override depends on "previously-encountered signals" and "the organism's internal parameter space" (Long, Zucker and Emonet 2017). Thus, the classificatory system of *E. coli* is a heterogeneous set of dispositions in which the external environment (as sensed by the organism) and the internal state of the organism jointly determine which dispositions prevails. Much the same is true of the mammalian mother whose disposition to flee a danger may be overridden by the disposition to protect her offspring.

Kauffman's remark on the internal models of organisms, which was quoted above, suggests a definition of knowledge as "reliably acting appropriately to circumstance in a class of cases" (Koppl 2021), which we may roughly reduce to "knowledge is adaptation." This definition is close to Campbell's (1965) account in which, recall, "any process providing a stored program for organismic adaptation in external environments is included as a knowledge process, and any gain in the adequacy of such a program is regarded as a gain in knowledge." It is also close to Butos and McQuade's "classification produced as a side-effect of the adaptation to its environment by any adaptive system." For humans and bacteria alike, knowledge in this sense need not be propositional. You know how to ride a bicycle. And you know rules of grammar that you cannot state. Most English speakers, for example, do not *know that* "adjectives in English absolutely have to be in this order: opinion-size-age-shape-colour-origin-material-purpose Noun" (Forsyth 2013, p. 45). But they *know how* to formulate idiomatic sentences that respect this "royal order of adjectives" (Edelstein 2020, p. 219).

If knowledge is adaptation, certain collectives might be said to "know" their environments. In the famous example given by Hutchins (1991, 1995) the "cognitive division of labor" (1991, p. 34) of a merchant

ship prevents us from imputing full knowledge to any person on it. And yet the ship responds appropriately to its environment. While not, of course, perfect or immune to system failure, the ship *reliably* responds appropriately to its location, the wind speed and other relevant aspects of its external environment and to its fuel level, the engine temperature, and other relevant aspects of its internal environment. It would not be unreasonable to say that the knowing unit is the ship as whole. We might define "knowledge" to exclude its application to Hutchins' ship. But as I have noted elsewhere (Koppl 2018, p. 120), "if we are not privy to the details of the ship's division of cognitive labor, then we cannot specify which persons knew which things and which persons made which choices. We do not need a map of the ship's division of cognitive labor to recognize that their interactions are generating potentially adaptive outcomes that depend on new information coming from both outside and inside the ship. In other words, we do not need a map of the ship's division of cognitive labor to see that it is thinking, learning, and acting in much the way individual humans think, learn, and act."

In the spirit of Hutchins (1995), whom they cite, Clark and Chalmers (1998) develop an "externalist" philosophy of mind.[3] They say, "when it comes to belief, there is nothing sacred about skull and skin. What makes some information count as a belief is the role it plays, and there is no reason why the relevant role can be played only from inside the body" (p. 14).

If we equate knowledge with adaptive response, even some inanimate objects might be said to "know" their environments. Your car "knows" when to distribute more power to the rear wheels. It is largely a matter of convenience and convention how broad a class of entities may be said to "know" their worlds. The usual convention in social science is to restrict knowing entities to persons and certain collections of persons such households and firms. It may be time to set that convention aside.

The volume Butos and McQuade have produced is an exemplar of high scholarship. They move seamlessly from general principles to practical problems, teaching us at every moment how to think like Hayekian systems theorists. Importantly, their lessons do not become catechisms. On the contrary, they stimulate new thoughts and new questions in the reader. We have focused here on epistemological questions, which are foundational to Hayek's *oeuvre* and to the theory of Hayekian systems. But their work raises an indefinite number of important questions in pure and applied social science, including questions with urgent policy implications. And it shows us by example how to approach such questions. Other scholars should join in the effort by developing the theory of Hayekian systems and applying it to urgent problems of pure and applied social science. The path has been shown to us; let us trod upon it.[4]

NOTES

1 I have elided a bit that Scheall (2016, p. 208) did not. And he cites the article as it appears in Caldwell (2014) where the quote can be found on p. 320.

2 The reference to compressing information is an allusion to Gregory Chaitin's work as Kauffman has confirmed in a private communication. See Chaitin da Costa and Doria (2012) for an introduction and overview.

3 Dekker and Remic (2024) is a valuable discussion of Hayekian social science and the "extended mind" literature "kickstarted" by Clark and Chalmers (1998). Roughly, they view Hayek as a precursor to the extended mind literature and thus not fully compatible with the behavioral economics tradition of Kahneman and Tversky (1979) and others.

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A city is a spontaneous order but is it a Hayekian system?

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Abstract: Butos and McQuade (2023) propose what they term a "Hayekian System," with the basic elements comprising a spontaneous order that they apply to various social systems—economic, scientific, governmental, and interventionist—and outline how each is organized to generate the self-sustaining and self-regulating characteristics of a spontaneous social order. They endeavor to improve upon F. A. Hayek's treatment of spontaneous order by purging the concept of what they identify as normative elements. The focus of this paper is on whether their approach applies to and sheds light on the idea [or concept] of the city as a spontaneous order and locus of innovation, as developed by the urbanist Jane Jacobs.

Keywords: spontaneous order, Jane Jacobs, living city, Hayekian system.

A. INTRODUCTION

In *Hayekian Systems* William N. Butos and Thomas J. McQuade offer a detailed look into the "structure of social interaction" that underlies the concept of spontaneous order, today most closely associated with Friedrich A. Hayek. They present a framework containing what they consider to be the basic elements that constitute a spontaneous order and discuss how those elements are related to one another and to the environment outside the system. They call this a "Hayekian system," which they apply to various social systems—economic, scientific, governmental, and interventionist[1]—to outline how each is so organized to generate a self-sustaining and self-regulating process, characteristic of a spontaneous social order.

The authors point out that Hayek's discussion of coordination in markets, where it has been most successfully applied, doesn't transition smoothly to other social orders, in particular to those where the price system is absent and profit and loss signals don't guide decisions. Butos and McQuade endeavor to improve upon Hayek's treatments of spontaneous order, as well as that of Michael Polanyi, by purging the concept of what they identify as normative elements that "add a complicating layer of normative claims to the analysis" (p. 20)[2] "leaving it open to misunderstanding and confusion" (p. 23). Their concern is with means, not ends.

> Our criticism is not with that direction nor the policy positions that Hayek endorses; our concern

> is that to secure his normative ends directly he cuts short the budding analysis of spontaneous orders (p. 22).

This they argue frees them to formulate the general concept of a Hayekian system without resorting to normative goals such as "commitment to truth" in the case of science (p. 20) or a commitment to "traditional liberal order" in the case of social theory (p. 23). In doing so, they draw on Hayek's neurological studies of the sensory order of the human brain.

Having spent most of my career as an urbanist doing research that takes as its starting point the idea that a "living city"—i.e. a settlement capable of generating social, economic, and cultural innovations (Ikeda 2024)[3]—is a spontaneous order, it is natural for me to wonder how a such city might fit into Butos and McQuade's framework. I will address this question, but my ultimate aim here is to find out what I can learn from Butos and McQuade's approach.

B. THE CITY IS A SPONTANEOUS ORDER

For reasons I explain in Ikeda (2024), the (living) city is a spontaneous order *par excellence*.

To begin with, I define a "spontaneous order" as it relates to social orders as

> …a set of interpersonal relations that emerges unintentionally over time and is sufficiently stable and coherent to enable independent individuals to form and carry out their plans with a reasonable expectation of success (Ikeda 2024, p. 60).

I will try to explain why a city is a spontaneous order in this sense.

B.1 A Jacobsian Approach

For present purposes I will adopt the perspective of the renowned urbanist Jane Jacobs on the economic nature and significance of cities for economic development.

First, I take as a starting point of Jacobs's definition a city as "a settlement that consistently generates its economic growth from its own local economy" (Jacobs 1969, p. 262). This approach views a (living) city as essentially economic in nature.[4] In particular, Jacobs argues that a city generates its economic growth through innovation.[5] It is a society's principal engine of economic development ("new work"), which takes place as a consequence of local experimentation. More on this in a moment.

Second, while she explicitly introduces markets and prices in her later works, they are largely absent or only implicit in her earlier writings. Profit-seeking, entrepreneurship, and property rights are necessary elements of her analysis, but she mostly takes them for granted. That is, while trade and markets are essential in her economic view of the city, she doesn't develop a complete theory of markets. In the same way, Jacobs (1961) takes it for granted that people move to, interact in, and stay in a city to seek opportunity and improve their situation. And in her earlier work she doesn't employ the price mechanism as a coordinating device à la Hayek. Instead, she relies on the idea that social networks are the primary means of conveying information within and across neighborhoods and districts in a city, and that enable safety and trust in public space among strangers to emerge spontaneously, which in turn makes possible a wide range of creative human interaction, cultural and economic. (As I have noted elsewhere (Ikeda 2024, p. 131), Jacobs should be credited as the first to use the concept of "social capital" in the modern sense of social networks and norms that facilitate the use of human capital.)

Third, Jacobs identifies four factors that together set the conditions from which can emerge a city that is safe, lively, and creative, although she is careful to point out these factors may be subject to change according to time and place. They are that the majority of its neighborhoods contain 1) diverse land uses (e.g. residential, commercial, industrial, recreational, educational, governmental) that attract outsiders, 2)

a sufficiently large number of people to economically sustain those land uses at different times of the day, 3) a system of navigable streets and pathways to make those local multiple uses readily accessible, and 4) enough low-cost working and living spaces to facilitate experimentation.[6]

Where these factors are present, they enable a large number of strangers to interact safely and to establish various formal and informal relations and contacts (e.g. commerce and community) that help to form different kinds of social networks, which in turn can help to transmit information smoothly to and from any of those networks. While Jacobs emphasizes the role these networks play in leveraging neighborhood concerns about municipal policies, they also facilitate innovation by making it easier for novel information from people who may be socially distant to enter a city and add to the diversity of knowledge and tastes, which can promote new discoveries, both cultural and economic, and valuable discoveries to be easily diffused to other localities.

The interaction among these four inter-dependent factors then creates a dynamically stable process of co-development, which manifests in changes in a city's complex division of labor, in ways that adjust to demand and supply without the need for central direction. The outcome of these processes is even greater land-use diversity and the generation of what Jacobs calls "effective pools of economic use" (i.e. heterogenous land uses that represent potential production complementarities) on the supply side, and an ever-increasing diversity of consumption on the demand side.

In all of this, there is no central planner that guides how the formation of the four factors or co-development takes place. Although Jacobs doesn't reject urban planning for basic infrastructure and minimizing negative externalities, she strongly rejects the kind of urban planning as practiced, for example, by Robert Moses (Caro 1975) in mid-twentieth-century New York, precisely because it was an attempt to consciously shape the city according to his grand urban vision. At best, however, urban planning might perhaps create the conditions for the inhabitants of a city to best execute their own plans.

Beyond some point, a point typically exceeded in practice by most planning authorities, the designed complexity of urban planners ceases to complement the spontaneous ordering of urban dwellers and instead begins to substitute for it.[7] That is, there is a tradeoff between designed and spontaneous urban complexity. The result is a degree of social complexity far below, and a society less prosperous, than what would have otherwise been the case.

B.2 Co-Development and Turning Diversity into Complementarity

Following Jacobs, I place equal importance on demand-side and supply-side diversity, both as constituting economic development, in the form of new and wider ranges of products and consumption, and as the motivating force of economic development, in the form of creators and adventurous consumers in a city.

On the demand side, cities attract and retain people seeking opportunities that aren't readily available in non-city environments. These individuals are diverse in the sense that the social distances (i.e. their backgrounds, knowledge, and beliefs) separating them tend to be relatively greater than would be found in, say, a suburban or rural setting. This means that their tastes also tend to be broader and their demand for lifestyle, food, jobs, entertainment, etc. broader too.

On the supply side, for reasons that I will explain shortly, the diversity of land-uses tends to be far greater in a city, again compared to non-city environments, which constitutes the effective pools of economic use—again, the local collections of diverse forms of material inputs and human capital—from which entrepreneurs can discover new combinations of inputs to create new products and services. Through trial-and-error and the filter of competition new products and production processes can emerge to meet changing demands for goods at all stages of production. Thus, for example, novel restaurants no matter how innovative will fail unless diners have a willingness to try diverse cuisine.

What is it that enables supply- and demand-side diversities to cohere and complement? As Butos and McQuade ask, outside the context of the market and the price mechanism how do you explain what motivates people to do what they do without recourse to norms of truth-seeking in the case of science or a com-

mitment to liberal principles in the case of political philosophy? Likewise, in the absence of a price mechanism, what enables people to coordinate their plans?

For Jacobs, as I have argued, social networks offer a path to an answer, at least in the case of cities. But the sociologist Ronald Burt adds a crucial element to this picture in his analysis of "structural holes" in social networks (Burt 1995). These are essentially unexploited personal connections that can increase the value of human capital and offer alert entrepreneurs the ability to spot profitable opportunities overlooked by others.[8] Burt adds to the picture of "buying low and selling high" the idea of "it's not what you know but who you know." That is, he introduces an explicitly economic dimension that doesn't directly invoke market prices, which is useful to complete Jacobs's idea of how social networks can generate economic development.

The nature of a city then is essentially economic because its evolution is largely driven by people seeking opportunities to improve their situations, as they see it, through trade and other forms of voluntary association, although of course it is much more than that.[9] It makes sense then to begin my investigation into whether a city is Hayekian system by seeing how well Butos and McQuade's analysis of a Hayekian "economic system" fits that of a living city, regarded as a system. And so among the particular schemas Butos and McQuade present in their book, the one for the economy would seem to be the closest fit. The follow-up question is whether such a schema improves our understanding of the city.

C. TO WHAT EXTENT IS A CITY A HAYEKIAN SYSTEM?

Butos and McQuade appear to offer at least two ways to characterize a Hayekian system that may be appropriate to address this question. One is depicted in the diagram in Figure 6.1 (p. 52), which illustrates "the process organization of a market system." I will discuss this later.

In their chapter on Hayek's *The Sensory Order*, Butos and McQuade lists several characteristics of a brain's neural network and compares them to "brain-like aspects of social systems" (p. 33). Although the list is not necessarily a set of criteria for what constitutes a Hayekian system, and some of the items may not be appropriate to all social systems, I believe they make a reasonable place to begin.

C.1 Social Systems, Neural Networks, and Cities

Butos and McQuade name eight characteristics that neural networks have in common with a spontaneous social order. Interpreting them as criteria for a Hayekian system, I comment how each might or might not align with the spontaneous order of a living city. Paraphrasing, I list them as follows (pp. 33-34):

1. The systems have structural integrity while at the same time exhibiting a mutability in response to environmental experience. Example: The institutions of property and exchange in markets and publication and citation in science.

Whether a city has the kind of structural integrity mentioned here depends on what one chooses to focus on. Certainly the "built environment" of a city—i.e. its streets, buildings, and infra-structure—have high structural integrity but limited mutability. But what is meant here probably pertains more to social networks and social capital and the norms that support them. In that case, as I indicated in the previous section these crucial elements of a living city do indeed exhibit structural integrity and mutability.

2. One can observe an expansion of number [sic] of elements involved in pathways associated with a particular stimulus as that stimulus becomes more frequent or more pressing, and a concomitant reduction in numbers of elements associated with relatively less pressing stimuli. Example: Creative destruction in markets and paradigm shifts in science.

Jacobs's theory of economic development employs the concept of the division of labor, which as I have explained increases in complexity over time as the city containing it becomes more productive. The increasing complexity consists of parts of the division of labor that recede and possibly disappear as demand for the work associated with it decreases and as other areas expand in the form of new work created to meet local and foreign demands. In a living city, this new work outpaces the loss of old work.

3. The systems exhibit functional mutability. Example: The way the brain is able to develop workarounds when certain neuronal paths are damaged.

I might use as examples of this the response of the locality to catastrophic events, such as the attack on the World Trade Center in 2000 or Hurricane Sandy that hit the New York City area in 2012 or the Covid-19 pandemic of 2020. In each of these cases, the City was able to recover economically relatively quickly, thanks in part to certain governmental responses, but mainly to the capacity of private individuals, organizations, and social networks to draw on their own resourcefulness to solve problems locally, enabling a systemic recovery. For example, in the case of the Pandemic, in the short run volunteers organized ways of getting food and other needed supplies to harried hospital workers and restaurant owners contracted many more workers to deliver food and later built outdoor sheds to accommodate worried diners.

For more chronic or systematic damage, for example poor urban planning (e.g. public housing) that resulted in increased displacement, poverty, and crime, New York City has had its better and worse years, but it remains economically strong. In 2022, the City alone generated $1.2 trillion in gross output, equal to that of the state of Florida and twice that of Michigan.[10]

4. The systems exhibit anticipation. Example: Futures prices in markets and the predictive aspects of science.

I confess it's difficult for me to grasp what is meant by anticipation in the case of complex social orders. Merriam-Webster's dictionary defines "anticipation" as "a prior action that takes into account or forestalls a later action" or "the act of looking forward."[11] Anticipation strictly speaking thus appears to be a property of a conscious entity. By contrast, an ant colony only acts *as if* it anticipates some future condition, and an economy or science "anticipates" or "predicts" only in the sense that particular individuals—i.e. the buyers and sellers or research scientists—deliberately attempt to predict. It's merely a metaphor to say that the system anticipates since it's not the system *per se* that anticipates, but in both cases there is some mechanism that operates on individual anticipations and filters out the wrong ones and filters in the right ones. Financial futures markets reflect the combined effects of a multitude of buyers and sellers few of whom, perhaps none, will exactly anticipate the actual future price. So, a system only metaphorically "anticipates" in the sense that, as an unintended consequence of market competition or scientific testing, a better product (as judged by the customer) or theory (as judged against evidence) emerges from competition and testing.

Moreover, it's a metaphor that doesn't really seem necessary, since "adaptation," which the authors include as a separate element, seems to be sufficient to do the conceptual heavy lifting in the process. Adaptation itself is consistent with individuals' anticipation insofar as a system is more adaptable the more flexible the options currently open to the anticipating agents in it. Again, in a social system there is genuine anticipation, but it's by the agents within that system, operating through some filtering device that then help the system to adapt to changing circumstances.

Not surprisingly I don't think this point applies to a city any more than to any other complex social order.

But perhaps I can say this. At the level of government planning, if planners construct the amount and kinds of infrastructure that for a time suit the needs of future inhabitants of the city, then this may be an example of the authorities within the system anticipating. But it's an individual or the planning department

that is formulating a deliberate policy, e.g. road construction, rather than a system itself. At the level of the order that emerges within the framework designed by the planning authorities, it's more like a futures market, with different individuals testing out different bids and offers that may or may not prove successful. The issue then is more a matter of whether, say, developers build enough dwellings in the right place at the right price, or of there being the right singers and actors to properly stage a Broadway show and the kind of theater-goers who are willing to pay to see that show.

If that's what it means for a system to anticipate future conditions then I suppose a city does anticipate, metaphorically.

5. The systems exhibit reactions analogous to addiction. Example: To cash or credit with the ensuing hangover in the recovery process.

Merriam Webster's dictionary defines "addiction" as

> a compulsive, chronic, physiological or psychological need for a habit-forming substance, behavior, or activity having harmful physical, psychological, or social effects and typically causing well-defined symptoms (such as anxiety, irritability, tremors, or nausea) upon withdrawal or abstinence.[12]

What would be analogous to addiction in this sense in the city; specifically, obsessive habits that result in a dangerous downward spiral? I can think of several possible examples. Let me start with the problem of what I call "urban interventionism" (Ikeda 2004).

In short, one characteristic of urban interventionism is the way a given policy intervention often produces problems that lead to and increases the demand for further policy interventions to address those problems, which can then result in further problems followed by more interventions, and so on. For example, rent regulation that keeps the rental price of dwellings well below market levels tend to generate chronic shortages of affordable housing. This lack of affordable housing in turn can lead to increased demand for housing subsidies, corruption among landlords, deteriorating apartments units and common spaces, and more. Each of these consequences in turn encourages some housing advocates to call for further interventions to address them. The bottom line is that this tends to create a host of government policies to attempt to address an ever-expanding array of housing problems, which can result in problems in other areas of the city such as homelessness, substance abuse, violent crime, and so on. Despite this the city as a whole may continue to work reasonably well for a while, again witness New York City, but certainly not as robustly as it might had other solutions been pursued initially: e.g. direct housing subsidies to low-income dwellers (not without its own problems, of course) instead of rent regulation or liberalizing zoning ordinances and other regulations to enable construction in areas where it is most needed (Ikeda and Hamilton 2015).

Jane Jacobs gives another example that isn't tied to public policy, which is the way some districts become so highly successful owing to their vibrant diversity of land use that it attracts more of mostly the same kinds of uses that have proven the most successful, driving up real-estate prices, which in turn makes it less likely that the kinds of diversity that were responsible for making the districts a success in the first place are now less likely to occur spontaneously. She calls this "the self-destruction of diversity" (Jacobs 1961, p. 241), a dynamics of decline that also seems to meet the above definition of addiction.

6. The classifications performed by these systems are relational, and what are being related in the final analysis are internal states of activation. Example: The way Austrian economists are attracted to phenomena that exhibit capital as a structure of production and lose interest in discussions in which capital structure is absent.

I confess I had trouble grasping what the authors mean here by the "relational" character of "internal states of activation." Perhaps I'm misinterpreting their example? That is, if the concept of "capital structure" serves as an "attractor" for Austrian economists, I might ask if there are conceptual counterparts among urbanists that equally serve as attractors to or underminers of professional discussions? Well, the concept of "masterplan" comes to mind: If you question the practice of drawing up a masterplan to guide urban planning, you likely won't be taken seriously among urban planners. How this might relate in particular to a city as a Hayekian system is hard to say because it would seem to apply to discussions of almost any kind on any subject, and not just among systems covered by the authors, such as economists, physicists, or policy-makers. This might be because point six (as well as the others) appears in Butos and McQuade's discussion of the brain's neural network, as discussed in Hayek's *The Senor Order*, which may be relevant in that context but not in the specific question I'm addressing here.

However, another way to interpret this characteristic is to focus more on the relational nature of the way a Hayekian system classifies different states of activation.[13] In that sense, the relevant question is whether a living city somehow "classifies" and appropriately adjusts to events, and I believe the answer is that it might. One example might be the way it both attracts and adjusts to large influxes of strangers when the four generators of land-use diversity are present, in the manner discussed earlier. That is, for example, when sufficient numbers of people are incentivized to occupy public spaces during different times of the day (owing to multiple and diverse attractors that have emerged in a given location), their "eyes on the street" then act as informal monitors that create the fact of and the perception of safety. If that is consistent with "classification of an internal state of activation" then perhaps characteristic six does apply to a living city.

7. There are areas of interaction that are within the boundaries of the system but which are, by and large, confined to a local context and dedicated to specific tasks. Example: Production activities in firms within markets and research activities in labs within science.

What I mentioned earlier about how the factors that make for a dynamic and lively neighborhood—a variety of attractors, population density, intricacy of pathways, affordable space—interact in an unplanned manner to spontaneously generate pools of economic use is scalable. That is, the way these elements (i.e. mixed uses, etc.) encourages experimentation and innovation in a neighborhood is a similar process, though different in its elements, as the relations that emerge among trading cities. In Jacobs's analysis, this involves local entrepreneurs finding ways to replace certain imports from other cities with locally produced products that may then be exported, which then increases export revenue for locals and allows them to import other novel products from other cities. In this way the city, considered as a unit of analysis, interacts with its "external" environment through trade. I will develop this idea in the section C.2.

8. How a system reacts to a particular stimulus depends not only on the stimulus but also on the current state of the system. Example: The way the effects of a minimum wage law may be obscured by relevant factors that are not held constant.

I might perhaps illustrate how this point applies to the city with the way landlords can often skirt regulatory caps on apartment rents by compromising along other margins such as upkeep of public areas to lower costs or insisting on large under-the-counter payments to offset the revenues lost by the cap. Or an example going in another direction could be the recent attempts at making housing more affordable by allowing homeowners in California and elsewhere to convert basements and backyards into rental housing. While this may sound promising to some on paper, the problem is that there are tons of other restrictions on housing construction such as minimum lot sizes, set-back rules, and parking regulations that often discourage homeowners from making such conversions.

C.2 Economic Systems and Urban Processes

Next, I turn to Butos and McQuade's application of the Hayekan system approach in their chapter on economic systems to see if it can also be applied to the city, given the essentially economic nature of the living city. Their presentation contains what they see as the major elements of an economic system—production, exchange, innovation, judgment—and how these elements are related to one another—results, knowledge, proposals, plans—and also to the environment—"resources for system maintenance and feedback in reaction of output"—outside the economic system, proper.

Here is a rough sketch of the system, which appears in Figure 6.1 (p. 52) in that chapter, with "→" indicating the direction of flows:

- **Production**: Implementation of production plans
  → Results of outcomes of production relative to plans, and information (including advertising) as to their desirability →
- **Exchange**: Transactions between buyers and sellers affected by preferences, expectations, and availabilities
  → Knowledge: The price structure as a model of the market, its productions and their brand reputations, and its environment →
- **Innovation**: Development of ideas for new products and improvements to existing products
  → Proposals: Entrepreneurial initiatives for future products, services, and production methods →
- **Judgment**: Assessment and selection of proposals for viability and financing
  → Plans: Directives for production, including the creation and organization of firms →
- **Production**…and so on.

Moreover, the production output interacts with the external environment, which provides feedback to the system.

Despite the economic nature of cities, it's hard to see how a living city fits neatly into this schema. First, the system as depicted appears to emphasize the supply-side more than buyers' demand, which is included implicitly in "exchange" stage. This may be a concern from my perspective since, as I have argued, in the process of urban innovation the diversity of tastes of buyers (for inputs and outputs at all stages of production) is an essential complement to the diversity of supply. Second, cities possess a non-market dimension vital to urban market processes that is absent in this schema. This includes the rules, norms, and conventions (e.g. respect for honesty, trustworthiness, and fair play) that facilitate social interactions and engender social networks, without which economic processes cannot flourish. Third, also absent are urban institutions such as neighborhoods, districts, and the infrastructure, which as I explained in section III.1 are important elements for fostering experiment and innovation.

This isn't necessarily a criticism of the how the economic system is depicted in Figure 6.1, especially if I can find a way to modify the framework to fit my urban-based concept of the economic system.

For instance, it may be possible to modify this schema to include the elements that I mentioned in section C.1, and to show their relation to one another and to phenomena outside that system, such as trade with other cities if the city is the unit of analysis. There, inter-city trade is highly important because no city can develop through innovation without extensive exchanges with settlements of various kinds outside its local area, such as other innovative cities and supply regions. Here is my attempt.

I have elsewhere (Ikeda 2024, pp. 200-201) recapped Jacobs's theory of how cities innovate, a process that takes place here at a more macro- or city-level, as follows:

> In summary, the stages of economic expansion are: (1) exporting local products and resources to buy imports, (2) using local pools of diversity [by the four generators of diversity] to entrepre-

> neurially replace some imports with locally produced goods, thereby (3) increasing the extent and complexity of the DOL, generating additional income and more potential complementarities, (4) exporting more local production, (5) increasing imports and shifting to new kinds of imports, (6) so that in time, some of these imports are themselves [entrepreneurially] replaced, beginning the process anew (Ibid.).

Import replacing occurs when local producers find novel ways to replace particular imports with ones better suited to meet local demand, and represents entrepreneurship on the supply side, while import shifting takes place when local consumers spend revenue they earn from exports on novel goods produced in other cities and represents entrepreneurship on the demand side. Both imports on the part of buyers from, and exports on the part of sellers to, other (external) cities drive this process.

Note that just as we might study how people in a given city interact economically or culturally with those in other cities in the region or globally, we could treat a single neighborhood as the unit of analysis so that other neighborhoods and the city as a whole interact externally to it, which is the focus of Jacobs in her famous *The Death and Life of Great American Cities* (1961). What is internal or external to the system thus depends on the level of analysis—i.e. neighborhood, city district, city, city region, globally—with each level nested within the one above. Thus, at one level of analysis the city may be the spontaneous order of concern so that cities elsewhere (regionally or globally) would be regarded as external to it, as in the import-replacement/shifting processes, while at another level the neighborhood may be of primary concern, and emergent phenomena there the object of study, with the city as a whole being the external "environment" with which it interacts.

At any level, processes related to them evolve through time and may slow down or reverse themselves, for example, owing to policy blunders (e.g. trade restrictions or rigid zoning ordinances) or natural disasters (e.g. climate change or pandemics) or greater competition for products and human capital from more vigorous cities.[14]

So, if what I describe here fits into a schema modified from Figure 6.1 then I have perhaps shown that the living city may indeed be a Hayekian system.

Moreover, the Jacobsian analysis can be seen as an investigation into the positive question of what factors promote innovation and economic development, without assuming that this is a good thing. That is, one need not accept innovation and economic development as normative goals to accept Jacobs's analysis, of course. For instance, some environmentalists and de-growth advocates strongly object to rapid economic development or any development at all.[15] Looking at Jacobs's analysis purely from the perspective of positive theory, this aspect of her work appears consistent with Butos and McQuade's non-normative approach to Hayekian systems.

D. CONCLUDING THOUGHTS

I have long had a deep appreciation for the importance and usefulness of the concept of spontaneous order, and Butos and McQuade's concept of Hayekian system hasn't much changed that one way or the other. However, the framework they provide may have given me a different way to organize my thinking about Hayek's concept of spontaneous order and a greater appreciation for the problems and complications of applying it outside the market context, as I've tried to do here.

I wonder why Butos and McQuade didn't apply a Hayekian systems approach to law or language, since after markets these are two of the most common examples proffered of spontaneous order. Perhaps it's because the evolutionary filtering process appears to be more clear-cut in these cases—i.e. the need to resolve disputes through an adversarial process in the case of law and in the case of language that differences in expression compete, as it were, with the need to communicate effectively—than it is in science or government. At the same time, Hayek has also been criticized for making the evolution of law and language appear more

cut-and-dried than they really are. In that case, it would be a useful exercise for Butos and McQuade to apply their approach to them.

In any case, it has been an interesting exercise to try to interpret a living city as a Hayekian system, in the sense that it has forced me to think more about how the various elements I utilize to study cities—e.g. generators of diversity, structural holes, the fractal nature of urban systems (i.e. neighborhoods, districts, cities, and regions), and inter-city trade—might relate to one another in a more systematic fashion. How useful this will be (and whether I've done this correctly) for my research remains to be seen. On the one hand, as I've said, my appreciation for the nature and significance of a spontaneous order hasn't really changed, though perhaps that's because I need to work harder to fully grasp the lesson. On the other hand, it might simply be the case that a living city is a spontaneous order yet not a Hayekian system, which would lead one to ask exactly why some spontaneous orders aren't Hayekian systems, and vice versa. And that's an interesting question.

NOTES

1 Butos and McQuade devote a chapter to "government systems" and deal at length with government intervention in another chapter on "interactions with government." At the risk of being self-serving, I might point out that I have written extensively with government systems or what I call "the governmental process" elsewhere but especially in Ikeda (1997). Indeed, that book is an extended and detailed analysis of the dynamics of the interventionist process, which authors reference without drawing materially from it.

2 All references to Butos and McQuade (2023) will appear here with page number, only.

3 For the purposes of this article, unless otherwise stated, "city" will refer to a living city in this sense.

4 In addition to Jane Jacobs, the noted urban planner, Alain Bertaud (2018), also stresses the economic nature of a city by characterizing it as a "labor market."

5 See her brilliant description of such innovation, as well as spontaneous order (although she doesn't name it as such), appears in Chapter 1 of Jacobs (1969).

6 For an extended explanation of these factors and how they work together to generate land-use diversity, see Jacobs (1961, pp. 143-221) and also Ikeda (2024, Chapter 4).

7 See Ikeda (2024) Chapter 3.

8 Burt (1995) extensively cites Israel M. Kirzner in his analysis of structural holes.

9 I have argued (Ikeda 2024) that the same urban process drives cultural change and changing social norms.

10 See data from the St. Louis Fed, https://fred.stlouisfed.org/release?et=&pageID=2&rid=397&t=

11 See https://www.merriam-webster.com/dictionary/addiction.

12 See https://www.merriam-webster.com/dictionary/addiction.

13 I thank Roger Koppl for suggesting this. The usual caveat applies, of course.

14 This is related to point 3 in section III.1 regarding "mutability" or resilience in the face of damage.

15 See for example the website https://degrowth.info/degrowth.

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Response

THOMAS J. MCQUADE

Bill Butos and I are very grateful to Leslie Marsh for setting aside an issue of *Cosmos + Taxis* for a symposium on our book, to Scott Scheall for expertly managing the contributors and editing the contributions, and to the contributors themselves who have taken the time to read and comment on the book. Academia is, most of the time, a lonely business in which public encouragements from one's hoped-for audience tend to be few and far between. But to discover that colleagues whose work you highly respect find it worthwhile to engage your ideas is very pleasant encouragement indeed, and is much appreciated. It is a tragedy beyond words that Bill is unable to join me in penning this response, but he has listened to what I have written and has expressed that he's satisfied with it, so you can be very sure that he joins me in both the pleasure and the appreciation.

It is heartening that all of the contributors find aspects of our work that relate in some way to theirs, and reading their accounts of those associations has been surprising—in a good way. Elisabeth Krecke has given an excellent account of the distortions in the European banking system due to the heavy-handed attempts of eurocrats to turn banking cosmos into taxis. James Wible has seen commonalities between Hayek's and Popper's works, as well as ours, and that of C. S. Peirce. Sandy Ikeda has assessed the applicability of our concept of a Hayekian system to his area of interest, cities. Randy Holcombe emphasizes the role of conscious choice in the top-down formation of institutions as an area in which our work could be extended. Robert Mulligan adds detail about the evolution of knowledge. And Roger Koppl, perceptive as always, has emphasized one of the fundamental underpinnings of our concept of Hayekian systems—the system-dependent nature of knowledge, implying its applicability to complex systems other than brains (an idea which resonates with his early work with Bill on expectations and with some ideas of his current collaborator, Stuart Kauffman). It has been a pleasure, and an instructive one, to read these thoughtful contributions.

Of course, being academics, we don't agree with everything anyone says! Several contributors raised interesting questions and challenges, and these require (and deserve) some discussion. But one criticism that we do agree with is from Wible, who points out our lack of clarity in distinguishing between "spontaneous order", "system", and "Hayekian system". So, let me try to do better.

By "system", we simply mean a set of interacting processes distinguishable from the environment in which it is located. A "Hayekian system" is a thermodynamically (and, in social systems, informationally) open system with pro-

cess closure, in which can be identified a physical or intangible (or both) structure generated by processes within the system which acts as a model of the system and its environment, and which can condition the actions of processes which interact with the environment. It is an idealization that we have constructed for the purpose of showing a form of process organization common to several important types of social systems. The Hayekian system diagrams abstract from movements of material and focus only on the arrangement and interplay of the different types of system processes, and they also abstract from the nature of the entities which, in social systems, animate the processes. While often "in real life" these entities are individuals, they could also be other forms of Hayekian systems, as is the case in markets containing firms. By showing only process types and their types of inputs and outputs, the diagrams abstract from the multitude of processes going on simultaneously. And finally, they abstract from underlying (possibly Hayekian) systems which condition and support the operation of the system's processes—examples of such being legal, security, and money and banking systems which are vital for the operation of market systems.

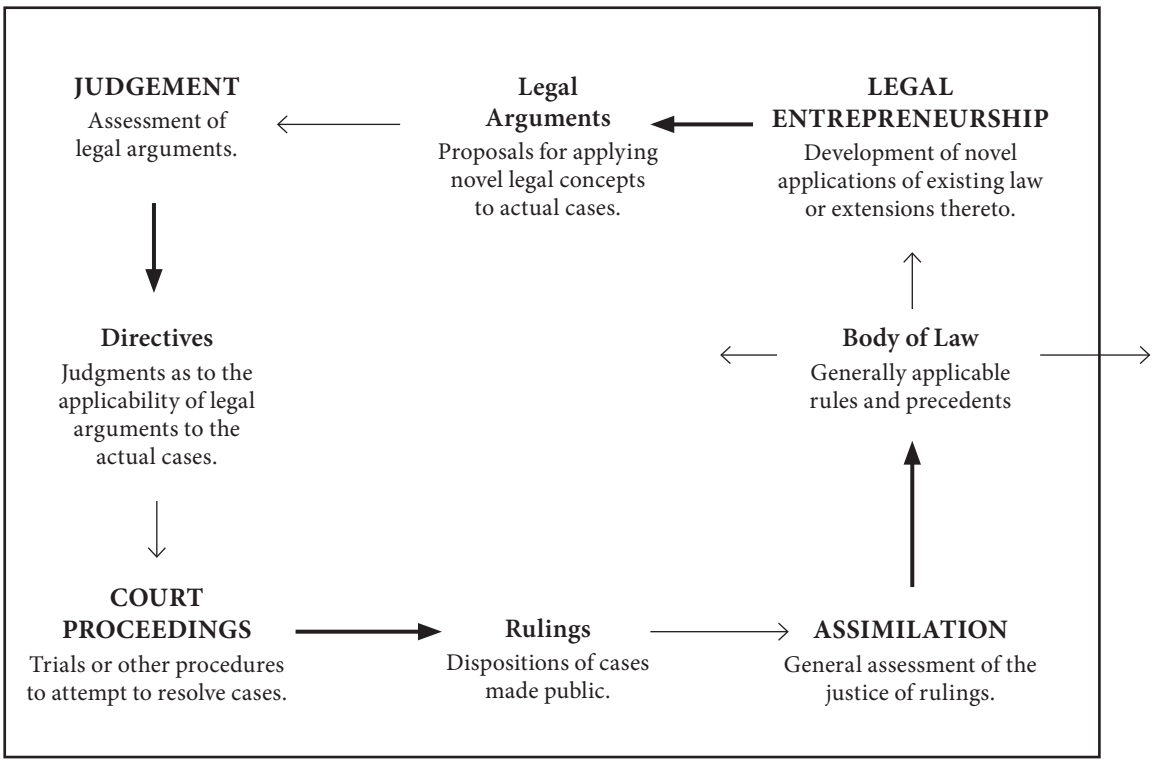
So, a Hayekian system is an "order" in Hayek's sense, but whether one designates a particular Hayekian system as "spontaneous" or not depends first on whether one is talking about its origin, or its continued operation once formed. Market and science systems are prominent examples of spontaneous orders in both senses—their origins were not planned, and their ongoing operation, even when interfered with, adapts spontaneously. But it is also possible to deliberately create a top-down, planned organization, such as a legislature or a firm, which, unplanned by the creators, grows (probably slowly) into an adaptive system. Such an entity is clearly not spontaneous in origin but can, accidentally as it were, become spontaneous in its continuing operation. And here is where we think of governmental systems with a quite different emphasis than that of Holcombe. We would claim that, in their internal operation, legislatures (at least those in more or less democratic states) are far more "spontaneous" than is usually supposed. The "conscious choices" of the legislative participants (in which group we have included lobbyists as well as representatives) do not directly result in the legislated edicts, but rather are an aspect of the interaction between these participants, and it is only through this repeated interaction that legislation is created. This is not to say that there are not many cases in both government entities and firms where the power structure is such that the best model is not a Hayekian system but simply a purposeful individual.

It is obvious from the above that, even in the most insightful contributions, we can always find something to argue about! For another example, we gladly agree with most of what Koppl says, and we appreciate his dissertation on the various concepts of "knowledge". His discussion of the adaptive ship echoes our treatment of the adaptive firm. But we cannot fully follow him in endorsing the attractively pithy slogan "knowledge is adaptation", for while there is certainly a strong linkage between knowledge and adaptation, they are not the same thing. Maybe that's a bit pedantic, but the worry is that it loses the important distinction between constructed-from-the-outside programmed responses and spontaneously generated knowledge structures. Koppl is braver than we are in his application of the term "knowledge", but we would want to distinguish categorically between the spontaneously grown knowledge of a Hayekian system and the built-in "knowledge" of a car.

Ikeda's exercise of grappling attribute by attribute with the applicability of the concept of Hayekian systems to cities is interesting. But here is how we would treat the question. We do not see a city as a system fundamentally distinct from a market system. Rather, it seems to us that the theory of cities is in fact the theory of markets (in the sense of market process), with the added concerns of situating the theory in physical and social space. The physical and social entities called cities are what happen when the basic market processes of exchange, entrepreneurship, judgment, and production can function relatively freely in an environment conducive to their mutually supporting operation. And Jane Jacobs, in her description of the hypothetical ancient city New Obsidian, suggests that the origin of cities lies in the activity of trade and exchange. The realization of the importance (both positive and negative) of the characteristics of the social networks and the physical spaces in which the market processes take place is a major step forward in market theory, and we applaud Ikeda for following up on Jane Jacobs' work and pushing it farther.

Ikeda wonders why we haven't included law or language systems in our catalog of Hayekian systems. All we can say is that law and language are huge subjects in which we have little or no particular expertise. But we do agree with him that treatment of these systems would be a useful extension to our work, and I can attempt brief sketches as to how one might proceed.

There seems to be little doubt that legal systems have emerged spontaneously, and there are several well-documented accounts of decentralized arrangements operating in "dark age" Ireland, Iceland, England, and continental Europe. This history certainly suggests that law can be produced in courts which rely on the support of litigants and defendants in a competitive environment. Reliable producers of rulings widely considered just would attract business; indeed, the process of assimilation of rulings widely considered just would add to or alter the body of rules and precedents which functions as law in the area of operation of the competing courts. In court proceedings, entrepreneurial lawyers could argue for novel applications of existing law or press the need for new rules to cover unusual aspects of the case at hand, and judges would assess the applicability of such innovations to the current case. A law-producing Hayekian system could, then, have the following process organization:



In modern legal systems, the spontaneous production of law still operates to some extent, but it is overlaid by a smothering blanket of legislation and administered and constrained by a monopolized bureaucratic structure. In fact, the distinction between law and legislation, emphasized by Hayek, has been lost. The state takeover of spontaneous systems of law is an interesting story, but much too long to be pursued here.

Language has not (yet) been taken over by central authority, and the process loop of a language system would seem fairly straightforward. Language entrepreneurs come up with novel words and phrases; influencers pick up on those they judge useful or catchy; the public utterances and writings of influencers make the novel contributions public; and a process of assimilation results, if there is more general acceptability, in additions to, or adjustment of, the generally understood vocabulary, grammar, and idioms, i.e., the lan-

guage. As with the case of law, there is much more to be said, but I hope that these briefest of sketches show that both law and language can fall under the umbrella of Hayekian systems.

Finally, Bill and I reiterate that we are very grateful to all involved with this symposium and we are honored that our book should receive such notice. We hope that others will find our approach to the understanding of social systems useful, and will correct and extend both our work and, more generally, that of Hayek, by continuing the redirection of social theory away from the mechanistic metaphors in which it has been imprisoned for far too long.

Review

Should Werner Sombart Get Some Respect?

CHRISTOPHER ADAIR-TOTEFF

In late October 1910 a group of scholars met for three days in Frankfurt am Main. The purpose of the meeting was to gather the members of the Deutsche Gesellschaft für Soziologie (German Society for Sociology) for their first conference. Among the scholars who participated there are a number of familiar names: Max Weber, Ferdinand Tönnies, Georg Simmel, and Ernst Troeltsch. Simmel gave a lecture on the sociology of socialization in the "greeting meeting" and the next day, Tönnies presented the opening address on the paths and goals of sociology. Weber later provided a brief business account and on the following day, Troeltsch delivered a well-received address on the history and goals of natural law. These four scholars are not just familiar names, but are now regarded as among the founders of German sociology. Partially as a result of this, all four have publishing houses devoted to their collected works: Max Weber's *Gesamtausgabe* by Mohr-Siebeck, Simmel's *Gesamtausgabe* by Suhrkamp, and Tönnies'*Gesamtausgabe* and Troeltsch's *Kritische Gesamtausgabe*, both by Walter de Gruyter. But there was another scholar who was equally important for that conference; yet one who lacks the name recognition of the others. And, someone who does not have a collected works in progress or even one that is planned. This scholar was Werner Sombart who presented a paper on the tense relationship between technology and culture.[1] Yet, in 1910, he was as famous, if not more so, than the other four men. Weber's "Protestant Ethic" had appeared only in a journal and Troeltsch was known primarily as a theologian. Tönnies had published *Gemeinschaft und Gesellschaft,* but it had not sold many copies during the two decades it was in print. Simmel had published his major work on money and his later one on sociology, but he seemed to have had a wider reputation outside of Germany. In contrast, Sombart had long been recognized both in Germany and internationally as one of Germany's leading thinkers: he was considered a specialist on socialism and a vigorous defender of workers. As an indication, his *Sozialismus und soziale Bewegung im 19. Jahrhundert* went through four editions in five years (1896, 1897, 1900, and 1900) and it was translated into thirteen languages during this period. Sombart became even more famous with his massive two volume work *Der modernen Kapitalismus* (1902), his volume on why there was no socialism in the United States, and his *Proletariat* (both 1906), which was the first volume in Martin Buber's series *Die Gesellschaft*. Sombart may still be lacking a collected works, but there are a few indications that scholars are beginning to regard his writings with renewed interest. This volume is one indication and the title can be translated as *Letters of an Intellectual 1886-1937.*

As the subtitle indicates, Sombart's letters range from 1886, when he was a twenty-three year old student to 1937 when he was a seventy-four year old world-famous scholar. This collection contains almost 400 letters and postcards, but they are of varying degrees of interest. There are more than fifty letters to Sombart's close friend Otto Lang from the time when they were studying together in Berlin. Many of these are focused on family matters, births, illnesses, and deaths. But some of them contain brief mentions about Sombart's leftist politics and his academic work. Sombart also sent almost as many letters to Heinrich Braun and while many of these contain personal wishes and thanks, most of them are focused on political matters and scholarly issues. That is because Braun was the founder and editor of the *Archiv für soziale Gesetzgebung und Statistik.* Between 1890 and 1903, Sombart was a regular contributor to this journal. Partially that was because Sombart was eager to publish, but much of it was because he and Braun shared the same leftist political views. And, both were staunch supporters of protections for workers and major defenders of workers' right. In 1903, financial difficulties prompted Braun to decide to sell the journal and it was then purchased by Edgar Jaffé for 60,000 Marks (Sombart 2020, p. 291, n. 1454). Jaffé not only renamed it the *Archiv für Sozialwissenschaft und Sozialpolitik,* but he added Sombart and Max Weber as co-editors. Jaffé apparently took care of the financial issues while Weber managed to convince Paul Siebeck to take over as the publisher of the renamed journal (Weber 2015, pp. 68-70). But it was Sombart who was regarded as the link between Braun's original journal and Jaffé's new version. The three editors wrote a brief lead article setting out the editorial principles and goals. They maintained that their principal focus was on the cultural ramifications of capitalism, hence, the preoccupation with the social: *Archive for Social Knowledge and Social Policy.* But they also maintained that their primary responsibility was to scholarly investigations and that it would be up to others to use that knowledge in order to formulate policy (Weber 2018, pp. 126-127, 129-130).

As much as scholars today tend to associate the *Archiv* with Weber, Sombart played a critical role in its development from 1889 until 1920 (Sombart 2020, pp. 442-443). Writing to the publishing house J. C. B. Mohr in late June of that year, Sombart announced his retirement from the *Archiv.* Sombart complained that he had not approved of the direction that the journal had been taking and that with Weber's recent death (June 1920), Sombart believed that it was the appropriate time to change the title page. In a follow up letter, he clarified that he believed that the *Archiv* had become a journal for Jewish-pacifistic, social democrats.[2] But he was also personally wounded by the decision to have the recently added editor Emil Lederer write the note regarding Weber's death rather than Sombart. Sombart regarded this as particularly "tactless" because he had been associated with the journal in its earlier form as well as its present one for thirty years (Sombart 2020, pp. 443-444). There are no letters to Weber in this collection but the reader can get an idea of what Sombart thought of him through some of these letters. The fact that Sombart wanted Weber as a co-editor is one indication of Sombart's respect for him. Another is the fact that in 1915 Sombart chose to write to the publisher of Weber's *Grundriss der Sozialökonomik* about the delay in publishing his contribution. Sombart explained that he was writing to the firm Siebeck and not to Weber in order to spare him this coarseness (Sombart 2020, p. 415).[3]

Despite his numerous publications and his growing fame, Sombart remained an "outsider." In a July 1923 letter to Robert Michels, Sombart conceded that it was not easy to live as an "outsider" because of one's choices and values (Sombart 2020, p. 254). Like Michels and like Tönnies, Sombart was denied a professorship because of his leftist political beliefs. The most interesting letters may be those to Tönnies because of what they reveal about Sombart as well as what they tell us about Tönnies. In a letter to Tönnies dated February 2, 1898, Sombart thanked him for sending condolences about the death of Sombart's father. But he congratulated Tönnies on the birth of his first child and encouraged him to bask in the warmth of the joy that only children can bring (Sombart 2020, pp. 181-182). When Sombart wrote again it was on July 13, 1919 and the relationship between them had changed. The formal "Lieber Herr Tönnies" had been replaced by the more familiar "Lieber Tönnies." And, while Sombart wrote again about his children, it was to indicate that they have all grown up. The wedding for Sombart's fourth daughter was scheduled for the first of August; thus, Sombart readily understood Tönnies' melancholy mood. And, he was in agreement with

Tönnies that perhaps it was time to dissolve the Deutsche Gesellschaft für Soziologie (Sombart 2020, pp. 433-434). How Tönnies responded is not clear but Sombart apologized for not replying to his letter from the beginning of October. Sombart apologized in his letter from November 25, 1919 and indicated that he has moved and invited Tönnies to tea in "our dog house" ("unserer Hundehütte"). He suggested that they should not dissolve the DGS but to reorganize it. And, he asked whether Tönnies had read Troeltsch's article on dialectical method? Not only did Sombart complain that Troeltsch's discussion of Marx was superficial but that it was a bit "rich" for Troeltsch to have the nerve to think that he had somehow "discovered" Marx. After all, Tönnies and Sombart had each written about him a generation ago (Sombart 2020, pp. 435-437). Sombart sent Tönnies a letter on the 30th of December in which he wished Tönnies and his family well and he repeated his hope that Tönnies' son Gerrit would finally be released from a prisoner of war camp in France (Sombart 2020, pp. 437-438). Another letter followed almost two years later and in it, Sombart supported Tönnies' continued membership in the executive committee of the DGS (Sombart 2020, p. 458). On the 25th of July 1925, Sombart sent a lengthy letter in honor of Tönnies' seventieth birthday (July 26) and he suggested that Tönnies look back over his long life with satisfaction. He has achieved much in his academic career and he has overcome numerous obstacles, all the while surrounded by his family. Sombart encouraged his old friend to enjoy his successes and he wished him good health and he expressed the hope that the day of honor will be worthy of Tönnies (Sombart 2020, pp. 480-482). Sombart did not write again to Tönnies for almost a decade and he explained the silence. Sombart was disappointed about Tönnies having ignored his 1924 book on Marxism. But he thanked Tönnies for having sent him a copy of the *Geist der Neuzeit* and indicated that there were parts of the book where their thoughts overlapped. The next letter was not to Tönnies but to Tönnies' wife Marie and it was prompted by news of Tönnies' death. Sombart admitted that in the last decade, he and her husband did not always agree but he indicated that in his last letter to Tönnies that he had not wanted their scholarly and political disagreements to mar their deep friendship. He noted that he had lost a close friend and a wise advisor: "A man, a character, a wise one." Sombart may have slightly inflated his feelings for Tönnies but it is clear that with his death, Germany had lost one of the last members of that scholarly generation and one of the few of which Germany could be proud (Sombart 2020, pp. 532-533). Sombart had shared the leftist beliefs with Tönnies for a number of decades and he had worked with Tönnies to establish and promote sociology in Germany. In 1935, Sombart could regard himself as Tönnies' equal. The difference in their paths undoubtedly contributed to the difference in their reputations. Tönnies rejected Nazism and was punished for it; Sombart became more enthusiastic about Hitler in his later years.

Many of these letters tell us something about Sombart the man and some of them shed light on his political views and his academic status. But there is the sense throughout many of them that Sombart was reluctant to reveal his true feelings and his real thoughts.[4] Whether it was because of his difficult childhood or his status as "outsider" is difficult to tell. Regardless of what he actually felt, he was one of the most significant social thinkers of the first three decades of the twentieth century.

In 1931 Alfred Vierkandt published his encyclopedia of sociology. This *Handbuch der Soziologie* contained 62 entries written by 37 scholars. Most scholars contributed one essay; but Vierkandt himself wrote five as did Theodor Geiger. Given his reputation, it is no wonder that Tönnies wrote a total of four: on property ("Eigentum"), on the modern family ("Die moderne Familie"), on community and society ("Gemeinschaft und Gesellschaft") and on class ("Stände und Klassen"). But it was Sombart who contributed more essays than anyone else—six.[5] These are on the worker ("Arbeiter"), on calling ("Beruf"), on modern forms of life ("Grundformen des menschlischen Zusammenlebens"), on capitalism ("Kapitalismus"), on city settlement ("Siedlungen, I. Städtische Siedlung") and on economy ("Wirtschaft"). By 1931, Simmel had died (1918), Weber was dead (1920), and Troeltsch had passed away (1923). Of the five who were the main speakers in 1910, only Sombart and Tönnies remained to promote sociology and to help establish it with Vierkandt's book. If Weber, Simmel, Troeltsch, and Tönnies are revered as the founders of German sociology and if Weber, Simmel, and Tönnies are regarded as specialists on modern capitalism, perhaps it is time to reconsider Sombart's work and elevate him to his proper place in the pantheon of German sociolo-

gists and socio-economists. This collection of letters provides another reason why Werner Sombart should get some respect.

NOTES

1 These five speeches as well as four others are found in the *Verhandlung des Ersten Deutschen Soziologentages. Verhandlungen 1911.* An account of this conference and a translation of the five speeches is found in Adair-Toteff 2005.

2 This complaint was not new; in a letter to Paul Siebeck from July 1915 he had requested that his name be dropped from the title page (Sombart 2020, pp. 416-417).

3 In the same letter Sombart complained that his essay on capitalism still had not appeared in the *Grundriss* despite having been written ten years prior. In fact, it would not be published until 1925, five years after Weber's death (Sombart 2020, pp. 442-443).

4 There are exceptions. In particular, the letters to Carl Hauptmann reveal the depth of Sombart's grief on the death of his wife Felicitas in December 1920 (Sombart 2020, pp. 450-453). It is also indicated in a letter of condolences to another friend Wilhelm Bölsche upon hearing the news that he had also lost his wife (Sombart 2020, pp. 464-465).

5 Sombart was internationally famous. To offer only a few examples: He gave two lectures (in German) at the London School of Economics in 1928. He estimated that his audience was between 150 and 200 people in each of the lectures. The same year he gave a lecture in Zurich and another in Munich the following year. And, he presented a number of lectures at Bern between the end of July and the middle of August in 1931 (Sombart 2020, pp. 492, 495, 510). Then there was a special "Festsgabe" for Sombart in 1932.

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Review

A Radical Right World?

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The Right is experiencing a political and electoral resurgence, particularly in the West. Leaders such as Javier Milei in Argentina, Giorgia Meloni in Italy, Viktor Orbán in Hungary, and the return of Donald Trump to the White House, alongside parties like Alternative for Germany and the National Rally in France, signal a growing strength. To paraphrase Harold Macmillan, the Right has never had it so good. Not since the 1980s, when figures like Margaret Thatcher and Ronald Reagan dominated, has the Right held such sway, with Right-wing ideas at the forefront.

The current Right ascendant globally differs significantly from both the Post-War Right of the 1980s and contemporary mainstream conservative movements. It opposes not only the modern world but also, as its proponents argue, so-called 'establishment' conservative movements that continue to uphold ideas central to the post-war Right. While recognising some of its valuable insights, the contemporary Right is highly critical of—sometimes outright rejecting—this legacy, which often persists in contemporary conservative politics. It views the ideas of the Post-War Right as partly responsible for today's ills, arguing that the solutions proposed at the time—many of which remain in place—merely served as smokescreens, reinforcing rather than challenging modern problems. Thus, the contemporary Right critiques both the Post-War Right's legacy and the liberal rationalism it despises.

The contemporary Right's rejection of the Post-War legacy and mainstream conservative movements can be traced to the rising influence of its radical elements, which are gaining dominance in both intellectual and political spheres. This shift is evident in the UK, where Reform UK challenges the Conservative Party leadership, and in countries such as France, Brazil, Hungary, and Poland, where radical Right-wing parties are gradually displacing traditional ones. The Radical Right is increasingly seen as synonymous with, or the main representative of, the contemporary Right.

The rising dominance of the Radical Right has sparked intellectual reflection on the future of conservatism and generated growing interest in how its views have come to dominate contemporary Right-wing politics. Its ideas have become so widespread that they now shape political discourse and enable it to attain power. The book *World of the Right: Radical Conservatism and Global Order*, by Rita Abrahamsen, Jean-François Drolet, Michael C. Williams, Srdjan Vucetic, Karin Narita, and Alexandra Gheciu, explores possible explanations for the Radical Right's success. This work, a comprehensive and essential introduction,

Rita Abrahamsen, Jean-François Drolet, Michael C. Williams, Srdjan Vucetic, Karin Narita, and Alexandra Gheciu. *World of the Right: Radical Conservatism and Global Order.* Cambridge: Cambridge University Press, 2024, pp. 220.

stands as one of the most preeminent studies of the Radical Right, its ideas, and its challenge to the modern world.

The book's central argument comprises several components, the first being the most crucial and challenging for the authors to substantiate. This component asserts that the Radical Right operates not only within domestic spheres but also "on a scale that is global rather than geographically confined" (pp. 2-3). While acknowledging that this claim may provoke scepticism, the authors emphasise that Radical Right ideas are not monolithic. However, their unity is anchored, first, in the Radical Right's transnational interactions and relations across multiple spheres. Secondly, the Radical Right is "substantially constituted…by its relation to the global…not just in opposition to globalisation, but in an ideological relation to the global" (p. 12). Finally, it shares common methods and tactics, fostering a form of unity. Through these shared methods and tactics, the Radical Right identifies a common adversary in the Liberal International Order established by Liberalism.

This leads to the second component of the argument, which asserts that the Radical Right poses a significant threat to the endurance and the achievements of the Liberal International Order. This threat arises from the Radical Right seeking

> to reconfigure political life as an all-consuming conflict between those who wish to deepen the infrastructures that grew out of the geopolitical transformations of the twentieth century and those who wish to dismantle these infrastructures to the profit of nativist and neo-traditionalist alternatives (p. 104).

The final component centres on the authors' contention that the political ascendancy of the Radical Right and its challenge to the Liberal International Order necessitate scholarly attention. They underscore this urgency by asserting, "we underestimate the Radical Right at our peril" (p. 182).

What is the Radical Right? This is a complex question that invites diverse interpretations within the scholarly community. The authors address this challenge directly, acknowledging the difficulty of defining both the Right and conservatism, as well as identifying their constitutive characteristics. As they note, this issue is compounded by the fact that the mainstream Right shares many concerns with the Radical Right. Therefore, they offer a key distinction: the Radical Right rejects the gradualist approach of the Mainstream Right in favour of

> a more militant, voluntarist, and programmatic approach that will command the loyalty of individuals and bind them together into an organic whole to a greater extent than existing institutions can be expected to do under present conditions of sociocultural decay (p. 24).

Building on this distinction, the book explores the intellectual strategies and ideological content that define the Radical Right. The first of these is the development of a 'Gramscianism of the Right'. The Radical Right's appropriation of Gramsci arises from the Post-War Right's failure to recognise the role of intellectual and cultural spheres in shaping societal and political power. This failure led the Post-War Right to either concede to liberalism, remain inactive, or, at worst, perpetuate its cultural and intellectual hegemony with destructive consequences. While the authors acknowledge conservatives' long-standing critique of liberal rationalism, what distinguishes the Radical Right is "both a foundational critique of liberal modernity and an attempt to build a non-liberal alternative by radicalising rather than rejecting some of modernity's most powerful dynamics" (p. 55).

The Radical Right's distinctive approach lies in its adoption of a Gramscian-inspired 'Metapolitics', which seeks to provide "the bases for a thoroughgoing critique of liberal modernity so as to reveal the deep and powerful interconnections between thought, culture, and power that underpin liberal domination—and in so doing, provide the means of resisting and gradually overturning it" (p. 50). This 'Metapolitics' offers the Radical Right both the doctrinal framework and intellectual tools to identify the liberal hegemony

to be challenged, as well as the counter-hegemony strategy required. It further outlines the strategic direction for implementing this approach, including the identification and mobilisation of the social forces necessary to establish the Radical Right's desired hegemony.

The second defining feature of the Radical Right is its critique of liberal hegemony and its consequences, particularly 'New Class Managerialism'. This development stems from the displacement of classical, or bourgeois, liberalism—with its scepticism of arbitrary power—in favour of managerial liberalism. The latter represents a technocratic form of governance, grounded in the belief that technical expertise and specialised knowledge are key to solving social problems, many of which, it argues, stem from bourgeois concepts such as national identity.

Managerial liberalism became the ideological foundation of the 'New Class'—a cadre of managers, bureaucrats, administrators, experts, and engineers—who replaced traditional bourgeois elites and drove the managerial revolution. This revolution involved "the merger of state and economy, the centralisation of government at the expense of local authority and mediating institutions, the diffusion of mass education, consumerism, the mass media, and so on" (pp. 74-75).

The New Class became the dominant elite not only domestically but, with the advent of globalisation, took on a more concerning global dimension in the eyes of the Radical Right. This global expansion is unsurprising for the Radical Right, as it is driven by the universalism embedded in the New Class's project of managerial liberalism. For them, globalisation is merely the operational force of this managerial liberalism. At the heart of the project is the targeting of "'traditional' social orders, states, ideas, and identities that oppose its expansion, eroding non-liberal societies and refashioning them in its image" (p. 83). Thus, economic, cultural, social, and political globalisation—and the practices, identities, and institutions emerging from it—serve as instruments for the New Class to propagate the managerial revolution, structure, and identity on a global scale.

The Radical Right appropriates Gramsci to identify both the problem—'New Class Managerial Liberalism'—and its manifestation in the Liberal International Order. It also draws from Gramsci the solution: the 'War of Position'. This gradualist, counter-hegemonic strategy involves, first and foremost, the emergence and expansion of a publishing industry that makes right-wing texts, from past to present and future, more readily available.

The authors wisely do not delve into the full range of publishers involved in the 'War of Position', but they do highlight Arktos Media, founded by Daniel Friberg, whose company operates under the motto 'Make anti-globalism global.' Additionally, even established right-wing publishers like Regnery Publishing have expanded their output, moving beyond mainstream conservative themes to include works inspired by the Radical Right.

The second aspect of the 'War of Position' is the emergence, sustainment, and expansion of educational institutions aimed at educating and preparing the Radical Right elite, who would lead the counter-hegemonic strategy. The authors rightly note the Right's widespread disdain for the evolution of the university, both as an institution and a community, particularly since the 1960s. The key difference now is that both established and new institutions with a right-wing ethos are increasingly adopting a more radical agenda.

Again the authors prudently avoid exploring the totality of this growing educational landscape, they highlight, for example, the long-established Hillsdale College in rural Michigan and its embrace of the Trump agenda, particularly through its president Larry Arnn's involvement in the 1976 commission. This commission was established as a right-wing, patriotic alternative to the 1619 Project. The book also highlights newer institutions, such as the Rassemblement National-connected Institute of Social Sciences, Economics, and Politics, whose ethos mirrors the Radical Right's critique of liberalism and its views on geopolitics.

In the authors' view, these identifiers provide a suitable framework for understanding the Radical Right. However, the exploration of these identifiers represents the book's main weakness. It lacks a deeper analysis of the idea—acknowledged by the authors—that the Radical Right's critique resonates with or mirrors mainstream Right ideas. This omission leaves the reader with an incomplete understanding of how the

mainstream Right may sympathise with or share the concerns of the Radical Right, even adopting some of the same identifiers, without necessarily aligning with the Radical sphere.

For example, consider the identifier related to the appropriation of Gramsci or Marxist themes. The authors fail to fully explain why mainstream conservatives who draw on Gramscian or Marxist frameworks might reach different conclusions and propose distinct solutions from the Radical Right. This omission is notable, as figures like Maurice Cowling represent a strand of conservative thought that embraces the label of 'Tory Marxist'. Cowling's theory of public doctrine shares intriguing parallels with Gramsci's concept of hegemony, underscoring the complexities and variations within Right-wing intellectual traditions.

The same critique applies to the other identifiers. Many of the themes discussed in the book reveal points of convergence between the Radical Right and the mainstream Right. For instance, Right-wing figures like Kenneth Minogue have offered compelling critiques of globalisation, internationalism, and what he terms 'Olympianism' and its leaders, themes that would likely resonate with the Radical Right. However, Minogue does not seek to radicalise modernity through counter-hegemonic cultural politics. Instead, he defends a specific conservative and individualist view of the modern world—one he believes is worth preserving.

By neglecting to explore these convergences and the divergent conclusions reached by mainstream conservatives and the Radical Right in greater detail, the authors miss an opportunity to offer a more comprehensive understanding of both the contemporary mainstream Right and the Radical Right. At the very least, this could have provided a richer framework for identifying and differentiating them. While one might argue that this omission is justifiable, given its potential to fall outside the primary scope of the work, it nonetheless diminishes the depth of analysis in what is otherwise an excellent book.

The lack of exploration on this point also exposes a potential weakness in the argument for a Global Radical Right, particularly regarding the Global Right label itself. Although the book acknowledges internal dissent within the Radical Right—such as divisions between capitalist libertarians, traditionalist conservatives, and advocates of state interventionism—this fragmentation could have been examined in greater depth.

For example, the authors conflate figures such as Tucker Carlson, Jordan Peterson, and Yoram Hazony as 'the luminaries of the global radical Right' (p. 134). While these figures undoubtedly share some views—for instance, their aversion to woke ideology—there are significant internal contradictions and doctrinal divergences that create tensions, making it difficult to classify them under the same label. A more thorough exploration of these differences would have strengthened the analysis and provided a more compelling justification for applying a unifying label such as the Global Radical Right.

Ultimately, the Global Radical Right label may require at least two fundamental identifiers to substantiate such a classification, despite the absence of monolithic ideas among Radical Right thinkers. First, its misreading of the challenges facing the West, as it attributes all perceived decline to the individualist disposition that made the modern West possible. Second, as a consequence of this misreading, the Global Radical Right advances an ideological project of total transformation. Moreover, while the book acknowledges internal dissent within the Radical Right—such as between capitalist libertarian factions, traditionalist conservatives, and advocates of state interventionism—this division could have been explored more thoroughly. For example, consider the contrast between figures like Elon Musk and Vivek Ramaswamy, who favour a more market-driven approach, and the more interventionist elements within Trump's coalition, particularly regarding policies like H-1B visas for foreign tech workers. Expanding on how these internal contradictions, both domestically and internationally, could lead to intellectual and doctrinal tensions would enhance the analysis. Ultimately, the Radical Right may be better understood not as a cohesive global force, but as a collection of overlapping yet distinct national movements.

The final chapter of the book explores the detrimental implications of the Radical Right's counter-hegemonic project for the preservation of the Liberal International Order and its geopolitical consequences. At the conclusion of the book, the authors succinctly summarise what is at stake, stating:

> The multipolar, civilisational world order envisioned by these alliances and the radical Right is not anti-hierarchical and inclusive. It legitimises new differences and new forms of exclusion through its claims to difference and cultural diversity…. And it seeks a more sovereigntist vision of the world in which these exclusionary forces would be able to operate with fewer international constraints, be it in the Global North or the Global South (p. 182).

I agree that the political and electoral growth of the Radical Right carries significant stakes. However, I leave it to the reader to decide and further explore this issue. What I wish to address here is a question that lies beyond the scope of the book but raises an important intellectual concern: Can mainstream conservatism, particularly the variation I term civil conservatism, survive being captured by these forces and still represent a moderate, prudential, and sceptical alternative to the Radical Right?

The preliminary answer is yes, but the challenge is considerable. Civil conservatism—the belief that the preservation of the civil association, which accommodates distinct individuals within a framework of laws, should be the primary concern of political conservatism—has been in decline for many years. For example, the civil ideal has often been confused or subsumed within the post-war Right by those who equate the defence of the civil association with an uncritical defence of the free market and capitalism. More recently, it has been overshadowed by doctrinaire national conservatives seeking to merge the civil ideal with the nation-state, or by conservatives advocating for a pre-political form of community. The Radical Right represents yet another way the civil ideal is being forgotten—consumed by the expectation, shared by many contemporary conservatives, that a civil association can deliver what it cannot: a Right-wing utopia.

The articulation of civil conservatism in a world shaped by the Radical Right requires, first, placing the civil association at the core of its doctrine. Second, it demands a realist, sceptical, and limited approach to politics. Third, it necessitates recognising both the limits and dangers of scepticism. Fourth, proponents of civil conservatism must engage beyond academic discourse. Fifth, it requires distinguishing the defence of a civil association from an uncritical defence of capitalism. The book offers the final essential ingredient: civil conservatism cannot ignore or dismiss the concerns of the Radical Right. On this point, the book is useful in identifying those concerns, but the authors, due to their explicit commitment to liberal ideas from a more left-leaning perspective, largely disregard them. That is, throughout the book, the authors neither sympathise with nor attribute any legitimacy to the concerns of the Radical Right. To challenge the Radical Right's claim as the sole and legitimate voice of the Right, civil conservatism must engage with these concerns directly and acknowledge the legitimacy of those that pose a genuine threat to the civil association.

World of the Right: Radical Conservatism and Global Order offers a wake-up call not only to supporters of the Liberal International Order but also to both the traditional Left and Right, whose themes are increasingly being embraced, expanded upon, and claimed by the Radical Right. The book makes it difficult to deny that the Global Radical Right has become the most formidable intellectual and political force driving total transformative change worldwide. This, in itself, alongside the changes the Radical Right advocates, makes it necessary that "for those who worry about its past successes and future potential, recognising its key elements and taking it seriously are essential steps in countering its impact" (p. 187). Abrahamsen and her co-authors have produced an essential work of scholarship that anyone trying to understand the rise, success, and allure of the Radical Right cannot afford to overlook.

Review

The Ethics and Economics of Liberal Democracies: Foundations for PPE

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The title of Carl Hodge and Andrew Irvine's book, *The Ethics and Economics of Liberal Democracies: Foundations for PPE*, encapsulates three interrelated and profoundly significant concepts: Ethics, Economics and Liberal Democracy.

University courses in Philosophy, Politics and Economics were born out of the conviction that combined study of these three disciplines would be beneficial to both students and the society at large. Since the first PPE degree course was established at the University of Oxford in the early 1920s, major universities around the globe have offered similar programs that stem from the same basic idea, recognizing the importance of integrating these fields.

At first glance, ethics, economics, and politics may seem like distinct disciplines. However, anyone familiar with the history of philosophy knows that these fields were historically interwoven. In ancient Greece, economics was an essential part of practical philosophy and closely connected to both ethics and politics, as can be seen in the works of Xenophon and Aristotle.

Philosophy explores and sets the principles and value systems that are implemented through politics, taking into consideration their economic implications. The examination of all three aspects lead to more coherent public policies that benefit societies at large. This unity persisted into the modern period under the umbrella of Political Economy, which examined politics and economics without losing sight of the ethical dimension.

However, in the 20th century, the rise of specialized academic disciplines fractured this connection. Economics began to be treated as an isolated field, separate from politics and ethics, under the assumption that it would advance more efficiently on its own. Nevertheless, this separation had a detrimental effect on both economics and politics. Economics lost its ethical foundation, while politics became either too abstract or confined to empirical case studies in political science. Over the years, economics has gradually gained the primary role at the expense of both politics and philosophy. This phenomenon was recently apparent in Greece during the decade of its financial crisis, 2009-2019.

In this context, the words of St. Augustine appear to be particularly relevant: "If justice is absent, what is political power but organized robbery?" The interplay between ethics, politics, and economics is crucial today, as liberal democracy faces threats not only on the periphery of the Western world but also at its core. Hodge and Irvine's book eloquently addresses this, offering an organized and accessible guide for students and the public. It provides the intel-

Carl Hodge and Andrew Irvine
The Ethics and Economics of Liberal Democracies: Foundations for PPE.
New York: Routledge, 2024.

lectual framework to reassess and protect the foundational principles of our civilization—principles that have been the fruit of centuries of human struggle.

It is imperative that the defence of liberal democracy be initiated at the level of universities, with particular emphasis on European institutions. In recent years, economic stagnation has fueled widespread discontent, especially among younger generations. Many of the brightest young Europeans are seeking opportunities abroad, while those who remain often turn to extreme political movements, blaming liberal democracy for their frustrations. This underscores the intrinsic connection between economics and politics. Meanwhile, in Asia's rapidly growing economies, we observe the opposite trend—youth, empowered by economic success, are increasingly demanding political reforms and aspiring to establish more liberal institutions.

As it is clearly stated in the first pages of the book, *The Ethics and Economics of Liberal Democracies* was written especially for PPE courses and PPE students. It is an excellent introduction, not only as a primer for undergraduate and postgraduate students currently engaged in PPE courses. It can serve as an excellent tool for students and scholars who are interested in theories and practices concerning the Liberal Democratic Paradigm in general.

Hodge and Irvine argue that the major pillars of liberal and democratic societies rest on six key principles: democracy, human rights and civil liberties, a rule-based economy, the rule of law, the formation of a political community, and liberal education. They trace the origins of modern liberal democracy to the ancient Greek tradition of mixed government, as articulated by Aristotle and Polybius, and the eudaimonic philosophy rooted in Aristotle's ethics.

The Liberal Democratic Paradigm can be identified as the socio-political environment in which parliaments function and free elections take place; that is, all those features of orderly political life appear which we recognize in parliamentary democracy. These are the "basic values of the West" according to Vaclav Havel's quote at the beginning of the book's Preface.

In economic terms, the economy in almost all parts of the world respects the right to private property and private ownership of the means of production; that is, it follows the so-called liberal economic model. The environment, characterised by a liberal economy and democratic representation in the exercise of power, is referred to as the Liberal Democratic Paradigm.

The Liberal Democratic Paradigm establishes the context and produces the framework within which the book is developed. In its ideal form, the Liberal Democratic Paradigm seeks to ensure that each person finds his place in society according to his talent and skills, not his social background. The primary concern of the state is to safeguard the individual rights of citizens, in particular the fundamental values of life, liberty and private property as John Locke famously espoused in the *Second Treatise*. It is vital to make reference to Locke, because this general concept that we are discussing here, has been associated with the moral liberalism and liberal pluralism of 17th century British philosophy. It has been followed by Bentham and Mill later on, but it was founded by Locke in 1688. In essence, the ideas under scrutiny align with the tenets of moral liberalism.

What, then, is moral liberalism? Moral liberalism could be defined as the theory that posits the capacity of individuals to ascertain the meanings of good and evil and to act freely without recourse to external factors, such as experts who possess the keys to the Kingdom of Knowledge.

But isn't that a self-evident principle? Does anyone disagree with this particular status of human beings as political beings? In the field of philosophy nothing is self-evident. Those who espouse an opposing view maintain that humans are incapable of discerning the meaning of good and evil and of determining their actions without the assistance of those who possess the requisite knowledge. In Plato's *Republic*, for instance, "those who know" are the philosophers. In medieval thought, "those who know" are the representatives of religion. In Marx's theory, "those who know," are the holders of knowledge of historical laws, namely those who follow historical determinism—one could add, in a more or less, religious way.

The book illuminates the interconnections between philosophy, politics and economics. After the general Introduction, the next three chapters of the book serve partly as introductions to each one of the three

disciplines. Each chapter of the book is accompanied by a very useful section offering guidance on bibliography and further reading.

The book's first chapter addresses philosophical foundations focusing on the concept of eudaimonia, or human flourishing, and how it is safeguarded within a political community. The authors also provide a comprehensive analysis of contemporary social contract theories, central to modern political philosophy.

In the second chapter, the authors explore economics, challenging the prevailing misconception that capitalism is a system in search of a moral foundation. Instead, they argue that capitalism itself embodies a moral framework. The current crisis of capitalist democracy, they suggest, arises from the artificial separation of economics from moral considerations. They emphasize the need for societies and governments to reclaim some control over economic forces to ensure stability while promoting progress. Their discussion of wealth inequality is particularly enlightening, as they argue that inequality does not inherently lead to poverty but must be managed within a balanced system.

The third chapter draws a distinction between ancient and modern democracies, highlighting significant differences between the two. The authors argue that modern liberal democracy aligns more closely with the mixed constitution of Greek and Roman governance, rather than the pure democratic model of 5th-century BC Athens. The chapter also delves into the importance of the rule of law in countering populism. Here, we could offer a slight critique: populism should not be considered an external threat to democracy; rather, it should be recognised as an inherent feature. In Greece, because of our ancient democratic tradition, populism remains a potent force, while the rule of law struggles to establish a firm foundation. This dynamic is evident in Greek universities, and more recently in Canada and the United States, where student groups often equate democracy with decision-making through random assemblies, irrespective of legitimate authority.

The fourth chapter examines the principles of rule of law and democratic accountability, which are considered fundamental prerequisites for a democratic society. The chapter opens with a quotation from Locke's *Second Treatise*. Locke's contributions to these concepts are much more advanced than those of Hobbes. In particular, Locke's ideas on accountability are seen as a significant development in the field.

However, the notion of democratic accountability is inextricably linked to the ancient Greek polis and the original creation of democracy. This concept is exemplified by the term [λόγον διδόναι] *logon didonai*. Cornelius Castoriadis elucidates this concept, asserting that the notions of *theory* and *democracy* emerged concurrently within the Greek polis.

Noam Chomsky's celebrated analysis of the term "theory" provides a comprehensive overview of the abuse the term has suffered. The arising question, therefore, is: what is theory? Castoriadis supports that theory is an activity, a human project, a socio-historical project which is based on *λόγον διδόναι*—to give account and account—for everything: for the world, for the objects that surround us, for their "laws", for ourselves, for this very activity. To say this is to say that we are still in the theory—in this project, and that we continue to pursue it. To ask ourselves: what does it mean to *λόγον διδόναι*, why we should *λόγον διδόναι*—still means to want *λόγον διδόναι*. This is a pure fact; we simply cannot do otherwise. We cannot do otherwise since the question has been raised. We know that it has not always been raised—but it was raised, "at a given time" in the Greek polis.

The chapters on corruption and climate crisis as threats to liberal democracies are particularly insightful. Corruption is an issue that has existed since the dawn of government itself. In today's world, it is amplified by the sheer volume of capitalist wealth.

Chapter seven begins with a quote from Rachel Carson's influential *Silent Spring*. Actually, Murray Bookchin's first book, *Our Synthetic Environment* (1962), was published a few months before Carson's book. Nonetheless Carson is considered the main pioneer of the subject.

In addressing the climate crisis, the authors draw on Oakeshott's and Hayek's thesis, cautioning against solutions that risk becoming worse than the problem itself. Environmental challenges and the EU's climate transition policies have triggered a significant political crisis for liberal democracy in Europe.

Chapter eight, *Civil Society*, is the last, and most probably, one of the best chapters of the book. It tackles difficult issues with particular clarity. We are referring to identity politics and academic freedom, as posited by the quotation, "it is by searching for shared values rather than shared identities that politics is elevated from comforting necessity to effective statecraft." This statement is both bold and valid.

Overall, Carl Hodge and Andrew Irvine's book is a masterful contribution to the field. It is clearly evident that the Liberal Democratic Paradigm is currently facing challenges from multiple perspectives. However, upon completion of the Epilogue and subsequent reflection on the contents of the book, it became apparent that there are compelling reasons to be less pessimistic about the future of this paradigm. It is therefore strongly recommended that the book be read. It could form the perfect companion for the parallel study of the interconnections between philosophy, politics and economics.

Review

Spectral Futures and Economic Civility: Rethinking Capitalism with Andy Hines

NATHAN MATTHIAS MOORE
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Andy Hines' *Imagining After Capitalism* (2025) presents a bold, speculative intervention in contemporary critical thought, offering a framework to envision economic, social, and cultural structures beyond the entrenched capitalist paradigm. By engaging with utopian imaginaries and theoretical extrapolations, Hines attempts to chart a course toward alternative modes of existence where human flourishing is no longer subordinated to market imperatives. This review interrogates *Imagining After Capitalism* through the lens of cultural studies, critical posthumanities, and transhumanist discourse, situating Hines' work within a broader conversation about economic hegemony, technological transformation, and the aesthetics of futurity in the wake of classical liberalism's supercalifragilisticexpialidocious enchantment.

One of the most striking insights, or enchantments, from Hines' argument, as emphasized in his interview with myself, Nathan Moore, on the *New Books Network*, is the assertion that "we are living in an economy rather than living in a society." This observation encapsulates the tension between capital's totalizing logic and the residual aspirations for social cohesion and ethical collectivity. This claim resonates with my previous work (Moore 2024), where I examined how technological infrastructures and transhumanist thought are frequently co-opted by neoliberal agendas, transforming them into tools of further economic enchantment and stratification rather than genuine liberation. Hines' critique, while deeply theoretical, calls for an urgent political reimagining of how technological and economic systems can be repurposed for the collective good rather than individual accumulation.

Hines' approach toward the "imaginary" or supercalifragilisticexpialidociousness aligns with recent inquiries in hauntological studies, particularly the specters of past economic failures and unfulfilled political promises that continue to shape contemporary imaginaries of the frontier. *Union Pacific* (1939) by movie director Cecil B. DeMille uses Hollywood's cinema of spectacle to explore how mass media reinforces the myth of frontierism's economic and geographical expansion, especially during or after wartime, as a moral and nationalistic imperative. Similarly, *Imagining After Capitalism* exposes the ideological scaffolding that is analogous to the transcontinental railroad motif, rendering alternative economic structures seemingly impossible within "capitalist realism," a notion deeply indebted to the work of Mark Fisher (2009). Furthermore, popular culture in the U.S., as it was partly shaped by mass media and a new Japan in the 1980s (McKevitt 2005), reflects on the international impacts *Capitalist Realism* ad-

dresses in reshaping a modern shock-and-awe cultural landscape. Hines' work, however, moves beyond criticism of capitalism and into speculative reconstruction (see *Union Pacific*), challenging readers to conceive of an economic system that fosters creativity, autonomy, and sustainability in new communities.

From a media-theoretical perspective, Hines' exploration of economic imaginaries can be fruitfully juxtaposed with theories of cinematic and digital spectatorship. The role of visual culture in shaping ideological constructs cannot be overlooked. Just as Sergei Eisenstein's montage film theory suggested that meaning is actively constructed by the viewer through juxtaposition (1949), Hines' method of critically re-imagining post-capitalist futures operates through a similar dialectical process—deconstructing the present to reveal potential alternatives. This is further complicated by the digital economy's reliance on spectacle, where consumerist desire is continually regenerated through algorithmic manipulation. Hines' challenge, then, is to carve out imaginative spaces not yet enclosed by neoliberal imperatives while maintaining a nuanced understanding of how economic freedoms contribute to human flourishing.

Another compelling aspect of *Imagining After Capitalism* is its engagement with historical trajectories of economic phantasms of thought (see *The Phantom of the Opera*), yet it occasionally falls into the abstraction that often plagues theoretical projects of this scale (Gunning 1986). While Hines acknowledges the material conditions necessary for systemic change, his analysis could benefit from a more explicit engagement with contemporary political movements actively working toward these transformations. This is where a synthesis with transhumanist and digital humanities scholarship could strengthen his vision. An intersection of spectacle and ideology is crucial to understanding the dissemination of economic mythologies. Hines' work, while gesturing toward the necessity of new narratives, could further develop the role of media and technological infrastructures in shaping post-capitalist consciousness.

Andy Hines' *Imagining After Capitalism* then presents a bold, provocative engagement with the necessity of envisioning alternative socio-economic structures in a world deeply entrenched in neoliberal ideology, a crossroads for classical liberalism. As an extension of utopian and speculative thought, Hines' work resonates with contemporary debates on post-capitalist futures, where imagination is not simply an intellectual exercise but a political imperative to building New Worlds. His core argument—that we have been living in an Economy rather than a Society—captures the ideological shift that has undergirded late-stage capitalism's reification of economic logic over collective well-being. This review situates *Imagining After Capitalism* into non-normative bounds as Hines suggests and into the broader intellectual traditions also transitioning to Cultural Studies.

Hines' project ultimately follows in the tradition of utopian theorists, offering a clear rejection of the fatalism that often accompanies discussions of capitalism's dominance. His work challenges us to rethink the frameworks of production, exchange, and labor, engaging with traditions that range from Marxist *critiques* of alienation to contemporary posthumanist *interventions*. However, a critical question emerges when examining Hines' vision through the lens of classical liberalism: *Can we construct an emancipatory economic future while still preserving the fundamental principles of individual liberty, voluntary exchange, and limited government?*

A useful counterpoint to Hines' perspective is found in *Freedom and Equality: Essays on Liberalism and Feminism* (Chambers 2024), where liberal theorists contend that economic liberty and social justice are not inherently at odds but can be synthesized through institutional design. Hines' vision of a post-capitalist world risks neglecting the insights of classical liberalism, particularly the Hayekian (1944) critique of central planning and the unintended consequences of top-down economic intervention. While his speculative approach is compelling, it lacks a clear engagement with how liberal institutions might *evolve* rather than be wholly discarded in pursuit of a new socio-economic environment.

Hines' argument also recalls Antonio Gramsci's concept of hegemony, in which ideological dominance is not just enforced through coercion but is maintained through consent and cultural institutions. Just as Gramsci emphasized the necessity of a 'war of position' to counteract hegemonic structures, Hines' work implicitly calls for a new terrain of ideological struggle—one rooted in imagination, speculation, and alternative futures. His emphasis on speculative narratives, while primarily directed at economic structures,

aligns with the broader cultural currents and trends of transhumanist foresight, as seen in narratives of technological enhancement, immersive digital landscapes, and emerging debates on digital sovereignty.

Ultimately, Hines' *Imagining After Capitalism* is a timely and necessary intervention into contemporary debates on economic futurity. By foregrounding the importance of speculative thought, Hines aligns with the broader avant-garde currents that seek to dismantle existing ideological structures in favor of more just and imaginative alternatives. His work is essential reading for scholars of cultural studies, political theory, and digital humanities who seek to engage with the pressing question: *What comes after capitalism?* As this review has suggested, *Imagining After Capitalism* is best read alongside contemporary engagements with posthumanism, emanation theory, and transhumanist speculation, as these fields offer complementary tools for understanding and enacting systemic change in an increasingly technologized world.

However, a truly *radical* imagination should not merely seek to replace capitalism but rather critically interrogate how economic systems—capitalist, socialist, or otherwise—structure human relationships. Classical liberalism has long argued that markets, when properly constrained by legal and ethical frameworks, are among the most effective means of fostering human cooperation and innovation. The challenge, then, is not simply to envision life after capitalism but to explore how economic liberty can coexist with egalitarian principles in a manner that is just, sustainable, and, most importantly, free. By incorporating these concerns, *Imagining After Capitalism* could offer a more robust vision for the future—one that is not only speculative but also deeply attuned to the enduring tensions between freedom, equality, and economic organization.

A critical engagement with *Imagining After Capitalism* must also address its limitations. While Hines' work is rich in theoretical speculation, it occasionally underestimates the material Malthusian constraints that prevent ideological transformation. Similar to what I discussed in my academic research on the Great Divergence, the aestheticization of utopia can sometimes obscure the historical forces that resist positive structural change. Hines' vision of a post-capitalist future risks an over-reliance on intellectual abstraction, requiring a more concrete engagement with political strategy and praxis in a synthesis of both culture and science. This echoes debates within transhumanist discourse, where the promise of human enhancement is frequently detached from the socio-political conditions that govern access and control to technologies.

Nevertheless, Hines' book offers an invaluable contribution to contemporary debates on economic futures. *Imagining After Capitalism* revitalizes the utopian impulse that is often dismissed within mainstream discourse by foregrounding imagination as a political tool. Drawing from my work (2024), I argue that a post-capitalist imaginary must not only challenge economic structures but also interrogate the epistemological frameworks that underpin them. The book serves as a crucial reminder that alternatives to capitalism are not merely theoretical exercises but necessary acts of intellectual and political resistance. In conclusion, Andy Hines' *Imagining After Capitalism* is a provocative and timely work that demands engagement from scholars across disciplines. While it requires further elaboration on practical implementation, its speculative approach is a necessary antidote to the cynicism that pervades contemporary economic thought. As we navigate an era defined by technological acceleration and economic precarity, Hines' book offers a vital space for reimagining what comes next.

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In Memoriam

Paul Lewis

Despite Paul informing me in February (a month ago as I write this), that because of ill-health, he had to withdraw from the *Palgrave Handbook of Classical Liberalism*, it nonetheless came as a profound shock to learn of Paul's passing. Just last year we chatted a couple of times via zoom about his chapter to the aforementioned handbook, tentatively entitled: "How Hayek's, Buchanan's and the Ostroms' ontologies informs their liberalism".

The first time I met Paul was at an LSE-hosted social ontology seminar, held under the auspices of the Department of Philosophy, Logic and Scientific Method. Having long since been out of the swim of the London philosophy departments, there was no-one there that I knew. In a room replete with blustery know-alls and wannabe public intellectuals, Paul was conspicuous: he was approachable, dignified and attentive. Learning that Paul was a Peterhouse boy, got my attention: we nattered on about Peterhouse lore. In addition to our shared interest in social ontology, we had a shared appreciation of Hayek and complexity studies.

Some years later, we met again at a *Cosmos + Taxis* conference hosted by Lauren Hall at the Rochester Institute of Technology.[1] We chatted about *The Sensory Order*, a conversation we carried on in the interim years via zoom, email, and most memorably, over a lovely extended lunch at Somerset House in October of 2023. This was the last time I saw Paul in person. When he wasn't in his office, and whenever I visited London, Paul always made a point of coming into town from his home in Muswell Hill. We talked of meeting up again this summer for the inaugural European PPE Society meeting at King's—sadly it wasn't to be.

Paul was always most supportive and enthusiastic about *Cosmos + Taxis* and served as a very responsive and nuanced editorial board member. Paul was in every sense of the term, a gentleman and a scholar. He will be greatly missed.

Leslie Marsh
Managing Editor

Paul's *Cosmos + Taxis* contributions are:

Orders, Orders, Everywhere … On Hayek's The Market and other Orders. Co-authored with Peter Lewin. 2015, 2(2):1-17.

Epistemic institutionalism: Rules and Order, Complexity, and Liberalism. 2020, 7(5+6):50-60.

The Bloomington School, as seen from Virginia: Levels of Analysis; Social Ontology; Schools of Thought; and Policy Implications. 2022, 10(3+4):71-85.

Paul's departmental website: https://www.kcl.ac.uk/people/professor-paul-lewis

NOTE

1 https://cosmosandtaxis.org/conferences/rochester-2015/

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SIEO refers to the assimilated *Studies in Emergent Order*

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Hughes, Mark D. 11:7+8

Ikeda, Sanford 1:3/SIEO 7/ 4:2+3/5:3+4/8:8+9/13:5+6
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Infantino, Lorenzo 7:1+2

Jace, Clara 6:1+2/9:1+2
Jacobs, Michael N. 13:1+2
Jacobsen, Peter J. 9:5+6
Jajodia, Ishaan 11:5+6
Jakobson, Mari-Liis 9:5+6
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Jones, Emily 9:9+10
Jones, Garett SIEO 7
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Krinkin, Kirill 12:5+6
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Kuchař, Pavel 4:1/10:5+6
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Lai, Lawrence W. C. 11:1+2/12:7+8
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Landes, Richard 12:9+10
Landgrebe, Jobst 12:5+6
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Editorial Information

AIMS AND SCOPE

COSMOS + TAXIS takes its name and inspiration from the Greek terms that F. A. Hayek invoked to connote the distinction between *spontaneous orders* and *consciously planned* orders.

COSMOS + TAXIS is a joint initiative run under the auspices of the Department of Economics, Philosophy and Political Science at The University of British Columbia Okanagan and the Political Science Department at Simon Fraser University.

COSMOS + TAXIS offers a forum to those concerned that the central presuppositions of the liberal tradition have been severely corroded, neglected, or misappropriated by overly rationalistic and constructivist approaches. The hardest-won achievements of the liberal tradition has been the wrestling of epistemic independence from overwhelming concentrations of power, monopolies and capricious zealotries. The very precondition of knowledge is the exploitation of the *epistemic* virtues accorded by society's *situated* and *distributed* manifold of spontaneous orders, the DNA of the modern civil condition.

COSMOS + TAXIS is not committed to any particular school of thought but has as its central interest any discussion that falls within the *classical* liberal tradition as outlined above.

COSMOS+TAXIS publishes papers on *complexity* broadly conceived in a manner that is accessible to a general multidisciplinary audience with particular emphasis on political economy and philosophy.

COSMOS+TAXIS offers a forum distinctively engaging the confluence of interest in situated and distributed liberalism emanating from the Scottish tradition, Austrian and behavioral economics, non-Cartesian philosophy and moral psychology, philosophy of social science, social epistemology, and political philosophy.

COSMOS+TAXIS publishes a wide range of content: refereed articles, topical issues and book symposia, though to moderated discussion articles, literature surveys and reviews. If you'd like to make a thematic proposal as a guest editor or suggest a book review, please contact the managing editor. All books listed on COSMOS + TAXIS' Facebook page are available for review. COSMOS + TAXIS does not have article processing—nor any submission—charges.

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