

# Science, the Market and Iterative Knowledge

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## INTRODUCTION

Whatever else might be attributed to liberalism, civil society entails that conceptions of good and goals of action are irreducibly plural and that there is no objectively known substantive theory of the human good. Two of the greatest and hardest-won achievements of the liberal tradition are the spontaneous orders of Science and the Market – each accorded independence and understood to be constitutive of their own criteria of objectivity, standards and teleology – an epistemic independence wrestled from overwhelming concentrations of power, historically the church, but more recently the state and the business/industrial corporation. To make one order answerable to (or reducible to) another order's teleology or metric is both rationalistic and indeed *anti-liberal*. It is the *sine qua non* of the liberal condition that there will *always* be tensions among and between orders: though such tensions will wax and wane, epistemic vigilance should be perennial. Our concern is with a specific instance of a tension that has become more noticeable over recent years: that is, the compromising of the epistemic veracity of some aspects of medical science responding to market pressures.

The concept of the market and its relationship to sociality is clearly not as straightforward as many believe. There is a voluminous literature on (a) the issue of the relative efficiency of the market over central planning, (b) the likely extent of market failure in the case of “public goods,” and (c) the relation of the market to economic justice (problematic since the market responds to demand not need). Less adequately discussed are (d) the application of the market model to the institution of free-speech (i.e. interpreting free speech in terms of a free market for ideas); and (e) the increasing sway of the market presented as a model for all social relationships and institutions. In the case of (e) epistemological, not ideological, considerations, should drive the discussion.

The discussion in this paper unfolds as follows. In the next section we clarify some of the philosophical presuppositions of liberalism viewed as primarily an epistemic stance. Spontaneous orders are, after all, communication systems and as such are essentially epistemic. In section III we defend and reclaim the work of Hayek, the preeminent spontaneous order and complexity theorist, against the misattribution by critics and followers alike of economism and or libertarianism. In section IV we examine in closer detail the idea of science as a spontaneous order. Section V looks at some cross-border skirmishes between the market and science generated by the very different structural epistemic and cultural imperatives. In the penultimate section, we further explicate the concept of “iterative” knowledge. Iterative knowledge, we contend, best fits the liberal stance in that knowledge is often tentative and dynamic. We offer some concluding remarks in section VII.

## INDIVIDUALISM AND THE LIBERAL CONDITION

It’s a common error to mistake the nature of liberalism. Of course liberalism is a term with many meanings, some unrelated and not all compatible. A common refrain from some self-avowed Hayekians and critics alike attributes to Hayek the view that the market is the root of social order. We dispute this assertion. Hayek made it clear in no uncertain terms that the market exists as part of a manifold of spontaneous orders that constitute the fabric of civil (liberal) society. Hayek’s defence of common law against legislation, morality and tradition against so-called “social justice,” and the market against the egalitarian impulse affirms the multiplicity view. What Hayek was recommending was the interdependence of independent equals (Hardwick, 2008).

Individualism too has many, often overlapping, connotations across moral philosophy, political philosophy, philosophy of social science, epistemology and the philosophy of mind.<sup>1</sup> In moral and political philosophy, individual persons are the ultimate units of moral worth: society has as its proper end the good of the individual; there is no social good over and above that of individuals; individual flourishing requires people to make their own choices as far as possible. Individualism in the philosophy of social science centers on the question as to how one apportions the extent to which individuals’ cognitive states are causally dependent upon their social milieu. Furthermore, could all statements about political and other institutions be reduced to statements referring purely to individuals and their interactions? Individualism in analytical epistemology (i.e. the Plato-Descartes tradition) is normative: it is internal in the sense that knowledge relies solely upon the operation of mental states without any appeal to external considerations. This is

in sharp contrast to the sociological tradition of social epistemology that gives priority to the manifold and ubiquity of social considerations.

Ascriptions of economism/libertarianism by critics and ideologues alike mistakenly turn upon the notion of individuality and associated expressions of choice. Libertarians, on current understanding, regard the market economy as offering the best expression of the notion of individuality manifest as choice. Of course, while Hayek is not out of sympathy with the importance of the market, for him it's a gross error to reduce all expressions of human freedom to this one area of human experience. Individual freedom (or individuality) at its richest is about choice, but choice that can only meaningfully exist at the matrix of art, literature, philosophy, commerce-industry, politics and science.<sup>2</sup>

## RECLAIMING HAYEK

Hayek is perhaps the most prominent “poster boy” for libertarianism but, as will be shown, a libertarianism that is profoundly at odds with his actual position.<sup>3</sup> For Hayek knowledge and freedom exist within a *manifold network* of spontaneous or complex adaptive orders, orders in which situated agents are perpetually responding to and redefining their environment. For Hayek, free (open and competitive) orders are, in effect, coordination and “communications systems.” Communication systems are mechanisms for the cooperation among strangers with differing wants, preferences and interests, a mechanism that offers epistemic (and computational) efficiencies in that knowledge is distributed and dynamic.

For Hayek the market had no special ontological status – it is one spontaneous order among many: nowhere did he claim that the market should subsume or impinge upon orders for a single or dominant communication system would impoverish the liberal condition. By the same token, Hayek could not countenance the imposition of a scientific methodology (“scientism”) upon matters of sociality (Hayek, 1952/1979). Whatever the virtues of the market as a communication system (and they *are* formidable) it is but *one* communication system among many (Simon, 1996; diZerega, 2010). Indeed, for Hayek the healthy functioning of a market *presupposes* institutions that cannot be provided by private enterprise (Hayek, 1944/1976, 38). Hayek, explicitly and repeatedly, distanced himself from radical libertarianism, the view that the market is both co-extensive with freedom and the universal panacea for all social ills. Even in the most charitable of interpretations *The Road to Serfdom* (the very book that would feature on most contemporary libertarian lists) just doesn't support the libertarian stance (Hayek, 1944/1976, 17, 35, 36, 39, 42, 81; and later in Hayek, 1967, 61–62; Hayek, 1976, 151). Hayek himself was certainly alert to this misappropriation. He writes: “Probably nothing has done so much harm to the

liberal cause as the wooden insistence of some liberals on certain rough rules of thumb, above all the principle of *laissez faire*” (Hayek, 1944/1976, 17). This is hardly an isolated instance. Yet again Hayek writes:

It is important not to confuse opposition against this kind of planning with a dogmatic *laissez faire* attitude. The liberal argument is in favor of making the best possible use of the forces of competition as a means of coordinating human efforts, is not an argument for leaving things just as they are (Hayek, 1944/1976, 36).

Let us get a few things straight regarding Hayek’s alleged doctrinal *laissez-faire* stance. For Hayek whether the state should or should not “interfere” poses a false dichotomy: every state must act (Hayek, 1944/1976, 80-81; Hayek, 1967, 162-163). Issues that legitimately fall under the purview of government include the provision of signposts, roads, health and safety in the workplace, and indeed environmental issues (Hayek, 1944/1976, 54). The inference to be drawn is stark: the market alone is not equipped to attend to these needs.<sup>4</sup> To suggest otherwise would be perverse: “In no system that could be rationally defended would the state do nothing” (Hayek, 1944/1976, 39). Adam Smith in *The Wealth of Nations* specifies three roles for the state: (a) protecting society from external threats, (b) protecting each individual of society from the injustices perpetrated by others of the society, and (c) the duty of “erecting and maintaining” certain public works and certain institutions, which can never be in the interest of any one individual or small group of individuals. Though current libertarianism looks to Smith’s idea of negative freedom (or “natural liberty”) for conceptual validation, it is far from obvious that Smith’s three roles would reduce the level of state activity in current conditions.

Needless to say, the rule of law is a necessary precondition for a liberal civil society. For Hayek “economic ends” do not prevail over others . . . “there are in the last resort no economic ends” (Hayek, 1973, 113; 1967, 162). A free enterprise society, misleadingly called “capitalism” (Hayek, 1976, 74; Hayek, 1973, 61-62), is not an economy coextensive with commodities of goods and services (Hayek, 1976, 107-108) or as his contemporary and closest intellectual ally phrased it “a danse macabre of wants and satisfactions” (Oakeshott, 2001, 104).

Predictably, we will be accused by libertarian ideologues of being anti-market. This is hardly the case. As diZerega puts it: “[our] argument is *not* anti-market, it is anti-economistic and anti the kind of marketolatry so often associated with those influenced by Hayek’s ideas” (diZerega, 2008, 8, 9, 15). So why, on the one hand, is the misattribution of a doctrinal “economism”

perpetuated by critics and, on the other hand, the setting up of Hayek as *laissez-faire* guru perpetuated? Richard Ashley's analysis (Ashley, 1983) is that *laissez-faire* is a species of, or continuous with, or even synonymous with economism. This would account for one source of conceptual confusion. Our view is that ascriptions of economism/libertarianism mistakenly turn upon the notion of individuality and associated expressions of choice. Libertarians, on current understanding, regard the market economy as offering the best expression of the notion of individuality *manifest as choice*. While Hayek is not out of sympathy with the importance of the market, it's a gross error to reduce all expressions of human freedom to this one area of human experience – this would surely be a form of rationalism that Hayek would find difficult to swallow.

The waters are of course muddied by those of a fundamentalist stripe which offer a nudge and a wink in the direction of free-markets oblivious of the inherent contradictions: spontaneous orders as expounded by Hayek can be deemed as incompatible, indeed corrosive of, traditional patterns of behavior – patterns that those of a foundationalist stripe ostensibly (and foolishly) seek to maintain or recover. On the other hand, there is much to commend Roger Scruton's view that in a true spontaneous order, the constraints on markets are already there, in the form of customs, laws, and morals (Scruton, 2007, 219-20). Don Lavoie, a prominent Austrian economist, in much the same spirit, takes the view "that the market process itself depends on the preservation of many ingrained cultural and productive habits and itself evolves" incrementally (Lavoie, 1985, 36).

Complexity for Hayek offers both the fabric of possibility and of inherent constraint. On the one hand, agents within a rich (complex) social tapestry have their conceptual and behavioral possibilities tempered by the partial cognitive and epistemic access to the (complex) manifold that informs the ambient culture. On the other hand, mind is itself constitutionally (and terminally) constrained in fully understanding its own (complex) mechanics – a mind that is significantly constituted by its (complex) social environment. For Hayek, the paradox is this: *knowledge can become less incomplete only if it becomes more dispersed*. Epistemic and cognitive efficiencies, well beyond the capacity of any one mind, are facilitated through the ubiquity of sociocultural scaffolding and dynamic looping. For Hayek, tradition, custom and practice are the vehicles or scaffolding for "computational" efficacy. For Hayek "cognitive closure," a mark of the human condition, can be ameliorated if the social and artefactual world functions as a kind of distributed extra-neural memory store manifest as dynamic traditions, part of the resources for acting, thinking, or communicating. Put another way, the notion of cognitive closure entails the postulation of an open society – here Hayek makes the highly distinctive and direct link between mind and social liberty. "Individualism" for Hayek is really

an attitude of humility and not merely a methodological principle. On Hayek's account notions of the abstract individual are a pernicious fiction.

But Hayek also believes that the constitution of liberty is more likely than any other to promote and go on promoting the satisfaction of our diverse and proliferant wants. Here his economic views, far more elaborate and sophisticated than Oakeshott's, come into play. It is true that Hayek defends civil association on this instrumental ground but it's a *complete caricature to say that this is his sole or principal ground of defense*. The central rationale of civil association/the constitution of liberty is the protection of freedom as an intrinsic value and the constitution of liberty is itself intrinsic to that value.

## SCIENCE AS A SPONTANEOUS ORDER

Hayek's writing on science as a spontaneous order is sparse but a close intellectual ally of his, Michael Polanyi, did deal with the topic extensively. We all agree that in some significant sense science is a spontaneous order (Buto & Koppl, 2003). It is a fool's enterprise to attempt to specify necessary and sufficient conditions as to what constitutes a spontaneous order. One can however pick out some *typical* features:

- A global context or environment comprised by an indefinite number of local environments.
- A multiplicity of agents populating with no one individual or clustering of individuals having global knowledge.

Giving rise to:

- Novel features that are neither predictable nor reducible to simpler constituents (Hayek, 1973, 38-39).<sup>5</sup>

With this in mind we can see that Polanyi's account of science as a spontaneous order neatly maps onto the above (Polanyi, 1962). Consider the following:

1. In freely pursuing their own choice of problems scientists are in fact cooperating;
2. The principle of their coordination consists in the adjustment of the efforts of each to the hitherto achieved results of the others;
3. Such self-coordination of independent initiatives leads to a joint result which is unpremeditated by any of those who bring it about.

In terminology that is somewhat unfocused and antiquated but nonetheless very much in the spirit of Hayek, Polanyi says that any centralizing attempt to aggregate knowledge would stifle independent scientific initiative.<sup>6</sup>

While we share in extolling the virtues of spontaneous orders we detect in the literature a tendency to misattribute a metric or teleology, or conflate the teleology of science with the teleology of economics, or misattribute the character of an institution for an organization. It's not immediately clear to us



McQuade and Butos (2003, 147; 2009, 87-88) for instance see the metric or teleology as “reputation as the relevant aim of individual scientists.” Whatever motivations the sociological tradition or social epistemology excavates, the teleology of science must surely be something like “the articulation of reality reflected in the study of natural phenomena” for want of a better phrase. Or, as Polanyi puts it, “truth” is an aspect of reality” (Polanyi, 1962, 6). The point is that a stronger distinction needs to be drawn between the natural/physical sciences and the social sciences if the integrity of both are to be maintained – and this is fully consistent with Hayek’s philosophy of social science (Hayek, 1952/1979). The view that science is merely a social process opens the door to the constructivist tendency associated with the sociology of (scientific) knowledge movement (the heirs to Marx and Mannheim) that Hayek takes to task.

Hayek attributes to constructivists the impulse that since all aspects of sociality are in some sense artifactual (in being created by man), therefore sociality in all its forms must be amenable to alteration (Hayek, 1973, 5). Implied in the constructivist viewpoint, according to Hayek, is the idea that because social phenomena are the residua of “conscious” minds, that therefore this consciousness connotes some notion of preconceived design. This is of course, as we’d all agree, an out and out anathema to Hayek.<sup>7</sup>

What occupied Polanyi was defending the integrity of science as a spontaneous order from bureaucratic meddling (Polanyi, 1962, 9, 13-14). But his deep interest in the sociology of science shouldn’t be discounted: “[t]hose who think that the public is interested in science only as a source of wealth and power are gravely misjudging the situation” and that the university is the one place that should be cordoned off from potentially corrupting intrusions and distractions (Polanyi, 1962, 14-15).

What we are not suggesting is some fatuous idea of a value-free science. Science inevitably interacts with value or human interest and medical science especially so since it is self-evidently concerned with ameliorating the wellbeing of human life. And of course there are ethical public policy and economic implications for medical science as well. This, however, does not undermine its commitment to its ancient ambition of seeking the truth or *episteme*: scientists *do* seek truth and they *should* seek truth – otherwise they couldn’t be plausibly be engaged in scientific explanation.

## A CLASH OF CULTURES

In the previous section we mentioned the misattribution of the character of an institution for an organization. In this section we set out the different teleologies appropriate to knowledge generation for these very different cultural

milieus.

Two corresponding players in the generation of knowledge are the university and corporate entities. Our concern is with the fundamental difference between original creative research in an open system vs. translational adaptive research in a corporate, industrial or other agency. The former is typically more focused on creation of new knowledge or basic foundational research, the latter more focused on marketing or adapting translational knowledge – the differing character of knowledge dependent upon the nature of the institution. In a university setting, “[T]he knowledge gained is . . . not amenable to traditional subordination . . . formal knowledge is accorded technical autonomy” (Hardwick & Dimmick, 1993, 773).

In executive systems, whether political, theocratic, industrial or corporate, information is sequestered and aggregated at the broadest bureaucratic level – “information is power” and is thus not shared (Rescher, 1989). At the industrial and corporate level, information is an intellectual property and may be sequestered through copyright or patents or just plain hidden for corporate use only. This distinction, while appropriate to a corporate instrumental organization, is precisely the opposite of an open system as it limits free-flow of information. From the perspective of individual scientists in an open system, typically the public university, this is problematic since academic promotion requires researchers to distribute knowledge widely to gain recognition and inform broad discussion. In an open system there is tension between organizational pressure to sequester and protect knowledge, and personal pressure to distribute knowledge promptly. In a corporate organization that is heavily focused on “information as a source of power” or as marketable “intellectual property” the individual scientist’s research must be congruent with that institution’s goals – it wouldn’t be rational were it otherwise.

The commoditization of medical knowledge has involved tampering with the mechanism that best promotes epistemic veracity – that is, tampering with the spontaneous order that is Science. The issue turns on the free-flow of knowledge, the distortion of which has profound implications for the greater good, compromising the very notion of expertise. Though science aims to contribute to the public good [it is as competitive as it is cooperative (Strevens, 2003)], we are certainly not suggesting that incentives have a necessarily corrosive epistemic influence. Though scientists attempt to satisfy their own curiosity, of equal importance is the exposing of errors or scientific fraud.<sup>8</sup> Philip Kitcher (cited in Goldman, 2010) argues that scientists driven solely by personal benefit, that is, the priority rule (“winner takes all”) system of rewards (Strevens, 2003), will result in better epistemic ends thereby, as Goldman says, making science a system that too has an “invisible hand” at work. Hayek’s

notion of “spontaneous order” or “complexity” thesis is of course a descendent of Adam Smith’s (Smith, 1776/1976) celebrated metaphor that Goldman alludes to. Science is an archetypal self-organizing system and essentially revolves around the freedom of individuals (like the market), as opposed to executive subordination or other forms of supervision. The lifeblood of all spontaneous orders, be they a market or science or a liberal democracy is freedom of information: freedom of information flow and access, freedom to select information of relevance to each individual, freedom of individual decision and freedom of action – constrained only by the need to respect the freedom and rights of others. Unfortunately, the epistemic rules of science are potentially subject to distortive improprieties.

We have identified three distinct trends of distortive influence that the market has on medical science.<sup>9</sup> First, there is the invocation of “return on investment” (ROI) or “accountability” as a general cultural shift. Second, there is the practice of medical “ghostwriting” whereby pharmaceutical companies secretly author journal articles published under the byline of academic researchers strategically placed in the medical literature (Fugh-Berman, 2010a; Lacasse & Leo, 2010). Third, there is the phenomenon of industry-funded medical education: that is, the priming of a market by making claims for “newly discovered conditions” with, of course, corresponding drug treatments.

### *Return on Investment*

Post World War Two, the U.S. National Institutes of Health initiated research programs with a fundamentally speculative bias (similar systems were implemented in Canada and the U.K.). The way it operated was as follows. If an investigator could demonstrate a track record (published reports of scientific research), then proposed an investigation that to several reviewers seemed plausible, he or she was given research funding to pursue the ideas. If at the conclusion of the project the researcher had published discoveries and also come up with another plausible proposal, additional funding would be forthcoming. This speculative grants architecture stimulated an outpouring of innovative concepts unparalleled in human history.

Under Reagan’s Presidency, the call to make such institutions financially “accountable” reached fever pitch.<sup>10</sup> Granting agencies, government ministries and hospital administrators quickly assimilated the notion of “Return on Investment” (ROI) and forcefully required extensive business case analyses of ROI from researchers. This preoccupation with ROI has flooded the public research system with a “deliverables” perspective encouraging translational research. Translational research is the (managerial) perspective that previous research has built up a huge bank of ideas and information begging to be

applied to today's problems. Thus the argument goes that if so much knowledge is already in the "databank" there is little return to be had by creating more!

ROI has had a corrosive effect upon research. To guarantee that research targets were met, research about the "unknown" could not be pursued with any certainty of meeting these delineated deliverables.<sup>11</sup> As Hayek himself might have said: *creativity cannot be commanded as a bureaucratic requirement*. It is a function of the conditions for knowledge, conditions best provided by a spontaneous order. Despite substantial bureaucratic pressures, open organizations, including public universities and federal granting agencies in both the U.S.A. and Canada, still encourage and fund original research, and permit a degree of discretion to the investigative scientist. In each setting grant requests are carefully scrutinized and are typically reviewed by peer adjudicators and grants panels. This is not to suggest that at each level scientific bias is not exercised; it is. However, had there not been broad latitude afforded original research by these agencies over the past six decades, quantum strides of modern medical science would not have occurred.

Whereas fifty years ago the largest component of medical care costs was professional fees (not counting institutional/hospital costs) today the balance has shifted towards pharmaceutical costs as being a major component. Not surprisingly this has drawn huge industrial agencies – pharmaceutical corporations – into vastly expanded action. Each corporate agency acts to maximize its profits – not to do so would be perverse. But this clashes with free-flow of information in a crucial way. For example: when a new drug is proposed, it must be tested through a clinical trial where the drug is tested by physicians on accommodating patients. The original design was crafted to provide a "final answer" as to suitability, purposely without a structure to follow up on late occurring negative outcomes. This "conclusive" single clinical trial structure is required by pharmaceutical companies so they can earn back their huge investment. This is best achieved through a subsequent twenty year run of sales, until the patent period has expired, without unwelcome disclosure of negative outcomes. Recent examples of this process without adequate patient follow-up to ascertain whether there were long term consequences i.e., acting as if the clinical trial were immutable proof that required no further study, has led to serious (some lethal) outcomes, such as in the case of Fen-Fen (an anti-obesity medication) and several other cardiac drugs (Connolly et al., 1997). This has stimulated major discussions in the U.S.A. and Canada proposing definitive follow-up studies that render the initial clinical trial open to "iterative analysis" – a *fundamental* of the scientific method.

This is a classic example of an organization within the "market domain" acting in such a way as to distort the functioning of the "science domain." The

actions of the pharmaceutical corporations are correct, proper and rational for the well-managed instrumental organization/corporation acting in the best interests of its shareholders. But these interests are in conflict with the “science domain.” The corporate motivation to protect and restrict knowledge flow is a coercive imperative and affects the clarity of reporting of scientific findings (Rescher, 1989). There have been several high profile cases of corporate attempts to conceal negative results and some scientists not acknowledging conflicts of interests (share ownership, paid consultancies) with companies about whose products they were reporting. Hand in hand with these issues is the practice of ghostwriting and industry-funded education.

### *Ghostwriting and industry-funded education*

Ghostwriting in the medical sciences, although not an extensive phenomenon, is an infinitely more sinister notion than the standard “hire a hack” ghostwriting in the popular imagination. The unsavory practice of recruiting academics to pose as the article authors so medical journals would accept their submissions that contain biased marketing messages such as overstating the benefits of a given drug and/or downplaying a risk undermines the whole foundational basis of scientific publishing.

Industry-funded continuing medical education is an euphemism for priming a market that heretofore didn't exist. The idea is this. Pharmaceutical companies identify opinion leaders (physicians, nurse practitioners) at academic medical centers. Those whose perspectives align with a company's marketing goals are courted and typically paid to be informational conduits to “sell diseases” or “an under-diagnosed condition” (Fugh-Berman, 2010b; Brown, 2004; Elliott, 2010). This strategy does not contravene FDA rules since it is the condition, not a drug, that is being promoted. By the time a drug comes up for clinical trials, the disease state is already well established. In effect, so-called “industry-paid speakers” are promoting a product through other means.

As Kitcher and Strevens show (Kitcher, 2008; Strevens, 2003) the desire for professional advancement need not undermine the quality of substantive research.<sup>12</sup> Since one of us (Hardwick) has been on the inside of medical science for more than 50 years and is thus well-placed to detect any trends: scientists, on the whole, work to satisfy their personal curiosity, much enhanced by recognition – albeit peer recognition. Both are incentives.

## **ITERATIVE KNOWLEDGE**

Knowledge in the natural sciences requires proof and in addition assessment in the form of attempts to disprove the acquired knowledge. What

is known is then considered “fact.” Further attempts to disprove the known occur, often by unrelated investigators assessing other processes. Thus medical science is assessed and reassessed and proven through repeated, iterative assessment. This is particularly the case in pathology which is the natural science of medicine. In pathology constant analyses and rapid reporting leads to a particularly active iterative system. In acknowledgement of this, the International Academy of Pathology, the worlds largest and oldest academic pathology society has through its U.S. and Canadian division created The Knowledge Hub for Pathology. This website has about 50,000 pages of current knowledge. Each item posted has been authenticated and validated through an over 100 person editorial review and is posted for a specified period typically three to five years before removal from the site. By that time it will have been validated, modified or disproved and finds its way into the more traditional journal literature. Thus the website does not contain cumulative knowledge as would a textbook or journal – it contains an immediately accessible most current knowledge – a free-flow of information for pathologists who utilize the website notching-up 6 million page loads per year! (Hardwick, Sinard & Silva, 2011).

## CONCLUDING REMARKS

It is intrinsic to the practice of good science that the free-flow of information is not constricted – in other words, science is allowed to flourish as a spontaneous order, the success of which informs the health of civil society itself comprising and supporting a matrix of spontaneous orders that *in toto* offer a far richer notion of choice and individuality than being merely co-extensive with the market order. There can be no resolution between tensions among orders unless a single teleology is imposed – and this monomania will be the sure-fire way of setting us on the “road to serfdom.” In a very recent paper Melo-Martin & Intemann (n.d., 3) hone in on the issue at stake:

The purpose of this paper is to show that worries about the commercialization of research cannot be successfully addressed by focusing on scientific impartiality, understood as a norm for governing either individual researchers or scientific communities.

Though Melo-Martin & Intemann appreciate the persistent and corrosive value skirmishes between commercial and public conceptions of funding, they do not offer a solution. One solution would be a return to the levels of funding that issued from the National Institute of Health of the 1950s. To suggest this is should not to be taken as a call for commercial funding to be curtailed. What

we are suggesting is that the balance of funding is redressed so that the value teleology is not conflated. It is the *sine qua non* of the liberal condition that there will always be inherent tension – to make one order answerable to another order’s metric is both rationalistic and indeed, *anti-liberal*.

## Notes

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<sup>1</sup> Gus diZerega (2011, 173) emphasizes moral and methodological individualism as liberalism’s central tenet. What makes liberalism distinctive is a *cluster* of features that of course includes individualism – universalism, egalitarianism and meliorism being the other typical features.

<sup>2</sup> A referee rightly suggests that examining Wilhelm von Humboldt might be a fruitful comparison. Humboldt is a very neglected figure in Anglophonic discussion of liberalism and is certainly worthy of being looked at in more detail at some other time. Hayek in *The Constitution of Liberty* notes that Humboldt, contrary to his earlier view that public education was harmful was the architect of in Hayek’s words “an effective system” of public education (378-379). Later Hayek quotes (394) Humboldt “The grand leading principle [of liberalism] . . . is the essential importance of human development in its richest diversity” and that this inspired J.S. Mill’s *On Liberty*.

<sup>3</sup> It has been suggested to us that this caricature of Hayek exists pretty much as a populist Internet phenomenon and that no academic theorist worth their salt subscribes to this. Sanford Ikeda, a prominent theorist in Austrian circles, has brought our attention to a recent counterexample. Roger Backhouse and Bradley Bateman are two economists who write: “In the 20th century, the main challenge to Keynes’s vision came from economists like Friedrich Hayek and Milton Friedman, who envisioned an ideal economy involving isolated individuals bargaining with one another in free markets. Government, they contended, usually messes things up. Overtaking a Keynesianism that many found inadequate to the task of tackling the stagflation of the 1970s, this vision fueled neoliberal and free-market conservative agendas of governments around the world.” Aside from the misplaced social atomism, *laissez faire* and limited government stance attributed to Hayek, the invocation of conservatism muddies the waters even more.

[http://www.nytimes.com/2011/11/06/opinion/sunday/worldly-philosophers-wanted.html?\\_r=2&ref=opinion](http://www.nytimes.com/2011/11/06/opinion/sunday/worldly-philosophers-wanted.html?_r=2&ref=opinion)

<sup>4</sup> In a related issue to note 3 Koppl (2011, note 7), rightly marks the promiscuous invocation of the term “socialism” in public discourse. He writes: “And yet one of the 20th century’s most important enemies of socialism, the Austrian economist F. A. Hayek, said in his most famous anti-socialist work “in the case of sickness and accident,” among others, “the case for the state’s helping to organize a comprehensive system of social insurance is very strong.”

<sup>5</sup> Hayek specifies three *typical* features of spontaneous order, none of which are essential: degree of complexity, abstract and purposeless (Hayek, 1973, 38).

<sup>6</sup> D’Agostino (2009) is similar to Marsh (in press) and Marsh & Onof (2008) in the discussion of search strategy as articulated by the particle swarm optimization algorithm, giving rise to spontaneous order.

<sup>7</sup> We take a referee’s point that discussion of Hayek on science should be cognizant of Hayek’s philosophical psychology (Hayek, 1952/1976), notably on p. 173 where he writes that the perennial

task of science is to refine, revise and reconcile the phenomenal with scientific explanation. See also Marsh (2011). If the dependence of facts upon human activity means no more than that the facts would not be what they are if people did not do certain things, then it has to be admitted that all facts are constructed. The view that Hayek seems to be proffering is the view that human activity causes and sustains the facts about the world (including scientific facts). A more interesting form of dependence is strong constructivism, one that insists that all facts (artifactual or natural) would cease to exist without the continued presence (and appropriate behavior) of human agents. This is not the fully-blown idealist variant that Hayek is recommending. The term “constructivism” is problematic (see Marsh, 2012).

<sup>8</sup> “There is a wide spectrum of scientific sins, ranging from wrist-slap offenses like bad data storage at one end, to data fabrication at the other.” Harvard Finds Scientist Guilty of Misconduct. *The New York Times*, August 20, 2010.

[http://www.nytimes.com/2010/08/21/education/21harvard.html?\\_r=1](http://www.nytimes.com/2010/08/21/education/21harvard.html?_r=1)

<sup>9</sup> We fully acknowledge that the commoditization of scientific knowledge is not the only distorting influence upon science. Governments themselves (for example, the British Ministry of Agriculture, Fisheries, and Food) “were economical with the truth” in connection with extent of the bovine spongiform encephalopathy epidemic. Other political examples include attempting to restrict stem cell research through legislation and religious organizations attempting to limit stem cell research through coercion. As Kitchen (2008) writes: “tendencies to acquiesce in scientific recommendations on some occasions and to defer to non-scientific authorities on others – poses a serious problem for democratic decision-making.” See also Resnik (2008).

<sup>10</sup> To be fair, the Bayh-Dole Act of 1980 probably has had the deepest effect. The act “allows for the transfer of exclusive control over many government funded inventions to universities and businesses operating with federal contracts for the purpose of further development and commercialization.”

<sup>11</sup> “If we knew what it was we were doing, it would not be called research, would it?” Albert Einstein. Consider the motivations behind the recently deceased David Colman, who was Director of the Montreal Neurological Institute and Hospital at McGill University and McGill University Health Centre. Colman’s recurring message was that science progresses through “undirected, non-targeted, curiosity-driven research” and quoted with approval Alexander Fleming’s famous phrase “[o]ne sometimes finds what one is not looking for” (Holtz, 2011).

<sup>12</sup> Individual scientists are as vulnerable as any other member of society to impropriety.

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