What Might Democratic Self-governance in a Complex Social World Look Like?*

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1 A CRISES OF SELF-GOVERNMENT

In supporting Brexit, Michael Gove declared "people in this country have had enough of experts," a remark that spurred derision among the intelligentsia.[1] But social experts do indeed have a most uninspiring track record;[2] despite the tremendous resources that have been poured into the economic and social sciences, and the extensive use of their models by policy makers, prediction and control of the economic and social system is, I shall argue, increasingly difficult, indeed probably impossible. If we understand self-governance as something like the ability of the governor to guide society along a preferred path, we have constructed a social world that is too complex for self-governance of any sort, democratic or not.

Most find this almost impossible to believe: our intuitions and folk causal reasoning lead us to believe that *of course* we can control our social world, and *of course* we can reform it to conform to our ideals.[3] In the grips of this certainty, in the face of each failed attempt at system self-governance we go back to the drawing board, and try again. Sometimes we see some positive effects, and this increases our conviction that we can control our social world after

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[1] *Financial Times*, June 13, 2016. For an expert reply, see Llewellyn, "The Experts Whose Forecasts Help Us Shape Our Lives," *Financial Times*, Saturday, December 16, 2016.

[2] See David M. Levy and Sandra J. Peart, *Escape from Democracy: The Role of Experts and the Public in Economic Policy* (Cambridge: Cambridge University Press, 2017). As Edward Tenner concludes his review of public policy, "[w]hat is almost a constant, though, is that the real benefits usually are not the ones we expected, and the real perils are not the ones we feared." *Why Things Bite Back* (London: Fourth Estate, 1996), p. 272. See also Philip E. Tetlock, *Expert Political Judgment* (Princeton: Princeton University Press, 2005) and my "Social Complexity and Evolved Moral Principles" in *Liberalism, Conservatism, and Hayek's Idea of Spontaneous Order*, edited by Peter McNamara (London: Palgrave Macmillan, 2007): 149-176. The recent turn to empirical economics, while in many ways welcomed, has not been inspiring: according to a recent survey the credibility of economics research is something between modest and low. John Ioannidis and Chris Doucouliagos, "What's to Know About the Credibility of Empirical Economics?" *Journal of Economic Surveys,* vol. 27 (2013): 997–1004. On the disappointing predictive power of models in political science, see James Johnson, "Review Essay – Formal Models in Political Science: Conceptual, Not Empirical," *Journal of Politics,* vol. 81(2018) < http://dx.doi.org/10.1086/700590>.

[3] I consider some of the reasons why this is so in "Social Complexity and Evolved Moral Principles." For an important and engaging analysis, see Nassim Nicholas Taleb, *Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets* (New York: Random House, 2005).

all. But ultimately we are disappointed, and we begin to question whether the problem is perhaps in our *democratic* system of self-governance.[4] Maybe it's because democracy lets the idiots have a say. Surely if the experts were empowered (or if voters had to demonstrate expertise), we could effectively control our social world. I disagree: the crisis facing democratic self-government is first and foremost a crisis of self-governance, not of democracy.

Section 2 reviews the nature of complex systems and why our contemporary social and economic order qualifies as technically complex — indeed, increasingly so, and why central control of such systems is hopeless. Section 3 then considers three models of functionality in complex systems, of which self-governance is one. I then (section 4) turn to the heart of the matter: is self-governance viable in our increasingly complex system — or, more subtly, what form of self-governance seems the most viable?

2 COMPLEX SOCIAL SYSTEMS

2.1 Complexity and Rules

Complexity can be analyzed in different ways: what a physicist considers a complex system may be rather different than what an economist has in mind.[5] In social contexts, a critical element of complexity is that the terms of interaction among agents is set by a network of laws, institutions, and norms. Each of these can be understood as specifying rules for individual behavior. Consider a simple case: a society in which all are interacting under a small set of rules — say simply those that characterize a simple exchange economy. We might suppose that a group of agents all guided by a small set of rules would produce a highly predictable system. Not so. Operating within this small set of rules is a very large number of individuals with highly heterogenous preferences. Each individual is seeking to satisfy her preferences within the rules, where this requires that she is constantly reacting to the choices of others about how to satisfy their preferences.[6] Such a system will be characterized by multiple levels of feedback loops: Alf's decision becomes an input into Betty's, which is in turn an input into Charlie's, which becomes a new input into Alf's.[7] When this system contains both negative and positive feedback loops[8] it easily abounds with multiple equilibria and its behavior quickly becomes mathematically incalculable. As Donald Saari concludes:

[4] This, of course, is the theme Hayek's unjustly disparaged *The Road to Serfdom*, edited by Bruce Caldwell (Chicago: University of Chicago Press, 2007).

[5] In physics complexity often focuses simply on the large number of elements; in social science the interconnectivity of the agents' behaviors is typically the main concern. Eric D Beinhocker calls this "interactive complexity." "Reflexivity, Complexity, and the Nature of Social Science," *Journal of Economic Methodology*, vol. 20 (2013): 330–342 at p. 332.

[6] Such systems are thus reflexive. See ibid and section 4 below.

[7] "Complexity, in other words, asks how individual behaviors might react to the pattern they together create, and how that pattern would alter itself as a result." W. Brian Arthur, *Complexity and the Economy* (Oxford University Press, 2015), chap. 1.

[8] In many economic models, these problems become tractable because it is assumed that the feedbacks are

> even the simple models from introductory courses in economics can exhibit dynamical behavior far more complex than anything found in classical physics or biology. In fact, all kinds of complicated dynamics (e.g., involving topological entropy, strange attractors, and even conditions yet to be found) already arise in elementary models that only describe how people exchange goods (a pure exchange model). Instead of being an anomaly, the mathematical source of this complexity is so common to the social sciences that I suspect it highlights a general problem plaguing these areas.[9]

The hidden complexity of social science derives from aggregation out of the unlimited variety of preferences, "preferences that define a sufficiently large dimensional domain that, when aggregated, can generate all imaginable forms of pathological behavior."[10]

Because such systems have strong positive return dynamics, their behavior is path dependent: the state of the system at time t+1 critically depends on its state at t.[11] Without good knowledge of the overall state of the system at t, and an accurate model of the dynamics that leads to future states, accurate forecasting about its state at t+1 is impossible. Slight differences in the initial conditions of the elements — often beyond our ability to measure — can result in very different t+1 system states.[12] Even a model based on simple linear dynamics can give rise to a wide variety of possible future states;[13] with non-linear dynamics these problems are greatly aggravated.[14] The behavior of such systems is, within broad parameters, essentially unpredictable. As Hayek stressed, we can know that some sorts of outcomes are

overwhelming negative (i.e. decreasing marginal utility/gains), thus leading the system into a unique equilibrium. See Eric D. Beinhocker, *The Origin of Wealth: Evolution, Complexity and the Radical Remaking of Economics* (Cambridge, MA: Harvard Business School Press, 2006), chap. 2. Once positive feedback becomes strong, multiple equilibria abound. See W. Brian Arthur, *Increasing Returns and Path Dependence in the Economy* (Ann Arbor, MI: University of Michigan Press, 1994). See also John H. Holland, *Complexity* (Oxford: Oxford University Press, 2014); John H. Miller and Scott E. Page, *Complex Adaptive Systems* (Princeton: Princeton University Press, 2007).

[9] Donald Saari, "Mathematical Complexity of Simple Economics," *Notices of the AMA*, vol. 42 (1995): 222-231, at p. 222. Strange attractors are related to chaos theory; see Peter Smith, *Explaining Chaos* (Cambridge: Cambridge University Press, 1998), pp. 142-46.

[10] Saari, "Mathematical Complexity of Simple Economics," p. 229.

[11] With positive return dynamics, once a system takes a step toward favoring option 1 over option 2, it can go to fixation on option 1, though if a chance event had tilted it toward option 2, it could have gone to fixation on that. Arthur gives the example of the familiar analog twelve-hour "clockwise" clock: in the fifteenth century there were clocks that went anti-clockwise, including the twenty-four-hour clock in a Florence cathedral. The selection of the familiar clock was path dependent. See Arthur, *Increasing Returns and Path Dependence in the Economy*, p. 2 (more generally chaps. 3, 8, 10); Beinhocker, "Reflexivity, Complexity, and the Nature of Social Science," p. 333.

[12] Smith, *Explaining Chaos*, p. 20.

[13] Beinhocker, "Reflexivity, Complexity, and the Nature of Social Science," p. 333. It is often the case that measuring these initial conditions sufficiently precisely is beyond our ken.

[14] See David Colander and Roland Kupers, *Complexity and the Art of Public Policy: Solving Society's Problems from the Bottom Up* (Princeton: Princeton University Press, 2014), pp. 117ff.

not possible, but a very wide range of possible system states — often novel and unexpected — can be generated.[15]

To get a bit closer to reality, now add a large number of other rules (moral, legal, institutional) which further affect agents' behaviors, and whose overall effects are interactive. For example, a rule with strict prohibition of squatter rights in urban areas will have very different effects depending on the presence of other rules and norms about, say, zoning, care for the urban homeless, mental health facilities, family structures, freedom of movement, and so on. And, of course, a host of background conditions are relevant: demographic changes, real estate investment, unemployment and growth rates.[16] When a system is composed of many rules of this sort, which jointly determine their ultimate social realizations (as always, along with a highly diverse set of individuals preferences, values and personal normative commitments), any attempt to optimize along some metric (welfare, justice, etc.) confronts what is known as a "rugged optimization problem."[17] In these optimization problems, even assuming that we could with certainty know the overall value of each set of institutional arrangements ($\mathbf{R}_i$), the overall value of a set of social institutions (rules, norms, etc.) $\mathbf{R}_1$ may be radically different than the overall value of an almost identical set, $\mathbf{R}_2$. Getting even a slight detail wrong can land a reformer in the dire $\mathbf{R}_{11}$ rather than the attractive $\mathbf{R}_{10}$ as in Figure 1:

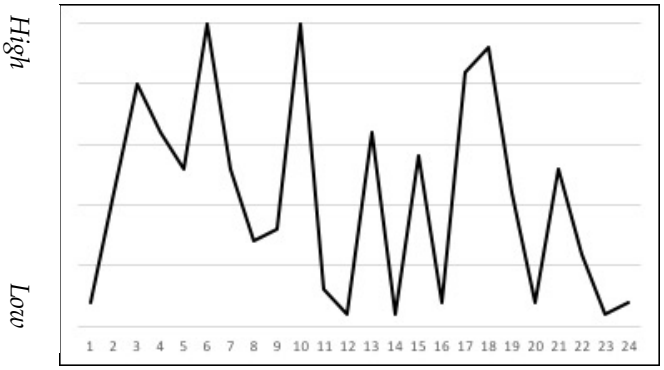

FIGURE 1 CHAOTIC SOCIAL CHANGE

[15] For which we cannot provide any probability distribution. See also Hayek, "The Pretense of Knowledge" in *The Market and Other Orders*, edited by Bruce Caldwell (Chicago: University of Chicago Press 2014): 362-72.

[16] This is not a philosophical conjecture. In her extensive fieldwork on actual institutions Elinor Ostrom stressed that institutions are composed of numerous rule configurations; the constituent rules have strong interdependencies, both with each other and with environmental conditions. "A change in any one of these variables produces a different action situation and may lead to very different outcomes." "An Agenda for the Study of Institutions" in *Choice, Rules and Collective Action*, edited by Fillippo Sabetti and Paul Dragos Aligica (Essex, UK: ECPR Press, 2014): 97-119 at p. 111.

[17] For accessible discussions see my *Tyranny of the Ideal: Justice in a Diverse Society* (Princeton: Princeton University Press, 2016), chap. 2.; Beinhocker, *The Origin of Wealth*, pp. 202-13.

Figure 1 illustrates a set of institutional schemes arrayed in terms of institutional similarity (*x*-axis)[18] and the value of the emergent social state (*y*-axis) in terms of overall welfare, justice, etc.[19] In this case the laws, institutions and norms are so tightly interconnected that a change in any rule, etc. produces changes in the outputs of every other. This system is chaotic: there is no correlation between the value of one social state and the next.[20] In such chaotic worlds there are no gradients to climb: if a change from scheme 9 to 10 was, say, welfare enhancing, a move from 10 to 11 can make us worse off than we started out. Only if a controller had perfect knowledge of the value of each institutional scheme, and perfect ability to bring about precisely the changes that would hit a specific institutional set up (with no variance or "near misses," landing on scheme 20 when we aimed for 19) is intelligent control possible.[21] In lieu of that, changes are essentially random moves around the possibility space, there is no room for expert control.

2.2 The First Hope: Decomposability

There is little doubt that our social system is complex in these ways. As I have said, when we intuitively think about the world using our folk concepts of causation, and as we recall what we remember as past cases as successful control, many refuse to accept this.[22] Here — as in evolutionary theory and much physics — commonsense and analytic reasoning part ways.[23] So, supposing the complexity analysis, how might successful control be possible?

The most viable route is to reduce the complexity of the system, and the most plausible hypothesis about how this can occur maintains that complex systems are often decomposable.[24] Suppose we have a set of rules, institutions, etc. $\{\mathbf{R}_1 \ldots \mathbf{R}_{25}\}$ with subsets

[18] On such similarity measures, see my *Tyranny of the Ideal*, pp. 51-61, 251-59.

[19] I shall not commit myself here to a particular understanding of an emergent property. One accessible formulation was proposed by John Stuart Mill. Supposing a system *S* composed of elements (e.g., rules) $\{\mathbf{R}_1 \ldots \mathbf{R}_N\}$ and an overall resulting order *O*, Mill suggests that *O* is an emergent property if: (1) *O* is not the sum of $\{\mathbf{R}_1 \ldots \mathbf{R}_N\}$; (2) *O* is of an entirely different character than $\{\mathbf{R}_1 \ldots \mathbf{R}_N\}$; (3) *O* cannot not be predicted or deduced from the behavior of the members of $\{\mathbf{R}_1 \ldots \mathbf{R}_N\}$ considered independently (i.e., apart from their interactions in *S*). *A System of Logic* in *The Collected Works of John Stuart Mill*, vol. 7, edited by J.M. Robson (Indianapolis: Liberty Fund, 2006), pp. 370-73; 438-40. For a helpful analysis see Sunny Y. Auyang, *Foundations of Complex-systems Theories in Economics, Evolutionary Biology and Statistical Physics* (Cambridge: Cambridge University Press, 1998), section 22.

[20] Stuart Kauffman calls this a "complexity catastrophe:" it results in in chaos. *The Origins of Order* (New York: Oxford University Press, 1993), pp, 52-4.

[21] See *Tyranny of the Ideal*, pp. 67-72.

[22] See Nassim Nicholas Taleb, *The Black Swan* (New York: Random House, 2007), pp. 68ff.

[23] It was recently remarked to me that social scientific reasoning is essentially a confirmation of commonsense. When successful, it is usually just the opposite: it shows that intelligent common sense misunderstands the social world. That is why Adam Smith's "invisible hand" in some ways invented social science: the commonsense conviction that orderly social outcomes must be produced by a directing intelligence (which was Mercantilist common sense) is fundamentally erroneous. And, of course, Darwin provides a similar rebuke to common sense.

[24] See Fred D'Agostino, "From the Organization to the Division of Cognitive Labor," *Politics, Philosophy &*

{$\mathbf{R}_1$…$\mathbf{R}_{10}$}, {$\mathbf{R}_{11}$…$\mathbf{R}_{15}$}, {$\mathbf{R}_{16}$…$\mathbf{R}_{25}$}, where the rules within each subset are highly interconnected (in the ways analyzed in §2.1), but the connections between the subsets are modest. At a limit, each subset could be a module that could connect with the others such that regardless of the changes that occurred within in it, it could be "plugged into" the others without inducing any change in them.[25] In this case we could optimize within each subset and then assemble the results, maintaining the optimization within each set. Herbert Simon has powerfully argued that evolving complex systems must be decomposable in this way.[26] If a change in one element produced changes in all the others, a species could not climb an evolutionary gradient, becoming increasingly fit. If, say, every change in the organism's ability to run faster affected all its other traits, the organism would be in a state of constant instability. Decomposability, then, makes the system less complex (less tightly interconnected).

Some have taken the necessity of decomposability for evolution to show that, after all, intelligent attempts to guide complex systems along desired paths are possible.[27] We can manipulate one part of the system without altering the rest, so if we focus on one decomposable subsystem at a time, real guidance can be achieved. Now certainly decomposability is necessary for successful incremental improvements in complex systems (see §4.3), but for at least two reasons we must not infer that we possess the ability to direct social change from the necessity of decomposability in evolved systems.

First, suppose that each subset is itself highly complex; although change in {$\mathbf{R}_1$…$\mathbf{R}_{10}$} may have minor impact on the rest of the system, a change in any rule within the set produces changes in the output of many of the other rules in the subset, again producing highly complex outcomes. Natural selection can often cope with such "high dimensional" selection.[28] If a species has a large number of offspring, a wide range of possible genetic combinations (in our case, {$\mathbf{R}_1$…$\mathbf{R}_{10}$} variations) can compete, and the most adaptive complex combinations selected. So biological evolution can function with decomposability conjoined with highly complex subsystems. However, in social "experimentation" this problem is almost always intractable (see §§2.3, 4.3). Ethically, we cannot simply randomly experiment with types of social arrangements to see which work (and which die out); practically, insofar as these are large-scale arrangements, there simply are not sufficient number of variants to cope with the problem of such high complexity partitions. We can only try out a modest

Economics, vol. 8 (2009): 101–129. Much of what I say here follows D'Agostino's excellent analysis.

[25] In this respect recall Rawls's claim that a public conception of justice is a module that fits into multiple comprehensive conceptions. *Political Liberalism,* expanded edn. (New York: Columbia University Press, 2005), p. 12.

[26] Herbert A. Simon, *The Sciences of the Artificial*, third edn. (Cambridge: MIT Press, 1996): 183-216.

[27] Allen Buchanan and Russell Powell, *The Evolution of Moral Progress* (Oxford: Oxford University Press, 2018), pp. 263ff.

[28] It is high dimensional since the trait being selected in an emergent property of many interacting genes. We are learning that few traits are controlled by a single gene. See Sergey Gavrilets, "High-Dimensional Fitness Landscapes and Speciation" in *Evolution—the Extended Synthesis*, edited by Massimo Pigliucci and Gerd B. Müller (Cambridge, MA: MIT Press, 2010): 45-80.

number of the possibilities to determine which are adaptive. Only if the subsystems themselves are relatively non-complex does it seems that decomposability be much of a help here.

Secondly, there is good reason to think that as human-constructed functional systems evolve they become more complex and less decomposable. Consider Brian Arthur's study of the evolution of the jet engine.[29] The original jet engine had one moving part; current engines have over 22,000 moving parts. What started as a remarkably simple system is now a highly complex one. Moreover, jet engine technology is now intimately linked to a number of other systems — e.g., those producing alloys, computer systems, the FAA. Jet engine technology has thus become more complex and less decomposable. Because of this, as Schumpeter stressed, advanced economies are subject to the "gales" of creative destruction: entire areas of the economy may ultimately be wiped out when there is a major technological change (say, from horse drawn carriages to automobiles).[30] And in many ways technology is a better model of the evolution of institutional complexity than natural selection: simple technologies are assembled and combined to solve problems, modified with an eye to increasing functionality and solving new problems, producing ever-greater complexity. Of course, compared to human society a jet engine is astoundingly simple: experts (though perhaps now only in highly-trained teams) continue to know how it works. But like technology, we have constantly rendered our institutions more complex, and more intimately tied to the rest of our social system.

2.3 The Second Hope: Experiments in Complex Living

From Mill and Dewey to important contemporary political philosophers, great hope has been placed on discovering better societies through social "experimentation." Often this is simply a name for exploring new ways of living together, but we should not confuse exploration and innovation with experimentation. The thought behind social experiments or "experiments in living" is that, while we cannot predict what type of social arrangements are best suited to humans (or yield more justice, etc.), experiments can be conducted that help us learn what sorts of complex arrangements actually work, and so obtain information that can be guide other situations and societies. In place of strong predictive knowledge based on models or theories, we might take a more inductive, learning, approach.

I have elsewhere suggested that such informal experiments are unlikely to give us much useful information about workable social arrangements,[31] but let us assume that the experiments could meet the strongest contemporary standard for studying interventions —

[29] Arthur, *Complexity in the Economy*, chap. 9. See also Kevin N. Laland, *Darwin's Unfinished Symphony: How Culture Made the Human Mind* (Princeton University Press, 2017), pp. 10-11.

[30] Joseph A. Schumpeter, *Capitalism, Socialism and Democracy*, third edn. (London: Allen and Unwin, 1950), pp. 81-87; Arthur, *Complexity in the Economy,* p. 141.

[31] *The Tyranny of the Ideal,* pp. 89-93.

Randomized Controlled Trials. In some ways it seems that Randomized Control Trials (RCT) are ideally suited to studying the combinatorial effects underlying complexity.

> An RCT is a study design based on John Stuart Mill's method of difference for making causal inferences …. Mill's method-of-difference supposes, as we do here, that effects are produced in accord with causal principles. The causal principles for a given kind of situation or population, *S*, say what the causes of a given effect in *S* are, what each contributes, and how they combine. A method-of-difference study then aims to compare individual units that are the same with respect to all causal factors relevant to the given effect except the one in question, by which they differ. If individuals that are otherwise the same differ in values for the effect, then the factor by which they differ must be among the genuine causes of the effect under the principles governing *S*.[32]

The great problem, though, is identifying all the relevant causal factors: if we have not identified the full set of relevant factors, our confidence that we know the causal network is undermined. And it is precisely this plethora of relevant (and indeed changing)[33] causal factors that confounds study of complex social systems. Using a Randomized Control Trail in one situation, against the background of a specific complex system at a specific time, is apt to tell one little about future interventions against a different state of the system. If many parts of the system affect the outcome, and the input of the system at time $t+1$ includes people's reactions to its state at t_1, it will be fiendishly hard to have any confidence that one has accounted for the causal influences during one's controlled trial.[34] "Like us," Cartwright and Hardie observe, "you want evidence that a policy will work here, where you are. Randomized controlled trials do not tell you that. They do not even tell you that a policy works. What they tell you is that a policy worked there, where the trial was carried out, in that population."[35]

3 COMPLEX AND ADAPTIVE?

The sort of social systems we have been analyzing — where agents respond to each other's actions, and adapt their actions in response to each other's pervious adaptations — are known as complex (and reflexive) adaptive systems.[36] In an important essay D. S. Wilson presses the question: what renders these complex interactions *adaptive* as opposed to simply complex but dysfunctional.[37] (We can be loose here as to what we mean by "dysfunctional":

[32] Nancy Cartwright and Jeremy Hardie, *Evidence-Based Policy* (Oxford: Oxford University Press, 2012), p. 33.

[33] Beinhocker, "Reflexivity, Complexity, and the Nature of Social Science," pp. 335-36.

[34] See Gillian Trent, "Weird Things are Happening to the Market," *Financial Times*, April 5, 2019.

[35] Cartwright and Hardie, *Evidence-Based Policy*, p. ix.

[36] On the relation between complex adaptive and complex reflexive systems, see Beinhocker, "Reflexivity, Complexity, and the Nature of Social Science," p. 334.

[37] D. S. Wilson, "Two Meanings of Complex Adaptive Systems," in *Complexity and Evolution: Toward a New Synthesis for Economics*, edited by David S. Wilson and Alan Kirman (Cambridge, MA: MIT Press, 2016): 31-46.

great conflict, low levels of cooperation, mass emigration, are all familiar indicators.) We cannot simply assume that complex systems are able to maintain their functionality: indeed, given their dense interconnectivity and positive return dynamics, in which many features are tightly coupled to many others, it may seem rather remarkable that they are able to maintain themselves.

3.1 Macro-selection (CAS 1)

In what Wilson calls "CAS 1" systems, the complex system is subject to adaptive pressures at the system level. This is a form of multi-level selection — in the most familiar form, a type of "group selection."[38] On Wilson's view this is the most plausible basis for system-level adaptation: "[f]rom an evolutionary perspective…only when a society is a unit of selection…. does it function well as a unit."[39] The critical claim is that a complex social order will maintain its cooperative functionality only if, at the societal level, forces are constantly selecting more over less functional variants of $\{\mathbf{R}_1 \ldots \mathbf{R}_N\}$. The entire set of social institutions $\{\mathbf{R}_1 \ldots \mathbf{R}_N\}$ generates what Hayek calls an "order of actions" — the emergent property of social order that arises in a rule-based society. Hayek agrees with Wilson: at the macro level evolutionary selection pressures operate directly on "the order of actions of a group."[40] This distinction between a set of rules and the order of actions to which it gives rise is a fundamental insight of Hayek's, which allows him to distinguish the focus of selective pressure (the overall functionality of the order) and the underlying rules and institutions (that structure it), which are transmitted.[41]

Social evolution is often thought to be a form of cultural group selection. "The rules of conduct have … evolved because the groups who practiced them were more successful and displaced others."[42] If society S_1, characterized by order of actions O_1, is more productive than S_2 based on O_2, society S_1 will tend to win conflicts with S_2, a mechanism akin to natural selection: O_1 was more adaptive than O_2.[43] But perhaps more importantly, the members of S_2, seeing the better-off participants in S_1 characterized by O_1, may either immigrate to S_1, or seek to copy the underlying rules R_1, thus inducing differential rates of reproduction between the two sets of underlying rules.[44] The overall order of actions is adaptive because systematic

[38] See Samir Okasha, *Evolution and Levels of Selection* (Oxford: Oxford University Press, 2006).

[39] Wilson, "Two Meanings of Complex Adaptive Systems," p. 44.

[40] F. A. Hayek "Notes on the Evolution of Systems of Rules of Conduct," in his *Studies in Philosophy, Politics, and Economics* (Chicago: University of Chicago Press, 1967): 66-81 at p. 72.

[41] There is an obvious analogy here to natural selection: selective pressures select a successful phenotype, with the underlying genotype being transmitted.

[42] F.A. Hayek, *Rules and Order* (Chicago: University of Chicago Press, 1973), p. 18.

[43] For formal modelling of this process see Samuel Bowles, and Herbert Gintis, *A Cooperative Species: Human Reciprocity and Its Evolution* (Princeton: Princeton University Press, 2011).

[44] Peter J. Richerson, and Robert Boyd, *Not by Genes Alone: How Culture Transformed Human Evolution* (Chicago: University of Chicago Press, 2005), chap. 3; Alex Mesoudi, *Cultural Evolution* (Chicago: University of Chicago Press, 2011), chaps. 3-5.

selection pressures favor rule sets that promote overall orders that are more adept at facilitating cooperation and securing its social benefits, satisfying the interests and commitments of its populating agents.

I think it is plausible to hold, as many do, that such macro social selection pressures have been great during some epochs. It is certainly plausible to hold that in the Late Pleistocene era humans groups were subject to severe selection pressures, and those orders that were less intensely cooperative were eliminated.[45] A similar case can be made for eras of intense warfare.[46] It is, I would venture, considerably less plausible to think that most societies are subject to equally strong pressures of this sort today. To be sure, some societies do look severely dysfunctional and the expected mass emigration has occurred. But most social orders have become, as societies, sufficiently wealthy that they can withstand competition with other societies without great adjustments.[47] For the same reasons that group selection pressures were so strong in the Late Pleistocene era — harsh, quickly changing, climate, numerous socially distinct groups near the margin of viability — we would expect that our modern era, characterized by the absence of these features, would have greatly mitigated macro-selection pressures. Moreover, what Hayek called "the Great Society"[48] — an expansive trans-national network of rule-based cooperation — blurs the boundaries between groups on which macro competition depends. While some investigators see strong group (macro-) selection pressures continuing today,[49] this seems highly conjectural.

3.2 Individual-level Adjustment (CAS 2)

This leads us to the second type of complex adaptive system identified by Wilson (his "CAS 2" system): adaptation via adjustment by each actor to the previous and anticipated actions of others. This can be understood as a strongly self-organized system. "Self-organizing systems are a special subset of dynamical systems. The hallmark of self-organization is the emergence of order from the interactions among a typically large number of components without any centralized control. … In cases of pure self-organization there is no real centralization of information or control, but the behavior of each affects that of the others in

[45] See Bowles, and Herbert Gintis, *A Cooperative Species*, chap. 6; Richerson, and Robert Boyd, *Not by Genes Alone,* pp. 224-29; Peter J. Richerson, and Robert Boyd, "Rethinking Paleoanthropology: A World Queerer than We Supposed" in *Evolution of Mind*, edited by Gary Hatfield and Holly Pittman (Philadelphia: Pennsylvania Museum Conference Series, 2013): 263–302.

[46] Peter Turchin, *Ultrasociety* (Chaplin, CT: Beresta Books, 2016).

[47] Compare here Schumpeter's analysis of late capitalism, in which firms have grown sufficiently large to weather the gales of creative destruction, and so competition and innovation slow. *Capitalism Socialism and Democracy*, pp. 87ff.

[48] F. A. Hayek, *The Political Order of a Free People* (London: Routledge, 1979), p. 160.

[49] This is an implication of Wilson's view. "Two Meanings of Complex Adaptive Systems," pp. 42-46. Small-scale societies continue to be subjected to stronger macro-selection pressures. See Peter J. Richerson and Robert Boyd*, Not by Genes Alone,* pp. 206-9.

a manner that produces an overall appearance of deliberately coordinated activity."[50] The invisible hand is, of course, the most famous model of self-organization in the social sciences.[51] These systems seem truly *self*-organized: rather than being formed by the pressure of competition with other groups: each individual acts in a way to adjust her activity to that of others, producing a cooperative and functional order.

Wilson believes that such systems could only be functionally organized by chance because of what might be called his evolutionary mindset: at each level actors are seeking to maximize their individual fitness in competition with others, and so unless this competition is suppressed by a higher-level selection, there is no reason to think that group functional cooperation will emerge — it would be only a random event.[52] This is far too quick.[53] As agent-based simulations such as those pioneered by Axelrod, Skyrms, Alexander and Vanderschraaf demonstrate, in a wide variety of contexts with different underlying games, cooperation and norms of fairness can emerge from self-organized action without any macro-selection pressures.[54] When the possibilities of mutual gains to agents through cooperation generally outweigh the benefits of individual defection, cooperative arrangements can arise simply though mutual adjustments by each actor.

3.4 Self-governance in CAS 1 and 2 Systems

A third alternative is self-governance. Writes Jenann Ismael:

> These are systems in which at least some organized activity is the result of a centralized process that involves the sharing of information and the formation of an overall plan and deliberate coordination of joint activity. Self-governance contrasts with pure self-organization. In a purely self-organizing

[50] J.T. Ismael, *How Physics Makes Us Free* (Oxford: Oxford University Press, 2016), p. 19. See also her "Self-Organization and Self-Governance," *Philosophy of the Social Sciences*, vol. 41 (2011): 327-51.

[51] Not surprisingly, macro-evolution theorists tend to be dismissive of the idea of the invisible hand unless it occurs in the context of a system with fairly strong selection at the group level. See Wilson, "Two Meanings of Complex Adaptive Systems," p. 44; John Gowdy, Mariana Mazzucato, Jeroen C. J. M. van den Bergh, Sander E. van der Leeuw, and David S. Wilson, "Shaping the Evolution of Complex Societies" in *Complexity and Evolution* edited by David S. Wilson and Alan Kirman (Cambridge, MA: MIT Press, 2016): 327-50 at p. 331. However models that understand evolution in terms of learning rules that lead agents to adopt more advantageous cooperative strategies and norms ("CAS 2" systems) seem well described as "the invisible hand of evolution." See J. McKenzie Alexander, *The Structural Evolution of Morality* (Cambridge: Cambridge University Press, 2007), p. 18.

[52] Wilson, "Two Meanings of Complex Adaptive Systems," p. 40.

[53] As I have argued in "Morality as a Complex Adaptive System: Rethinking Hayek's Social Ethics" in *The Oxford Handbook of Ethics and Economics*, edited by Mark D. White (New York: Oxford University Press, 2019). Sections 3.1 and 3.2 of the present paper draw on that essay.

[54] Robert Axelrod, *The Complexity of Cooperation: Agent-based Models of Competition and Collaboration* (Princeton: Princeton University Press, 1997); Brian Skyrms, *The Evolution of the Social Contract* (Cambridge: Cambridge University Press, 1996), Skyrms, *The Stag Hunt and the Evolution of Culture* (Cambridge: Cambridge University Press, 2004); Alexander, *The Structural Evolution of Morality;* Peter Vanderschraaf, *Strategic Justice* (New York: Oxford University Press, 2018). See also my "Self-organizing Moral Systems: Beyond Social Contract Theory," *Politics, Philosophy and Economics*, vol. 17 (May 2018): 119-147.

> system, all behavior is emergent from the aggregated activity of components, each doing its own thing. The coupling among components can generate the appearance of coordination, but there is not really any pooling of information and centralized control of activity. In a self-governing system, by contrast, at least some of the information distributed throughout the systems is collected, synthesized, and used to fuel a decision procedure that plays a role in guiding the system's behavior.[55]

Self-governance functions alongside the other mechanisms of system functionality, macro-selection (CAS 1) self-organization (CAS 2). No plausible analysis of complex systems would hold that the entire system can be regulated by a central controller. The critical claim made by advocates of complex system self-governance such as Ismael is that, in addition to the bottom-up forces of self-organization, there occurs a top-down direction of the entire system. The self-governance center aggregates information from the lower-levels of the system and uses that information to make decisions that guide system behavior and, perhaps, can change system parameters so that it functions in the desired way.

Still, strong self-governance appears in tension with strong self-organization, which is maintained by agent-level adaptations and dispersed information. Self-organized complex systems depend on ongoing numerous micro-adjustments in the reflexive decisions of each agent. Because the system is in a state of constant flux, and its functionality produced via these ongoing reflexive micro-decisions, it is not obvious to what extent a central information processor can guide the system along a desired path without interfering with the freedom of the individuals to reflexively adjust. As Adam Smith (certainly a "CAS 2" theorist) stressed in the *Theory of Moral Sentiments*, "in the great chess–board of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might chuse to impress upon it."[56]

In contrast, in a macro-selection account, the entire complex system was selected because it was, among the options, a good adaptive solution to past environmental challenges. And this could well include a complex system that had just the correct level of self-governance to promote systemic functionality. Ismael's thesis that self-governance is critical to individual human beings is consistent with the entire (human) complex system, including a certain level of self-governance, being the best solution to past adaptive challenges. We may not know why or how this level of self-governance has come to be or even why it is functional, but that is often be the case with an evolutionary phenomenon. In contrast to self-organized systems, which depend on allowing individuals large degrees of freedom to reflexively 'do their own thing' in responding to the decisions of others, macro-selected systems impose strong constraints on the freedom of the parts. On a multilevel selection account, the higher-level selection inherently restrains lower-level (individual) selection (there is no point to higher-level selection if it does not). Critical to the integrity of an organism, for example, is restricting the freedom of parts to go their own way (a cancer cell is precisely a part that has broken free

[55] Ismael, *How Physics Makes Us Free,* pp. 19-20.

[56] Adam Smith, *The Theory of Moral Sentiments* (Indianapolis, IN: Liberty Find, 1982), p. 234.

of these restraints, and because of this threatens ultimate system collapse). We might say, in a rough and ready way, that restricting individual decisions in order to secure system-wide functionality is precisely what macro-selection accomplishes; thus extensive instructions by the governor need not be at odds with the degree of freedom required for system maintenance. Not too surprisingly, in the history of social theory this type of social order typically has been identified with the idea of a "social organism"[57] and a morality of "my station and its duties."[58] Leaving aside this rather dubious normative basis for self-governance, because strong macro-selection looks implausible today (§3.1), I henceforth shall focus on self-governance in self-organized complex systems (CAS 2) — a far more puzzling issue.

4 IS DEMOCRATIC SELF-GOVERNANCE POSSIBLE?

4.1 From Democratic Decision Making to Self-Governance

In his recent *Securities Against Misrule,* Jon Elster is acutely aware of the difficulties posed by social complexity. In the end, he seems to accept that we can achieve little in the way of effective self-governance. Secure fairness, guard against bias, try to utilize whatever intelligence there is, and after that "we have to let the chips fall where they may."[59] Essentially, self-governance is abandoned for fair proceduralism: we make fair decisions, though we cannot be said to truly govern our social order. We can hold elections and make decisions — we can do things, and maybe even convince ourselves that we know what we are doing — but we will not really be governing our society. What is required for self-governance, as Ismael stressed, is a "decision procedure that plays a role in guiding the system's behavior" rather than simply modifying its structure.

Let us, then, distinguish *centralized decision making* from *self-governance*. Centralized decision making in system *S* occurs when there is a centralized decision procedure that can reliably change the rules, laws, and institutions structuring *S* (or, as a Rawlsian might say, the basic structure of *S*);[60] *S*'s centralized decision-making is democratic when it sufficiently conforms to the principles and procedures of democracy. But that *S* possesses a centralized decision-making procedure does not imply that those operating the procedure can change the overall system to move it closer to a desired state. To employ Hayek's idea of an emergent order of actions (§3.1), self-governance requires that the decision maker reliably observes the current order of actions *O*, forms a judgment that *O** would be a superior order, and makes

[57] Interestingly, this idea has been revived in current theories of social evolution, which often stress group-level selection. Joseph Henrich explicitly compares individual cells in an organism to individuals in the evolving "superorganisms" of our societies. *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter* (Princeton: Princeton University Press, 2016), p. 318.

[58] F. A. Bradley, *Ethical Studies,* second edn. (Oxford: Clarendon Press, 1927), Essay V.

[59] Jon Elster, *Securities against Misrule (*Cambridge University Press, 2013), pp. 1-2.

[60] See Rawls, *Political Liberalism,* Lecture 7.

a decision that reliably enhances the probability that *S* will move closer to *O**. This requires both "cognitive" and "manipulative" functions.[61] "As Beinhocker puts it, *"If I perceive state A (cognitive function) and take action X (manipulative function) then state B will result, bringing me closer to (or farther from) my goal G."*[62] If a centralized decision-making procedure does that, it is self-governing. Complexity, then, constitutes a barrier in moving from centralized decision making, which can reliably change the underlying structure, to self-governance, which reliably induces changes in the justice, welfare levels, efficiency etc. of emergent outcome of the structure. (We can, as it were, fiddle with the genes: the problem is whether we can shape the emergent phenotype.) Our question, then, is whether Elster's proposal — to focus on making the decision procedure democratic and fair — is all we really can do, and after that we can only let the chips fall where they may.

4.2 Centralized Democratic Reflective Self-Governance

Jack Knight and James Johnson recently have developed a powerful case for democratic self-government in heterogenous social systems. To their great credit, Knight and Johnson are sensitive to the importance of accounting for heterogeneity and dispersed information.[63] Moreover, they rightly analyze contemporary socio-economic orders as composed of diverse interacting institutions at different levels — there is no illusion of an overall democratic central controller, selecting various preferred social states and planning society to secure them. Rather, on their view the task of a centralized democratic decision making is a reflexive monitoring of other social institutions — and itself. Consistent with Ismael's understanding of self-governance in complex systems, they see centralized democratic decision making as aggregating information dispersed throughout the system to evaluate the system's functioning and employing the information to "experimentally" reform it. The tasks of democratic decision making are "(1) to coordinate effective institutional experimentation, (2) to monitor and assess effective institutional performance for the range of institutions available in any society, (3) to monitor and assess its own ongoing performance."[64] The stress on (2), institutional experimentation, is fundamental to their essentially pragmatic approach: democratic self-governance does not simply select a path to be followed, but is an ongoing process of monitoring, evaluating, and "experimenting" to discover better institutional arrangements. Such centralized reflexive capability is held to give democratic decision making a priority over decentralized forms of self-organization.[65]

[61] George Soros, "Fallibility, Reflexivity, and the Human Uncertainty Principle," *Journal of Economic Methodology*, vol. (2013): 309–329.

[62] Beinhocker, "Reflexivity, Complexity, and the Nature of Social Science, p. 332. Emphasis in original.

[63] Jack Knight and James Johnson, *The Priority of Democracy* (Princeton: Princeton University Press, 2011), pp. 42ff.

[64] Ibid., p. 169.

[65] They also hold that self-organized (CAS 2) systems cannot ensure society-wide coordination (ibid., pp. 105-6), and thus centralized self-governance is required to ensure the normative acceptability of the overall

Knight and Johnson's proposal is, in my view, by far the most sophisticated attempt to defend the priority of centralized democratic self-government in heterogenous systems with dispersed information. It certainly merits closer examination than I can give it here. Nevertheless, it is hard not to conclude that it too heavily taxes both the (*i*) *cognitive* and (*ii*) *manipulativ*e capacities of reflexive self-government (§4.1).

RE: (*i*). In the spirit of pragmatism, Dewey observed that each person knows best "where the shoe pinches."[66] Following Dewey, Knight and Johnson view democracy as a method of gathering and aggregating the dispersed information about how well the system is functioning (how many toes are being pinched). However, as we have seen, in complex systems the dynamics underlying why one's toes are being pinched may be intimately related to why other things are going well — perhaps given the limits on current technology, shoes with great arch support pinch, and we remain ignorant of the critical fact that only because one's shoe pinches one does not have crippling backaches. Thus aggregating complaints about pinched toes may well be entirely misleading about how well the system is doing. Less homely, in a complex system we often only know the surface (immediate) effects of our rules, norms and institutions: since we cannot know the invisible effects, reports of the felt problems do not give much insight into system performance. The functionings of our norms, practices and institutions are, as Henrich says, often "*causally opaque* — an individual cannot readily infer their functions, interrelationships, or importance," and so "intuitions and personal experiences can lead one astray"[67] If a voter is in the dark that the other side of what she is unhappy about is that it satisfies a need, complaints about what she is unhappy about do not provide much information about how well the system is doing.

RE: (*ii*). Presumably, at this juncture an advocate of centralized reflexive democracy would stress the reflexive, incremental and "experimental" nature of democratic interventions: as the system discovers that it has eliminated arch support shoes, it can better learn about its own performance (it just made things worse, not better). Successful interventions are not once-and-for all determinations, but ongoing iterative experiments in improving our social system. Now to be sure, an iterative "experimental" procedure does not require hitting the correct answer at one go; it does, though, require that after an intervention the governor reliably knows, as it were, in what direction to move next. To use a cybernetic example, if the governor has decided that it is too cold in a room, it must reliably know whether this should lead to turning the heat up or down.[68] In a simple system such as Figure 2, this will be easy.

system. Cf. Wilson's view in section 3.2.

[66] John Dewey, *Intelligence in The Modern World: John Dewey's Philosophy*, edited by Joseph Ratner (New York: Modern Library, 1939), p. 402.

[67] Henrich, *The Secret of Our Success*, pp. 99-100, emphasis in original.

[68] See Paul Lewis, "Purposeful Behaviour, Expectations, and the Mirage of Social Justice: The Influence of Cybernetics on the Thought of F.A. Hayek." Prepared for the History of Economics Society meeting, Durham NC, 2016. Available at SSRN: https://ssrn.com/abstract=2790169

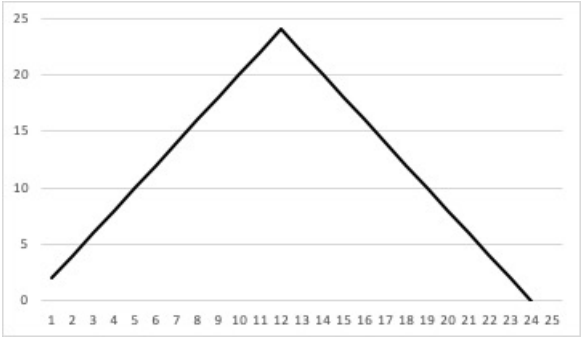

FIGURE 2 A SYSTEM GROUNDING INCREMENTAL SOCIAL CHANGE

Note that here one does not have to know precisely where one will end up. Once one knows the direction of improvement (turning the heater up at social world 3) one can keep evaluating the outcome, and proceeding in the same direction until movement in that direction is no longer an improvement; one then has reached the optimum. Here incremental social improvement really is truly incremental and improving, since each move produces a better result until no better is possible. But as we approach Figure 1, the governor is unclear about the proper response to a decision (the cognitive capacity) that the system is not functioning well. Move right or left? But then the *manipulation* capacity is lacking: even if we are not happy with the current system, we do not, as it were, know which way to turn the dial.

Both these problems — with the cognitive and manipulation functions — are greatly aggravated by the fact that the democratic self-governor is just one reflexive agent in a world of reflexive agents. As the centralized self-governor acts by *X*, changing rules and institutions in current state *S*, the constituent agents reflexively respond to that very institutional change, bringing about *S*.* But *X* may no longer be appropriate against this new background, so the centralized self-governor responds with *X**, to which other agents reflexively respond to in myriad and unpredictable ways, making *X** also inappropriate. The rugged landscape (§2) is thus constantly shifting as the democratic self-governor tries to optimize within it.

4.3 Democratic-Governance in a Polycentric Order

The reflexive learning model of centralized democratic self-governance thus strains under great heterogeneity and diversity. To effectively apply it diversity needs to be reduced. The key to doing so, I believe, is implicit in Knight and Johnson's Deweyan focus on problem solving.[69] Pursuing this insight has been the great contribution of Paul Dragos Aligica.[70] One

[69] Knight and Johnson, *The Priority of Democracy*, pp. 36ff. Cf. John Dewey, *The Public and its Problems* (Chicago: Swallow Press, 1954).

[70] In his recent *Public Entrepreneurship, Citizenship and Self-Governance* (Cambridge: Cambridge University Press, 2018). See also Paul Dragos Aligica, Peter J. Boettke and Vlad Tarko, *Public Governance and the Classical-Liberal Perspective* (Oxford: Oxford University Press, 2019).

of the lessons we learned from the work of the Ostroms was that joint action is most apt to arise when a group of people face a common problem. For example, we face the degradation of a common pool resource and seek to do something about it. In problem-solving contexts diversity is reduced because people share (*i*) a common perception of a problem to be solved, (*ii*) an agreement that a range of policies constitute plausible solutions to the problem and (*iii*) a belief that most any of these solutions would be preferable to leaving the problem unresolved. If crime is rising in my neighborhood, my focus is on solving *that* problem; to a significant extent, many of my other diverse aims and goals are bracketed; a crime-fighting community becomes a simpler (less heterogenous) community, thus reducing the complexity of the public policy problem.

The key to the Ostrom-inspired polycentric approach is to, as far as possible, allow problem-solving groups to organize themselves in such a way that the level of governance approaches the optimal public for that problem: just large enough to encompass the stakeholders who perceive a common problem and whose participation is essential to solve the problem. Note that there is limitation on the scope of the aims of governance: to adequately solve perceived common problems — not, say, to guide the overall system along a preferred trajectory of social improvement. In the polycentric vision, diverse problem-solving institutions — state as well as nonstate —— self-organize in forming rule-based reflexive efforts to solve shared problems.[71] Such polycentricity has five major attractions.

(*i*) Because the self-governing unit is focused on a smaller set of problems and common perceptions of solutions, its reflexive monitoring task is much easier. We saw above (§4.4) that in a reflexive system each participant reflexively responds to the judgments of the self-governor, greatly complicating the problem of governing the system. When the self-governor is solving shared problems of the group, anticipating the reflexive responses to the self-governor's decisions is simplified. Note here that when self-government covers a large and diverse population such that it seeks to solve problems that many participants do not see as problems, this benefit of polycentricity is lost. The governor is then no longer able to anticipate their reflexive response to its decisions, since they do not share its problem-solving orientation.

(*ii*) As far as possible the polycentric program encourages duplication and competition among different polycentric problem-solving institutions, which provides some approximation of the ideal of experimenting with diverse institutional designs, to see which institutional schemes are more functional and efficient (§2.3).[72]

[71] See here Vincent Ostrom, "Polycentricity: The Structural Basis of Self-Governing Systems" in *Choice, Rules and Collective Action: The Ostroms on the Study of Institutions and Governance* (Essex: ECPR Press, 2014) chap. 3. See also Paul Dragos Aligica, *Institutional Diversity and Political Economy* (Oxford: Oxford University Press, 2014).

[72] See Vincent Ostrom, Charles M. Tiebout and Robert Warren, "The Organization of Government in Metropolitan Areas: A Theoretical Enquiry," *American Political Science Review*, vol. 55 (December 1961): 831-42. For a philosophical analysis, see Julian Müller, *Political Pluralism, Disagreement and Justice: The Case*

(*iii*) Polycentric institutions are in an important sense themselves part of social self-organization (§3.2). As we see in Elinor Ostrom's work, they often arise within a self-organized network of relations; they certainly are not top-down governance imposed on the self-organized system.[73] They form out of the self-organized networks and common perceptions of inadequacies in them. Polycentric systems thus provide space for norm exploration: groups experiencing perceived unsolved (or badly solved) collective action problems seek to resolve them within the context of their current social networks.[74]

(*iv*) The social conflict that heterogeneity can engender is transformed in problem-solving contexts into a more cooperative inquiry looking for better solutions. Once politics is conceived in terms of inquiry into the best solutions to common problem, we can draw on results such as Scott Page's, which show how diverse groups possess enhanced problem-solving capabilities.[75] It is important that Page's diversity theorems are about problem solving contexts: when we have identified a common problem and have agreed on what would be a good solution, then Hong-Page dynamics can get going. Because democratic citizenship is about collective problem solving, the stage is set for diversity to assist in social searches for better solutions.[76]

(*v*) Of course polycentric self-governance still faces the core problem of complexity — that its solutions will impact on the output of other rules and institutions. However, because one of the characteristics of polycentric systems is the exploration of diverse specifications of the relevant public (the size of the problem-solving self-governing group), it enhances the chances that the governing unit will correspond with boundaries of whatever decomposable subunits presently can be found (§2.2). Rather than commencing with a preferred unit (which is apt to be highly diverse and complex) as the focus for all policy, different publics form at different levels in response to various collective action problems: the boundaries of the public are thus responsive to the nature of the networks forming complex social relations. When competing subpublics frustrate each other's solutions to perceived collective action problems, the polycentric answer is to constitute a wider public or to otherwise create rules that adjudicate their conflicts.

for Polycentric Democracy (New York: Routledge, 2019).

[73] See Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990); Ruth Lane, T*he Complexity of Self-Government: Politics from the Bottom-up* (Cambridge: Cambridge University Press, 2017).

[74] See Colander and Kupers, *Complexity and the Art of Public Policy*, pp. 28, 181ff.

[75] See e.g., See Lu Hong and Scott E. Page, "Problem Solving by Heterogeneous Agents," *Journal of Economic Theory,* vol. 97 (2001): 123–163; "Groups of Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers," *Proceedings of the National Academy of Sciences of the United States of America*, vol. 101, No. 46 (Nov. 16, 2004): 16385-16389; Page, *The Diversity Bonus* (Princeton: Princeton University Press, 2017).

[76] See further my "The Complexity of a Diverse Moral Order," *The Georgetown Journal of Law and Public Policy*, Vol. 16 (2018, Special Issue, The Ethics of Diversity): 646-80.

Polycentricity's partial reconciliation of self-organization and self-governance leads, on Aligica's analysis, to a revised conception of democratic citizenship. Especially prominent in his account is the task of the "public entrepreneur," who takes the leading role identifying potential collective problem-solving contexts. That a group confronts a collective action problem does not mean that the problem is obvious. The public entrepreneur takes a leading role in mobilizing recognition of the problem and ways to solve it, which would include providing the contexts for discussion and exchange of information.[77]

4.4 The Deontic Framework of Democratic Self-Governing Groups

Conflicts between self-organized complexity and intentional reflexive, democratic self-government are, reduced, not eliminated in polycentric systems. Nevertheless, polycentrism enhances the possibility for truly effective self-governance of reflexive, problem-solving communities. Not all social interactions, however, are forms of problem solving to secure collective goods. Self-organization of self-governing problem-solving networks occurs within an overall framework of rules specifying the rights of citizens and prohibiting various forms of harmful activity. We should not become so enamored with the resources of polycentricity for democratic self-governance that we suppose that it can be the sole form of social regulation in complex systems.[78]

It is inevitable that democratic decision making will often be a form of what we might call "myopic morality" (or, less pejoratively, "deontology").[79] That is, democratic decision makers often conclude that some forms of social interaction — say racial discrimination — are inherently wrong and are to be prohibited and then, *al la* Elster, they let the chips fall where they may. To be sure, the democratic decision maker may consider some immediate and highly predictable proximate effects of a rule, but as we have seen, anything approaching a sound judgment of its overall effects will be impossible. While such rules do not govern the system in the sense of guiding it toward preferred social states, they structure the ways that self-organization will take place. In this sense they are what Hayek called "purpose-independent" rules.[80] They are purpose-independent not because we do not intentionally follow them to avoid certain forms of prohibited conduct, but because they are not followed as a means to securing more favored social states, as we do not know what social states they will produce, and some may have grave problems.

To see why this is so, we must remember that the moral upshot of any rule depends not simply on the degree of conformity to the rule's deontic imperatives, but on how heterogenous reflexive agents react to the rule, and the morally-relevant options they take.

[77] *Public Entrepreneurship, Citizenship and Self-Governance*, chap. 2, where Aligica shows that the entrepreneur can build on different preferences for public goods, helping to show how diversity of preferences can cause convergence on outcomes, not simply divergence.

[78] An error that Aligica does not make. See his *Institutional Diversity and Political Economy*, pp. 58ff.

[79] I have argued for this in some detail in "Social Complexity and Evolved Moral Principles."

[80] Hayek, *Rules and Order*, pp. 85ff.

Rules, after all, seldom mandate specific actions: they generally permit and prohibit actions.[81] Consider a moral rule that prohibits religious arguments in the democratic deliberations about basic justice.[82] Suppose that societies S_1, S_2 and S_3 all fully comply with the rule. In S_1 many are religious citizens, and while they comply, their moral perspectives lead them to retreat from the public sphere, where they cannot appeal to what they consider the fundamental basis of their convictions, leaving political matters to their secular brethren. In S_2 religious people tend to have a much stronger devotion to civic engagement, and so participate actively in political debate while complying (though perhaps with some misgivings) with this duty. In S_3 the secular citizens, interpreting this moral duty as confirming their conviction that religious arguments are bogus and are unworthy of admittance into public debate (their scientific arguments *are* admissible, after all), become even more dismissive of religious comprehensive doctrines. All three societies perfectly comply; the emerging moral relations between citizens are vastly different.

None of this is to deny that deontic moral and social rules are necessary in social systems; we must have rules to structure self-organization in ways that conform to our moral convictions, though of course we should be aware that as we multiply such rules the adaptability of the system may be compromised. The critical point of section 3 should not be forgotten: adaptability and functionality are by no means assured in complex systems. To be sure, those who embrace macro-selection (§3.1) can invoke a more comforting analysis: the "purpose-independent" rules of our basic framework have evolved as part of our overall society, and thus are (or at least, have been) adaptive, though we do not know the causal basis of why this is so.[83] These explanatory resources obviously are not available to a self-organization (predominantly CAS 2) analysis. For the CAS 2 theorist, we can have no assurance that parts of deontic framework are not causing more problems than they solve. However, as we learn more about the functioning of complex social and moral systems, we can obtain theoretical knowledge of features of the deontic framework that facilitate self-organization. In this vein, Hayek argued that the principle of liberty was firmly grounded in the need of individuals in complex systems to effectively reflexively adjust their behavior.[84] Freedom and markets, he insisted, were first and foremost ways for individuals to successfully coordinate their heterogenous plans. In a broadly similar way, Shaun Nichols and I have argued that rules stated as prohibitions are more effective in encouraging

[81] See Gerald Gaus and Shaun Nichols, "Moral Learning in the Open Society," *Social Philosophy & Policy*, vol. 34 (Summer 2017): 79-101.

[82] Rawls, with a rather complex proviso, endorses this as a moral duty. See his "Public Reason Revisited" in *Political Liberalism*, pp. 440-90.

[83] At times Hayek invokes explanations of this sort, *The Fatal Conceit: The Errors of Socialism*, edited by W. W. Bartley III (Chicago: University of Chicago Press, 1986), chap. 5 (but cf. *Rules and Order*, pp. 88ff). See also Henrich, the *Secret of Our Success*, pp. 145ff.

[84] *Rules and Order*, pp. 56ff. See Eric Mack, "Hayek on Justice and the Order of Actions" in Edward Feser, *The Cambridge Companion to Hayek* (Cambridge: Cambridge University Press, 2006): 259-86.

innovation and exploration than a rule system based on permissions.[85] We are by no means in the dark about the types of deontic rules that facilitate the coordination of different plans and interests in a diverse society, and so bolster its functionality. Here we have something between self-governance and deontic imperatives — rules that facilitate forms of self-organization, the specifics of which cannot be anticipated.[86]

5 A FATAL CONCEIT

I have departed from Hayek's pathbreaking analysis of complexity in important ways, most importantly regarding his strong reliance on macroevolution. And our analysis has brought us to conclusions about democratic self-governance much closer to those of Vincent and Elinor Ostrom than Hayek. Yet our itinerary has paralleled his. Much thinking about democracy starts with small group contexts in which the decision determines the resulting state of affairs. It is then implicitly supposed that problems of scale are essentially linear: as the questions become more complex, more information and expertise is required, but scale does not fundamentally alter the basic dynamic. This strong intuitive conviction — something approaching a certainty that we can control our world — is, to borrow from Hayek, a fatal conceit. It is a conceit because it not only wildly overestimates our intelligence and information but is blind to the intractability of the task of governing complex social orders. And it is fatal because the conviction that democratic control is possible ultimately delegitimizes democratic self-governance. No form of self-governance could do what so many political philosophers insist is not only possible, but required: to form an ideal of a perfectly just social order and then chart a path to it.[87] When we ask the impossible of it, democracy is bound to disappoint.

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[85] See our "Moral Learning in the Open Society."

[86] This seems more accurate than the claim that public policy, while it cannot control, can "tweak" or "shape" the evolution of a complex order. Shaping evolution is no mean feat. Cf. Colander and Kupers, *Complexity and the Art of Public Policy* pp. 8, 59; John Gowdy et al., "Shaping the Evolution of Complex Societies?"

[87] On this, see my *Tyranny of the Ideal,* chaps 1 and 2.