

**Essays on *Wired for Survival*:
Human Nature, Lawgivers, and Other Wifemen**

By

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Abstract

In *Wired for Survival: Rational (And Irrational) Choices from the Gas Pump to Terrorism* (September, 2008) I argue that we are biologically wired for survival. Our most important political and economic institutions are codified not in law, treaty, government, or culture, but in the neural networks embedded in our bodies and our brains. For centuries we have debated whether growth and prosperity depends upon better people or better institutions. The debate raged anew among the 18th century Anglo-Scots political economists, whose work provides a foundation for the U.S. political economy and scholarship in institutional economics. Yet today when we think about economic organization and regulation, we typically focus on discovering regulatory arrangements that produce technically efficient outcomes without considering the real objective functions of the people who are the object of our efforts. Then we attempt to select the “best” fit, create artificial enhancements or reengineer ourselves, institutions, organizations, and networks to achieve efficiency ideals. North (2005) argues that to create adaptive institutions, our minds must evolve. But the evidence suggests that can’t change our minds or our institutions without changing our brains. Successful adaptation requires remapping ourselves, the way that we interact with others, and consequently, the way that we think and make choices. This essay summarizes what we know about the biological basis of choice and develops implications for economic organization and regulation.

“But what is government itself but the greatest of all reflections on human nature?”
James Madison, *Federalist Papers*, No. 51

Introduction

With this observation, Madison raises the fundamental problem of institutional design: If the way we govern reflects our nature and human nature seeks to govern itself, what does this suggest about the human capacity for government and therefore the most fitting governing institutions? Put somewhat differently, what can advances in the study of human nature tell us about institutional analysis and design?

Working to create a modern government in the midst of accelerating growth and geo-political adventurism, early Americans were not raising new questions about human nature or institutional design – they were mining centuries of debate for models that were compatible with what they had learned and experienced, and the ideals they aspired to achieve.

The 18th century version of this debate was launched by the moralist Bernard Mandeville (1723).¹ Taking issue with the reformers of the day who railed against the vices and social ills that accompanied rapid growth and urged strict self-governance and virtuous asceticism, Mandeville argued instead for individual liberty and strong, mitigating government. Humans are prone to selfishness and greed and it cannot be eliminated by any means, he reasoned; “To make a great and honest hive. T’ enjoy the World’s conveniencies, Be fam’d in war, yet live in ease without great vices, is a vain

¹ Originally published in 1705 as *The Grumbling Hive: Or Knaves Turned Honest*. Benjamin Franklin, another founding brain, was introduced to Mandeville in London around the time he began to think of himself as a moralist and engage in the moral debates of the day. He describes Mandeville as: “Dr. Mandeville, author of the Fable of the Bees who had a club there, of which he was the soul, being a most facetious entertaining companion.” (Franklin, 1771, pg. 40)

Eutopia seated in the brain.”² But unleashing human vice stimulates demand for industry and trade, which creates prosperity and promotes the “wealth, glory, or goodness of nations.”³ In Mandeville’s view, human nature could be guided to serve the public interest by “lawgivers and other wise men, that have laboured for the establishment of society.”⁴ And the best form of government combines monarchy, aristocracy, democracy, and the rule of law.⁵

Assailing Mandeville’s view of human nature, moralist Francis Hutcheson argued that strong government is not needed to achieve virtuous ends because human nature is inherently benevolent and rational. The human capacity for reason and self-regulation was, in his view, sufficient to sustain a commitment to public interest that is “better served by actions that appear to have the most universal unlimited tendency to the greatest and most extensive happiness of all the rational agents to whom our influence extends.”⁶

Adam Smith, a student of Hutcheson, extended Hutcheson’s ideas in a theory of human nature and then a model for political economy that included individual liberty, self-regulation, and limited, mitigating government.⁷ In Smith’s view, human nature, with

² Mandeville (1723).

³ Ibid.

⁴ Ibid. Mandeville argues in “An Inquiry into the Origin of Moral Virtue” that the difficult task of breaking the “savage man” has been achieved not by religion nor by philosophy but by “the skilful management of wary politicians” who use flattery to persuade: “... making use of this bewitching engine, they extoll’d the excellency of our nature above other animals, and setting forth with unbounded praises the wonders of our sagacity and vastness of understanding, bestow’d a thousand encomiums on the rationality of our souls, by the help of which we were capable of performing the most noble achievements.”

⁵ Ibid. p. 401.

⁶ Hutcheson (1725).

⁷ I interpret *The Wealth of Nations* as the logical outcome and final stage of the development of Smith’s political economy ideas, which begins with *The Theory of Moral Sentiments*. While some find contradictions between the two works, I believe these contradictions are resolved if one reads his work in the context of the 18th century debate and accepts the biographical evidence that he began with an effort to explain human nature and then built his theory of political economy on this foundation. See for example

its apparent capacity for both reason and passion, is able to balance its own interests with those of others to serve the public interest. However, this is not achieved without both self-regulation and government by others. While he argued that; “Self command is not only itself a great virtue, but from it all other virtues derive their principal virtue,” he also took pains to describe the many ways in which passions overcome reason and interfere with the capacity for rational self-command.⁸ I interpret Smith to have theorized that many of these departures could be checked by the competitive pressures created by free trade and specialization. However, he allowed for limited government that provides that which is under-provided by individuals pursuing their own ends.

But it was the founders of the United States – the first American “brain trust” – who transformed the debate into a working experiment in government and political economy.⁹ First hand experience with the excesses of self-regulation as well as the strong regulation of the “law givers and other wife men” of 18th century England motivated the American founders to find the contemporary equivalent of a third way.¹⁰ “If men were angels,” Madison argued, “no government would be necessary.”¹¹ Worried about the potentially corrosive effects of majority factions and reasoning that it was not possible to change human nature; “The latent causes of faction are thus sown in the nature of man,” he argued that the principal challenge was to design a set of governing institutions that

Cannan (1976) and Raphael & Macfie (1982). For another very interesting perspective on the consistency of Smith’s work, see Vernon Smith (1997).

⁸ Smith (1776) Part VI, Section III.

⁹ In U.S. government, the term “brain trust” is most closely associated with the individuals who advised President Franklin Delano Roosevelt in creating the “New Deal.” Today it is used to refer to any close group of advisors.

¹⁰ Each of them had personally had the occasion to take flight from angry mobs, observed mobs in action, or had friends who had the experience. And as leaders in colonial government, they had first hand experience with the excesses of King George and the English Parliament. Today we typically look to the Plymouth colony or Tocqueville’s observations for an account of early American government, but the first colony, Jamestown, with its extraordinary excesses (including cannibalism) is an equally important though certainly less savory chapter in the American experiment in self-government.

¹¹ Madison 51 in Cooke (1961).

would permit individual liberty but check its excesses.¹² “The inference to which we are brought, is, that the *causes* of faction cannot be removed; and that relief is only to be sought in the means of controlling its *effects*.”¹³

Today, in the early years of the 21st century, we observe a wide range of governance models in the global political economy and often quite heated debate about the role of government in human affairs. Only a handful of countries, representing about 6% of global population, practice the Anglo-Scots-American model of political economy.¹⁴ The personal and economic liberties of most of the world’s population are much more closely restricted. Most people live in either “nanny states,” where citizens have numerous liberties subject to the rule of law but expect democratically elected governments to play a strong role, “authoritarian states,” which limit political and economic rights, or “failed” states that are overrun by conflict and corruption that sharply constrains growth and development.¹⁵

If government reflects human nature and we observe different forms of government in the world as we know it today, why has human nature produced different types of government, and why hasn’t there been more convergence as our interaction with each other has increased through exchange? What does this suggest about similarities and differences in human nature across the world? And for those of us who

¹² Madison 10 in Cooke (1961). In the view of the American founders, political and economic factions were perhaps the single greatest threat to democratic government.

¹³ Ibid.

¹⁴ The most obvious examples are the U.S., Australia, and the U.K., with the U.S. arguably the most observant among the group.

¹⁵ For example, economic decision making in Canada and the western European social democracies is fairly concentrated and policy makers take a corporatist approach, which balances government, business, and labor concerns. The Eastern European countries and India have long standing socialist traditions and are opening to more limited government in fits and starts with frequent reversals. There are several devoutly communist countries in the system including China, Cuba, and Vietnam. But authoritarianism is perhaps the most common tradition in the global system with some countries ruled by strong individuals, families or theocracies, and other putatively democratic countries cycling between military and civil control.

are interested in the new institutional economics, what are the implications for governing exchange?

Empirical Foundations

Our existing models of human nature and institutional design and the relationship between them rest on rather thin empirical foundations. In part this is because until fairly recently we have had limited tools to investigate human nature. But with advances in the neurosciences and analytical technologies, it is possible to begin to examine the biological basis of human choice, which I take to be the principal activity involved in government and exchange.

Developing alternative governing schemes and choosing among them begins in human minds, which regardless of how one approaches philosophy of mind, requires at least a nodding acquaintance with the brain and what we know today about its relationship to the mind and the body.¹⁶ Embodied minds working together (or not) create and enforce the institutions that govern exchange, choose among these institutions, adapt to changing conditions, and suffer or enjoy the consequences. As North (2005) has argued, adaptation requires that the minds of the members of society evolve to solve the problems presented by an ever-changing world.

However, changing our minds may require changing our brains: many neuroscientists argue that there can be no change in our mental state without a change in our brain state. We are first and foremost societies of brains and the first order rules of human order are biological mechanisms, which experimental and field evidence suggests

¹⁶ I understand philosophy of mind as the study of the nature of the mind, consciousness, mental events and functions, and their relationship to the physical body. The “mind-body problem” – the relationship of the mind to the body – is one of the central issues in philosophy of mind but well beyond the scope of this essay.

are influenced by both hereditary factors and our experience in the world. Hence, human order includes our brains, minds, bodies, experience, and the choices we make about how to order exchange.

The Biological Rules of the Game

Like most other behaviors, exchange behaviors are associated with observable activity in the brain, which is part of the nervous system.¹⁷ The nervous system is a bio-electro-chemical signaling and information system that links mental and physical activity at cellular, molecular, neural, and behavioral levels through four mechanisms: 1) voluntary actions of the muscles (somatic systems), 2) involuntary actions of the smooth muscles, heart, and glands (autonomic systems), 3) the endocrine system, and 4) the immune system.¹⁸ In addition to supporting mental activity, the nervous system plays a key role in maintaining the internal steady state needed to physically adjust to changes in our surroundings and sustain vital functions.

The “headquarters” of our nervous system – the central nervous system – is composed of the brain and the spinal cord (Figure 1). The actions and output of the central nervous system are influenced by incoming sensory information conveyed by the peripheral nervous system, a supporting collection of spinal and cranial nerves. In addition to providing sensory information to the central system, the peripheral system conveys motor commands from the central nervous system to the muscles.

The nervous system begins to form in the third week of embryonic development. The brain and motor nerves begin to form in the fourth week, and reflexes appear

¹⁷ What follows is an abbreviated overview. For a more detailed discussion and illustrations, see Polski (2008), Chapters Two-Six.

¹⁸ The endocrine system includes the system of glands that release hormones directly into the circulatory system, the system of cells along the sympathetic nerves, adrenal glands, and other organs, and the neurons that are specialized to produce and secrete hormones. The immune system includes the organs and cells that defend the body against infection, disease, and foreign substances.

between the 8th and 12th weeks. The growth of the cognitive capacities of the brain depends upon massive proliferation and migration of neurons and glial cells, which occurs during the third through fifth months of development, and the formation of neuronal connections, which continues well after birth and perhaps throughout our life.¹⁹

It is neurobiological signaling across dense networks of neurons that enables attention and sensory perception, learning, emotion, problem solving, memory, and motor control. While major systems of functions can be broadly associated with specific areas or regions in the brain, it appears that mental activity is polycentric: many functions involve multiple regions and multiple levels of activity involving both cortical and subcortical components.²⁰

However, our ability to make choices and engage in exchange requires more than chatty bundles of specialized neuronal assemblies. An equally challenging scientific endeavor is to understand how neural systems work together to think and choose, the impact of internal and external stimuli on these processes, and what influences the relationship among these variables. We know from studies of injuries that our brains play an important role in producing and sustaining both voluntary and involuntary activity: Our brain mechanisms and our thoughts and choices are inextricably linked.²¹ Yet we consistently observe differences among individuals and groups in field studies and in laboratory experiments where we have more control over external stimuli: Different

¹⁹ The evidence suggests that adult humans are able to produce new neurons throughout life. For an overview of brain plasticity, see Gazzaniga (2004, Part II) and Gazzaniga et al. (2002, Chapter 15).

²⁰ For example, frontal, parietal, occipital, temporal, basal ganglia, and thalamus areas are all associated with sensory and motor functions. The limbic system, hippocampus, and hypothalamus are associated with emotional experience. Learning is most closely associated with the limbic system but memory is associated with the limbic system, the basal ganglia, and the hippocampus.

²¹ Consider for example, the loss of functionality or personality changes associated with stroke and “brain death,” the ability of the brain to control advanced prosthetic devices, or our capacity to reassess our prior experiences and change our beliefs and experience such that we behave differently than we would have without reassessment.

people think differently in similar situations. Moreover, subjects in economics experiments frequently impose a familiar context on ambiguous exchange situations to explain their choices. Are we observing differences in brains, experience, context, or all three?

The Biological Coordination Problem

Brains are wired to receive, integrate, and send information the whole organism needs to function and survive. The way they do this is literally and figuratively, mind-bogglingly complex: all manner of inputs are transmitted at different levels of biological order, across regions and systems, and between our bodies, our brains, and our environments. How do we process and integrate information about the world we experience, make sense of it, and translate this into action? And how do the disparate neurobiological networks in our bodies and brains work together to think and make coherent choices?

One way to think about mental activity is as an intentional and conscious computational process using specific routines that involve paying attention to, taking in, and processing new information, comparing new information with memories of prior knowledge or experience, calculating alternative courses of action, strategizing about what others may do, and finally coming to a decision that is logically related to our values and preferences.

Standard theories about economic behavior, policy making, and management all assume that we are not only capable of this form of thinking but that it is our default operating mode and our brains are able to do so with mathematical and statistical precision. From this perspective, the brain is a trainable information processing system

and thinking is a set of logical computations. The brain itself is a kind of digital thinking device somewhat akin to a modern computer that encodes sensory information into binary inputs that feed rule-based programs or routines, which are our values and beliefs “software.”

Yet we know from experience and experimental research that even when we are trained to consciously reflect and plan, we often make choices before we are consciously aware that we have made them based on “intuition” or “gut reaction.” Many – perhaps most human choices – emerge from unconscious, spontaneous activity that is not apparently directed by an overtly logic-driven “thinker” or “decider.” Rather than thoughtful outputs of logical computations directed by an “executive” function, our understandings of our choices are *post hoc* stories that we weave about what we think we did and why we think we did it.

Recall that mental activity arises from neurons in the brain (assisted by molecules acting as neurotransmitters) receiving incoming signals from other neurons located throughout the nervous system and responding by sending out a stream of their own signals. The signals that neurons send are generally related to their perception of signals in other parts of the nervous system. In this sense, our perception of what is going on in our bodies and the world around us is not just in our heads but arises from neural chatter throughout the nervous system in response to cues in our physical and social world. As Francis Crick (1994) put it, we are a “pack of interacting nerve cells and their associated molecules,” and who we are, what we perceive, think, and do emerges from these largely involuntary and transitory neural interactions that occur in response to our experience in our environment.

Marcus Raicle argues that to understand the biological basis of mental life we need to understand and differentiate between task-related activity and “spontaneous intrinsic functional activity.”²² Estimating that task-related neural activity accounts for less than 10% of functional brain activity whereas spontaneous, intrinsic activity consumes more than 50% of the brain’s energy budget, Raicle, et al. (2001) view the brain not as a system simply responding to changing circumstances but as one operating on its own with sensory information modulating the operation of the mind-body system.

The implications of Raicle’s research are subtle but profound. The brain is a real energy hog, consuming over 20% of total body energy. The energy intensive spontaneous intrinsic activity in the brain that is the subject of Raicle’s research is associated with cycling glutamate. Glutamate sustains the metabolic processes that keep us alive and well. It also functions as a neurotransmitter in the brain, which you may recall are the chemical partners that enable neural signaling. If maintaining system balance expends the greater part of the brain’s total available energy, than either our brains primarily operate on the neurobiological equivalent of auto-pilot, or some as yet undiscovered mechanism exists that allows us to reallocate brain energy from spontaneous functions to directed functions. In the former case, our environment and our internal sensory systems potentially play a greater role in thinking and choice that we typically imagine and in the later case, the brain retains its super power status.

The current evidence suggests that our brain may be necessary for thinking and choice but it is probably not sufficient. Our “mind” is a brain and a body state that represents a specific physical and social state, which is fleeting but recordable. It emerges from neurobiological signaling that ultimately synchronizes around a common estimate

²² Presentation, Decade of the Mind conference at George Mason University, May 2007.

of excitation or inhibition that the brain recognizes as a focal point. We can call this focal point, which is a biological composite of our current and past experience in the world, a “state of mind.”²³ In other words, it appears to take a whole body – including the brain – as well as cues in our environment to think and choose. As Gerald Edelman (2006) puts it: our brains are embodied and our bodies are embedded in a physical and social environment: From a regulatory perspective, thinking and choice is not just a mind-body problem: It is a mind-body-environment problem.

An Alternative Approach to Human Choice

While there is still much to be learned about our reasoning processes, there are several propositions for which there is considerable consensus. First, we do not operate according to formal rules of logic although we are capable of learning and employing logical systems. Our primary mode of reasoning is pattern recognition, which gives us substantial latitude to create and to adapt to novel situations. Second, our thoughts and choices emerge from an intuitive interaction between brain, body, and environmental states. As a consequence, human reasoning trades off precision for rapid, associative power, which means that it is error-prone and subject to bias.

Our biases are innate, pervasive, and automatic. They emerge from brain-body-environment interactions and the intuitive way that we reason. Heredity, experience, training, sensations, emotions, brain anatomy, physical circumstances, and the presence of others affect thinking and choice in ways that are not predicted by standard approaches. Our past and our biases are sources of friction that tend to lock us into status quo routines, and our tendency to reason based on the gist of things makes it difficult for us to work with detailed information. We are efficient but imperfect interpreters,

²³ For a more detailed discussion of theories and evidence, see Polski (2008), Chapters Four-Six.

skimming our biased stock of knowledge to conjure theories about our environment and the courses of action that will lead to instinctively preferred results.

Homeodynamics

Standard models of political and economic decision-making are based on unrealistic assumptions about how we are wired to think and choose. All the interesting aspects of life that we routinely consider whether we realize it or not, are assumed away: individual differences in experience, patterns of associations, and capabilities; cues in physical and social surroundings; sensations; emotions; bias; uncertainty; change; conflict; and innovation. When we ignore these influences we misconstrue our own motivations, the motivations and intentions of others, and what survival demands of us.

However, to grapple with what I'll call homeodynamics -- the interaction among signaling activities in our brains, bodies, and environment -- we need a framework for analyzing intuitive choice. Here is what I have in mind. Intuitive thinking and choice emerge from interactions among signaling activities in three states: an external state, which includes activities and events in our physical and social surroundings; an internal state, which refers to neurobiological activities that sustain body and brain functions; and a brain state, which refers to the mental maps created by the convergence of neurobiological activities triggered by cues in the environment and the body. (Figure 2) The extent to which external, internal, and brain states overlap and influence our thoughts and choices is an empirical question that depends on how a decision-making situation is structured.

External states

Contrary to popular conception, intuitive thinking and choice is fact-based, data driven, and logical. Intuition is informed and structured by a combination of experience and what Hayek called “local knowledge.” We are wired to get a better feel for things from what we observe and experience first hand than from what is written in a handbook or espoused by a group of remote advisors. When we ignore cues in our environment, conduct due diligence on the cheap, or from afar relying exclusively on technology, regulatory control, or unproven sources, we get in trouble. We further err when we imagine that we can overcome adverse local circumstances with a grand plan and strong will. Due diligence is more than a paper chase, which can be manipulated rather easily: it involves getting the lay of the land, looking your counterparty in the eye, and getting a good feel for their behavior in the context of their surroundings.

Internal states

While our environment provides cues that help us get a feel for things, we need our bodies to sense and process these cues. We are able to experience what is going on around us because we have a very smart, sophisticated, and largely automated internal sensory system that works in tandem with our brains and our other perceptual systems including sight, hearing, touch, taste, and smell. It is our sensory system that makes it possible to literally and figuratively “get a feel” for place, things, people, and situations, and to adjust to changes our environment.

Like other human systems, the sensory system that monitors and maintains our internal state is made up of millions of sensitive, chatty cells suspended in a kind of biochemical soup that nourishes chemical and electrical signaling. Sensory signaling creates neurobiological maps that provide directions for those members of the nervous

system – including the brain – that are involved in serving the chemical cocktails associated with sustaining proper body temperature, blood oxygen concentration, and PH levels, all of which help us think and choose in what Vernon Smith (2003) has called “ecologically rational” ways.

Standard economic and policy making approaches assume that we all have the same body-sensing experiences, that internal states do not differ in different environments, and that sensory experience does not influence thinking or choice. Yet internal dynamics are a critical component of thinking and choice, and like so many other human attributes, there is considerable variation across individuals.

Brain states

The brain is a necessary partner in thinking and choice. It is active when we think, choose, and act. And when it is damaged, thinking, choice, and behavior are often impaired. When it is severely damaged, life itself is compromised. As Damasio (1999) observes, our brains both preserve and expand our ability to sense internal and external states and to adapt to changes in these states. How our brains do this – both consciously and unconsciously – is one of the most challenging research enterprises in neuroscience.

In addition to understanding unconscious, spontaneous thinking and choice another challenge is to understand activity in the brain when we are consciously and deliberately engaged. The goal of this research is to be able to identify which neural networks are involved in particular actions and experiences and describe the signaling pathways that link these networks. This line of research is important because it can help us understand the components of our decision making processes, which in turn may tell us something important about the nature of our regulatory challenge.

For example, functional magnetic resonance imaging (fMRI) studies that investigate brain activity when we make conscious goal-directed choices in a very tightly controlled environment, demonstrate that systems in the brain that are associated with social control, emotions, calculative reason, and conflict resolution are all engaged when people interact with each other – even in impersonal financial transactions.²⁴

One very interesting result from fMRI studies involving economic choices suggests that when we are on the other end of an unfair offer most of us refuse offers that would make us better off. Our social and emotional systems swamp our calculative reasoning and conflict resolution systems and we make choices that are contrary to our own immediate financial interest.

Why might human reason favor social and emotional logic over strictly rational logic? One reason may be that it is more adaptive. True enough, any positive offer regardless of how small is an improvement over nothing at all. In the short-term and from the perspective of a single transaction it makes sense to accept an unfair offer. However, this may not be a rational choice if we are more concerned with long-term survival than short-term gain.

Intuitive Choice

Measuring and describing conscious and unconscious neurobiological activity is a breathtakingly vast undertaking that many researchers estimate will take more than a generation of research to address. The discovery process will involve analyzing the functional requirements and sets of operations that make up the tasks associated with particular choices, identifying changes in neural pathways, systems, neural populations,

²⁴ See for example, McCabe, et al. (2001), Sanfey et al. (2003), and Stucco & Fum (2007).

and cell activities that are involved in performing these operations, isolating the physical and social factors in the environment that influence neurobiological activity, and modeling how all of these activities are organized and governed.

However, one thing that is clear at this stage is that to understand thinking and choice we will need to address the mind-body problem as a mind-body-environment problem. If in fact our behavior is governed by spontaneous neurobiological order as Hayek (1952) proposed over fifty years ago and contemporary research suggests, where might this order come from? If one accepts my argument for homeodynamic choice based on an intuitive understanding of our circumstances, than it may be more useful to think of human choice as a complex, adaptive sensory system with action potential that is inextricably linked to a physical and social context (Figure 3). Because our perception of this context is partly real, partly remembered, and partly imagined, intuitive choice may be as likely to be ruled by what Keynes' dubbed "animal spirits" as it is by utilitarian logic and we will be better off if we design our institutions accordingly.

And so we return to Madison's assertion: to govern ourselves in a way that is true to our natures, we must focus equally upon understanding the capacities and processes of human nature and systems of polycentric government. Unfortunately, we know as little about how spontaneous polycentric systems work as we do about human thinking and choice.²⁵ Given the diversity of human nature and human order, we have our work cut out

²⁵ Vincent Ostrom (1972) attributes the first reference to polycentric systems to Polyani (1951: *The Logic of Liberty*), who drew a distinction between deliberate or directed order and spontaneous order. Note that Polyani and Hayek were close colleagues and the complementary nature of this work by Polyani and Hayek's work on sensory order (1952). Extending Polyani and his own work with Tiebout and Warren, Ostrom argues that polycentric systems are an example of spontaneous order that is self-generating and self-governing. He identifies a number of examples of polycentric systems that have relevance for exchange-related thinking and choice including markets, coalition formation, and the selection of political leadership. Polycentric systems as distinct from hierarchical or codified systems, have many centers of decision making that are formally independent of each other but operate under the same general system of

for as. But rather than striving to find the most efficient way to organize and govern ourselves, we may be better served if we focus on finding ways to achieve interoperability. Each individual and every society has its own internal order forged by heredity and experience that is not easily remapped: it may not be an order that we are accustomed to or wish to become accustomed to. Progress (not to mention survival) may very well depend upon our ability to design and implement institutions that permit cooperation when warranted and peaceful co-existence in default mode.

rules, which provides a framework for ordering relations within the system. Ostrom theorizes that polycentric systems have no center, no central or dominate power, no coordinator and no integrator. However, these are empirical questions that have not to my knowledge been systematically examined.

Figure 1: The Central Nervous System

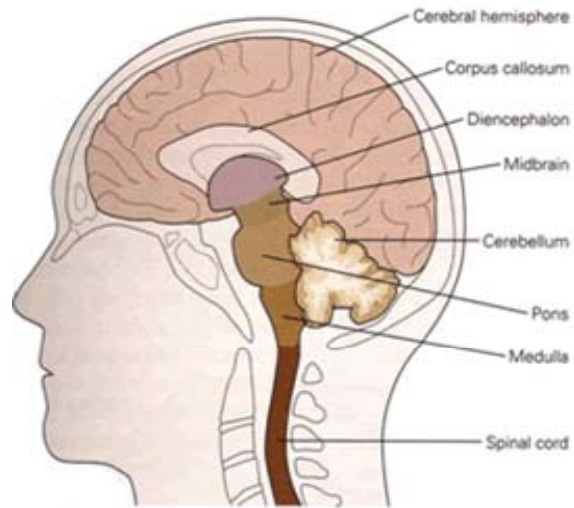


Figure 2: Homeodynamics

QuickTime?and a
decompressor
are needed to see this picture.

Figure 3: Intuitive Choice

QuickTime?and a
decompressor
are needed to see this picture.

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